

Task Management : Approach to Problem Solving and Its Relation to the Scrum and Agile Software Development Method

Maria Susan Anggreainy, Alvin Putra Sulaiman, Calvin Mathew and Kezia Eka Tirta

Computer Science Department, School of Computer Science, Bina Nusantara University
Jakarta 11480, Indonesia

E-mail : {maria.anggreainy, alvin.sulaiman, calvin.mathew, kezia.tirta}@binus.edu

Abstrak

Task management is the activity or process of identifying, planning, visualizing, monitoring and evaluating work over a period of time. Usually in carrying out these activities, you will first identify which work is important and urgent. Once planned, visualized, and worked on. Each job is monitored to what extent the work has been done or the progress of the work. This study explores ways to manage such tasks in projects, with scrum and agile software development methods. The mobile application created has several features to help users manage tasks well and help implement the scrum method more easily.

Key-words : agile, scrum, sprint, task management, mobile application

Abstrak

Manajemen tugas adalah aktivitas atau proses mengidentifikasi, merencanakan, memvisualisasikan, memantau, dan mengevaluasi pekerjaan selama periode waktu tertentu. Biasanya dalam melakukan kegiatan tersebut, Anda akan terlebih dahulu mengidentifikasi pekerjaan mana yang penting dan mendesak. Setelah direncanakan, divisualisasikan, dan dikerjakan. Setiap pekerjaan dipantau sejauh mana pekerjaan telah dilakukan atau kemajuan pekerjaan. Studi ini mengeksplorasi cara untuk mengelola tugas-tugas tersebut dalam proyek, dengan metode pengembangan perangkat lunak scrum dan tangkas. Aplikasi mobile yang dibuat memiliki beberapa fitur untuk membantu pengguna mengelola tugas dengan baik dan membantu mengimplementasikan metode scrum dengan lebih mudah.

Kata-kunci : tangkas, scrum, sprint, manajemen tugas, aplikasi bergerak.

Introduction

In this era of globalization and digitalization, people have more tasks, and are required to be more productive than previous generations, given the growing population and increasingly fierce competition. To be productive, one arguably needs to do their job well. With the increasing number of tasks, often people feel confused to take notes and organize their own tasks, especially if the tasks are done together or in teams. This “task management” thing should be considered a must-have skill in this era. Even though it is important, the majority of the society lacks this skill and it can deliver a much bigger problem than not being able to finish tasks on time. Considered as a lack of responsibilities, decreased trust, and lost jobs are some of the possibilities that might happen when we are not able to manage our task or schedule properly [1].

Then, recording using conventional methods or

notes is also sometimes difficult and quite lazy things to do, especially by the millennial generation, then other problems such as forgetting to bring notes to a to-do list, it is difficult to edit to-do list notes, and it does not has features that can be offered through the convenience of technology such as assigning an assignment to someone. Not just difficult and make people lazy to create their to do list, using conventional methods such as physical notebook also can make our world be a worse place to live, because of it uses of paper, and paper uses from tree means there will be less tree in our earth, causing so many things such as global warming and many other bad thing.

All the problems above are the start of the “Centang” application. “Centang” is created to help people with organizing the to-do list they have and all the tasks they have to work on. “Centang” works as an application where the user can edit, organize,

delete, and add their to-do list, just as people created their to-do list in their physical notebook, but easier to edit, delete, and organize. “Centang” also helps people with some big task that can’t be done in a day, that should be broken to some smaller task. This helps come in a way that they can break their task as small as they want, so hopefully that can help the user to get the big task done. Not just that, “Centang” also helps to organize the team’s work, by the feature to assign some tasks to other people that also have the “Centang” application. Last but not least, “Centang” has the reminder features that are surely not there in the physical notebook.

The best thing about “Centang” is this app can be accessed through the mobile phone. Nowadays, people usually bring their mobile phone almost everywhere they go, like the office, home, public places, etc. This makes cents always in people’s pockets, so everywhere someone remembers there is a task or things they want to add to their to do list, they can always add it through their phone, everywhere, anytime, as easy as chatting with their friends or girlfriend. This makes the excuse like forgetting to bring their notebook won’t exist anymore, because “Centang” will always be there with them.

Many studies also said that people will use and open their phone at least thrice a day, which means that people will always check their phone, and all the notifications come in. This makes “Centang” help through the notification, the things they will always check, to remind people about the task they should do, and decreasing the percentage of people forgetting to do their job, or even do some task past the deadline. Not just by notification, but through “Centang” that always be there for them, in their phone, hopefully can create a habit that they always open “Centang” apps before they start the day, so they know what to do that day, and will make them more productive to use their time, if they have so many task to do that day.

