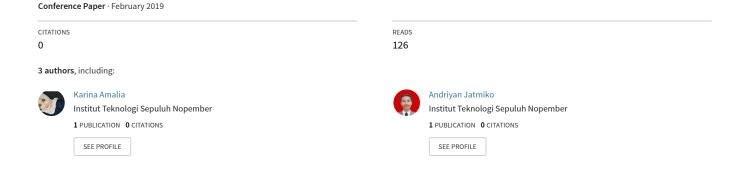# The 2 nd International Conference on Informatics for Development 2018 Impact of Change in Software Development Project Management Method on Human Resource Behaviour: Case Study in…

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Impact of Change in Software Development Project Management Method on Human Resource Behaviour: Case Study in PT. SVM

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