Lastly, The existence of “Centang” also hopefully can reduce people to using their physical notebook, because by reducing the use of a physical notebook, this means solving a lot of bigger problems, not just by productivity. This bigger problem is global warming, greenhouse effects, and etc. Reducing the use of physical notebooks can reduce the use of paper, and reducing the use of paper means saving a lot of trees, so “Centang” hopes that by the creation of this app, all the dangers and problems like global warming will be significantly reduced.

Hopefully, through all the easy and convenient “Centang” created, this app can help people that were so lazy to create their do to list, now want to create their to do list. Also, for all the people that lack skills such as management, task management, or schedule management, “Centang” will be there to help them solve all the problems. Also, “Centang” wishes that this application can help people to get their job done, be more productive, make life easier,

and help save the earth by reducing paper used by people to create their to-do list in their notebook.

Research Methodology

Agile Manifesto for Agile Software Development was signed in 2001 by noted software developers, writers, and consultants. The purpose of this software development is to show a better way of developing software by combining a philosophy and a set of development guidelines. Agile software engineering focuses on individuals and interactions, working software, customer collaboration, and responding to change[2]. This type of software engineering is important especially as an alternative to conventional software engineering and it has been demonstrated to deliver successful systems quickly[3]. The work product of agile software engineering is a “software increment” where development is allocated into some range of time which is also called as sprints. Agile adopts the customer as a part of the development team and works to eliminate the “us and them” attitude that continues to pervade many software projects, recognizes that planning in an uncertain world has its limits and that a project plan must be flexible[4]. Nowadays, many companies around the world use this method, even if they have to face so many problems during the transition. People and organizational culture are some of the problems in the transition process.[5] But the method has its strength so it is widely used around the world. Even though not every project is conducted in an agile way, the numbers are increasing considerably [6].

Scrum is one example of agile software development. Agile and especially Scrum are based on the philosophy that software takes on a life of its own, constantly being improved, extended, and enhanced, and these changes can be delivered in hours, rather than weeks, months or years.[7] Principles of scrum are consistent with the agile manifesto and are used to guide development activities: requirements, analysis, design, evolution, and delivery[8]. Scrum finally made its position in the literature of the software industry. Scrum specializes in project management where a self-organizing team is developing a software in increments or usually called sprints. Scrum started with planning and ended with review[9]. For each software process pattern, scrum consists of a set of development activities such as backlog (a prioritized list of project requirements), sprints (work units), and scrum meetings[10]. The strength and pain of Scrum is that you are forced to adapt it to your specific situation[11]. There are a lot of ways to plan a scrum software development. It can be multi level planning consisting of portfolio planning, product planning, release planning, sprint planning, and daily planning. There are also some principles in scrum planning.

Scrum Planning Principles :

1. Don't ever assume we can get a plan right from the start
2. Starting or up-front plan should be helpful not excessive
3. Planning option should be still open until the last responsible moment
4. Adapting and replanning are more focused than conforming a plan
5. Manage the planning inventory
6. Keep an eye on smaller and more frequent releases
7. Learn fast and pivot when necessary

In scrum planning, there are some mandatory steps to do:

1. Create a scrum project
2. Create user stories or tasks and backlog
3. Create sprint (consider the range time and priority too)
4. Development execution
5. Schedule the sprint planning meeting
6. Schedule meeting for review
7. Repeat

Scrum, in the first place, is created as an answer to old software development methods. It is created to increase agility and productivity of the development team. But how is this better than the others? Here is why: [13]

1. Improved customer satisfaction

In Scrum methodology, user and product owner are considered as the addition to the development team members. They are in charge of giving constant feedback to the programmers. It also dissolves the border between user and programmers. As a result, the user and product owner should have the sense of being involved. This makes them give more useful and realistic feedback to the programmers, creating more user-centered applications.

2. Achieve better quality

As there are many brains involved in the project, multiple paradigms are also created during the thinking and development process [14]. From the technical, economical, to usability perspective, all of these are created and discussed. This should make the end product to be more satisfactory from multiple perspectives, creating the perfect product.

3. Lower production costs & reduced risk

Comparing with the other traditional methods, Scrum has lower production costs in the long run because of the well-planned development and analysis [15].

4. Decreases time to market

Scrum enables the production team to act more agile. This means that the team and the program is resistant to changes. Scrum also allows the team to adapt rapidly with any condition on the market. As a result of these, the application can be delivered faster. The process of doing updates and feature addition also takes less time.

5. Enhanced collaboration & communication

As mentioned in the first point, constant feedback between user, product owner, and development team is the key to achieve successful Scrum. This method increases the amount of feedback and involvement from the user and product owner.

Result and Discussion

The result of this paper will be an application that will be used to monitor tasks and manage them. To achieve this result, we will be using the scrum framework. Our scrum team consists of 3 people in total, in which we will follow scrum framework steps including making the product backlog, doing daily sprint meetings, etc.

A. Product Backlog

The product backlog in Table 1 describes the features of the application that meet client requirements along with the estimated time span and priority level.

B. Sprint

Scrum sprint is a fixed-length event of 2- 4 weeks, in this sprint there will be a daily sprint in which the team will discuss any progress that has been made from the product backlog, see Table 1. While making this application, we decided to do 8 total sprint.

Table 1: Product Backlog

Sprint	Backlog	ET (Hour)	Priority
1	Sign in/up with google account	6	High
2	Add new task	6	High
	Add administrator	4	Low
	Add description	4	Med
	Add deadline	4	High
	Set as repetitive task	4	Med
	Add collaborator	4	High
	Set task priority	4	Med
3	Add new sub-task	5	High
	Assign collaborator to sub-task	4	High
	Add separate deadline to sub-task	4	Med
	Add separate reminder to sub-task	4	Med
4	Create List View from the task	10	High
	Sort the task based on dates	6	High
	Create navigation to detail page from list view	6	Med
	Sort the task based on collaborator	8	Med
	Create calendar view	12	High
5	Create feature to choose months and year in calendar view	6	Med
	Create navigation to detail page from calendar view	6	High
6	View task detail	8	High
	Edit previously made task	8	Med
	Delete previously made task	8	Med
7	View unfinished task	6	Med
	View task that is in progress	6	Med
	View unfinished task and passed deadline	6	Med
	View finished on-time task	6	Med
	View finished task but passed deadline	6	Med
8	Logout	4	High
	Set passcode	6	Med
	Set notification	6	Low
	Add Feedback	4	Low

Sprint 1

Sign in/ up with google account

1. Connect Centang with Google Firestore Fire-base (0.5 hour)
2. Enable authentication method with Google account (0.5 hour)
3. Design and implement UI for sign in/ up (2

hours)

4. Implement and integrate Google authentication
5. Algorithm to the interface (2 hours)
6. Do unit testing for current feature (1 hour)

According to the estimated hour of each task, the current sprint will take 6 hours in total, or almost 1 office day (8 hours). This number may increase to at most 5 working days if there are big problems during the execution, as this is the first sprint so lots of initial adjustments are needed. Figure 1 shows the estimation time to complete sprint 1 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

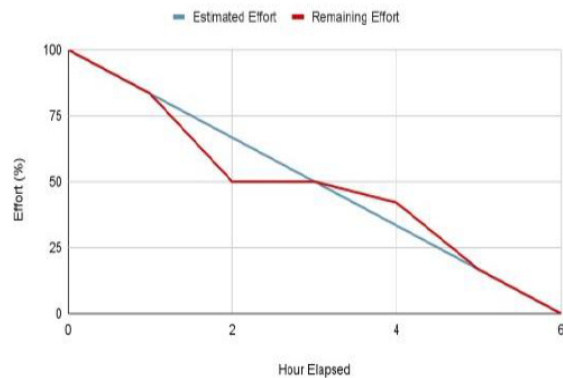


Figure 1: Sprint 1 Burndown Chart

**Sprint 2
Managing Task**

1. Add new task (6 hours)
2. Add administrator to each task (4 hours)
3. Add description to each task (4 hours)
4. Add deadline to each task (4 hours)
5. Set chosen task as repetitive task (4 hours)
6. Add collaborator to each task (4 hours)
7. Set task priority (4 hours)

According to the estimated hour of each task, the current sprint will take 30 hours in total, or more than 3 office days (8 hours). This number may increase to at most 5 working days if there are big problems during the execution. Fig2 shows the estimation time to complete sprint 2 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

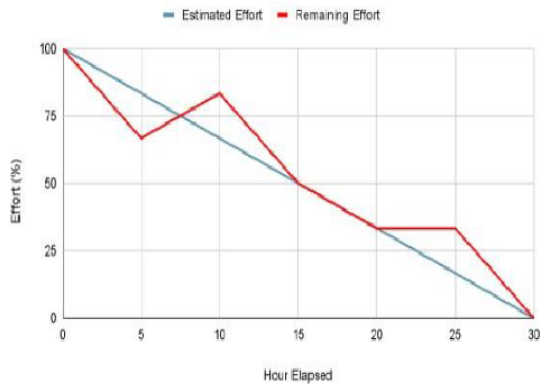


Figure 2: Sprint 2 Burndwon Chart

Sprint 3

Managing sub-task

1. Add new sub-task (5 hours)
2. Assign collaborator to sub-task (4 hours)
3. Add a separate deadline to sub-task (4 hours)
4. Add separate reminder to sub-task (4 hours)

According to the estimated hour of each task, the current sprint will take 17 hours in total, or more than 2 office days (8 hours). This number may increase to at most 5 working days if there are big problems during the execution.



Figure 3: Sprint 3 Burndwon Chart

Sprint 4

List View

1. Create List View showing all tasks (10 hours)
2. Sort tasks based on deadline date (6 hours)
3. Show task detailed information (6 hours)
4. Sort tasks based on the collaborator(s) involved (8 hours).

According to the estimated hour of each task, the current sprint will take 30 hours in total, or around 3-4 office days (8 hours). This number may increase a little bit, but should not exceed 4 office days. Fig4. shows the estimation time to complete sprint 4 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

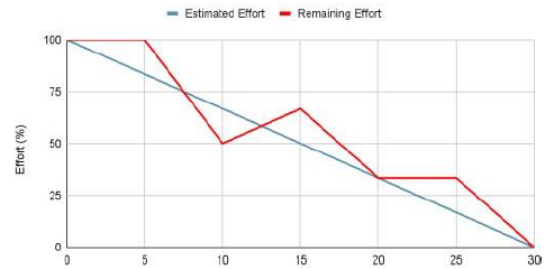


Figure 4: Sprint 4 Burndwon Chart

Sprint 5

Calendar View :

1. Create calendar view (12 hours)
2. Create feature to choose month and year in calendar view (6 hours)
3. Create navigation to detail page from calendar view (6 hours).

According to the estimated hour of each task, the current sprint will take 24 hours in total, or equal to 3 office days (8 hours). This number may increase to at most 5 working days if there are big problems during the execution. Fig5 shows the estimation time to complete sprint 5 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

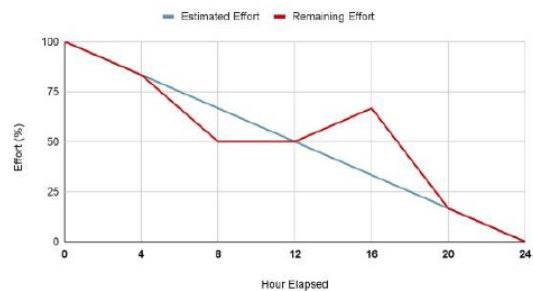


Figure 5: Sprint 5 Burndwon Chart

Sprint 6

Manage task detail :

1. View task detail (8 hours)
2. Edit previously made task (8 hours)
3. Delete previously made task (8 hours).

According to the estimated hour of each task, the current sprint will take 24 hours in total, or equal to 3 office days (8 hours). This number may increase to at most 5 working days if there are big problems during the execution. Figure 6 shows the estimation time to complete sprint 6 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

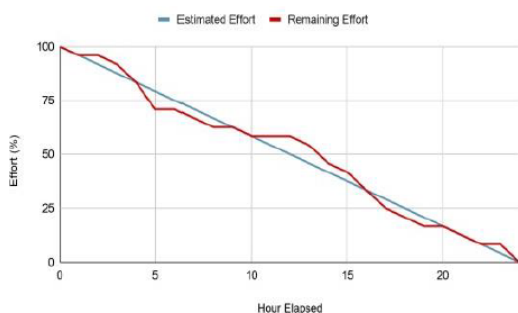


Figure 6: Sprint 6 Burndwon Chart

Sprint 7

Task overview :

1. View unfinished task (6 hours)
2. View task in progress (6 hours)
3. View unfinished task and passed deadline (6 hours)
4. View finished on-time task (6 hours)
5. View finished task but passed deadline (6 hours)

According to the estimated hour of each task, the current sprint will take 30 hours in total, or more than 3 office days (8 hours). This number may increase to at most 5 working days if there are big problems during the execution.

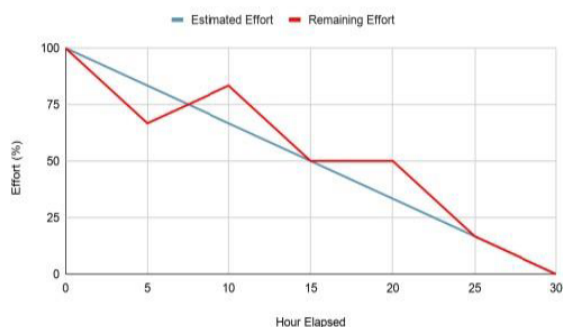


Figure 7: Sprint 7 Burndwon Chart

Figure 7 shows the estimation time to complete sprint 7 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

Sprint 8

Setting page:

1. Logout google account (4 hours)
2. Set passcode to protect application data (6 hours)
3. Set notification as a reminder to do the task (6 hours)
4. Add feedback to improve the application (4 hours).

According to the estimated hour of each task, the current sprint will take 20 hours in total, or less than 3 office days (8 hours). This number may increase to at most 5 working days if there are big problems during the execution. Fig8 shows the estimation time to complete sprint 8 (shown by the blue line), and the remaining effort or time to finish the sprint (shown by the red line). By comparing the red against the blue line, the sprint has been completed with no backlog left.

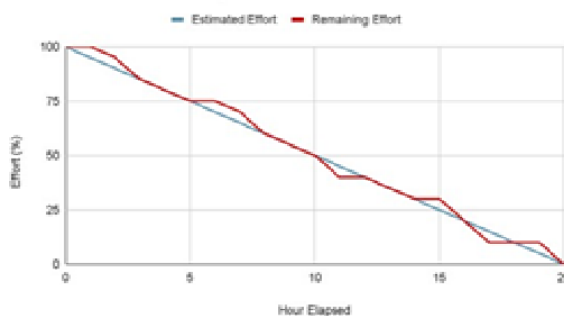


Figure 8: Sprint 8 Burndwon Chart

C. Interface

For the application design, “Centang” choose blue as its fundamental color. Before start the application, there will be welcome login page (can be seen in Figure 9), After login success, we will directing to form to do list (can be seen in Figure 10). And then as we see, there are floating buttons to move to other menu, but before we click the navbar, let’s click the add (+) button first (can be seen in Fig 11).



Figure 9: Welcome Page

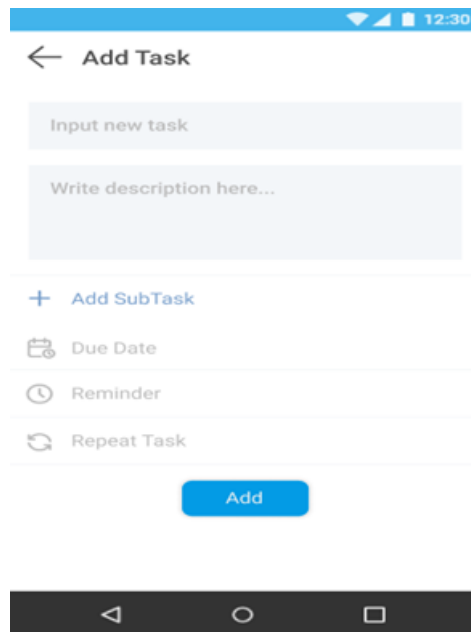


Figure 11: Form Add Task

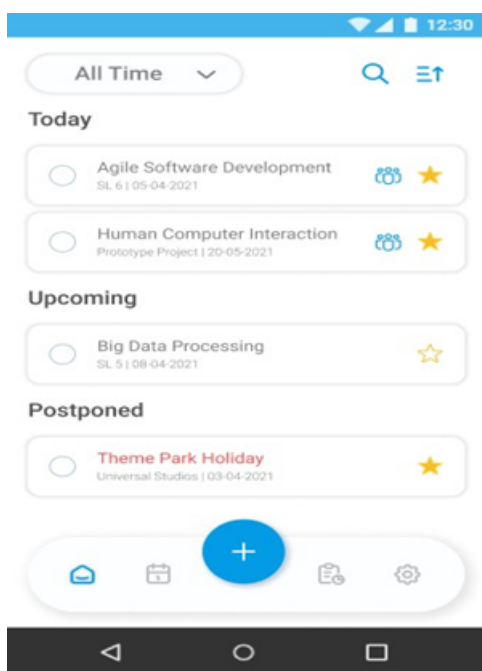


Figure 10: Form To Do List

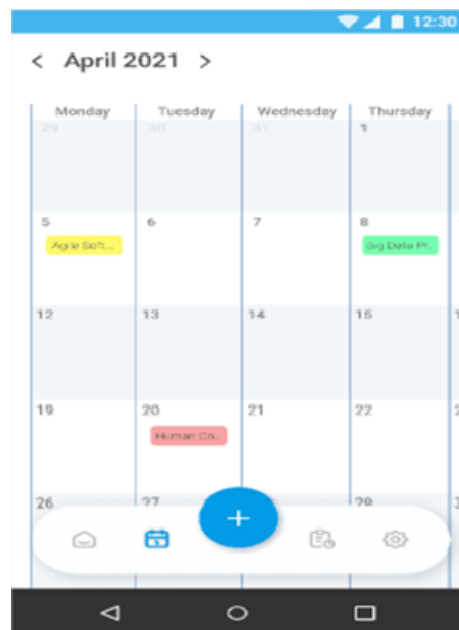


Figure 12: Form Calendar

Conclusion

Scrum principles, from backlogs, roles, and meetings, based on our development experience, are proven to be important in both speed and accu-

That page is used to add the task or to-do list which is the main point of the app. And then, for the other menu, if we click the calendar icon it will shows our task (it can be seen in Figure 12).

racy. They act as reference and motivation to keep focusing on the tasks in every sprint. Although we encounter some accelerations and decelerations, overall the project is able to be completed within the desired time. Accelerations occurred when the

actual execution is easier if compared to the estimation. While decelerations occurred mostly because of slight requirement feedback and minor bugs. Scrum has minimized the occurrence of bugs - major bugs do not occur at all (or still perceived as small due to incremental yet iterative nature of Scrum method) and minor bugs do not occur too much

References

- [1] B. Victoria, D. Brinda, G. Nathaniel, F. Peter, G. B. Daniel, D. Nicolas, "What a To-Do: Studies of Task Management Towards the Design of a Personal Task List Manager", vol. 6, no. 1, pp. 7, 2004.
- [2] Ma'arif, Muhamad Yusnorizam and Hafifi Yusof, Mohd Fikri and Mohd Satar, Nurhizam Safie, "The Challenges of Implementing Agile Scrum in Information System's Project", Jour of Adv Research in Dynamical & Control Systems, Vol. 10, 09-Special Issue, 2018.
- [3] Maximini, D., Maximini, & Rauscher, "Scrum Culture", Springer International Publishing AG, part of Springer Nature. pp 3-4, 2018.
- [4] S. P. Roger, R. M. Bruce, "Software Engineering: a Practitioner's Approach", (8th ed.), McGraw-Hill Education. pp 68, 2015.
- [5] G. Imran, J.A.N. Dayang, D. Siva, S. Ahmad, "Emerging Innovations in Agile Software Development", pp 26.
- [6] M. S. Mark, "Secure, Resilient, and Agile Software Development", Crc Press. pp 3, 2019.
- [7] M. Dominix, "Scrum Culture Definition", Springer, Cham. pp 3, 2018.
- [8] S. P. Roger, R. M. Bruce, "Software Engineering: a Practitioner's Approach", (8th ed.). McGraw-Hill Education. pp 78, 2015.
- [9] S. Astha, G. Divya, "Scrum : An Agile Method", vol. 2, no. 6, pp. 182-190, 2014.
- [10] S. P. Roger, R. M. Bruce, "Software Engineering: a Practitioner's Approach", (8th ed.). McGraw-Hill Education. pp 78, 2015.
- [11] Kniberg H., "Scrum and XP from The Trenches", (2nd ed.). InfoQ. pp.2, 2015.
- [12] Maximini, D., Maximini, & Rauscher, "Scrum Culture", Springer International Publishing AG, part of Springer Nature. pp 33-36, 2018.
- [13] T. K. Ahu, E. Esra, "A New Way of Management : A Scrum Management", International Journal of Commerce and Finance. vol. 4, Issue 2, 2018, pp. 108-117, 2018.
- [14] Maximini, D., Maximini, & Rauscher, "Scrum Culture", Springer International Publishing AG, part of Springer Nature. pp 153-155, 2018.
- [15] H. Michal, O. Nikolaus, "Scrum in Practice : an overview of Scrum adaptations", Proceedings of the 51st Hawaii International Conference on System Sciences. pp 5445-5454, 2018.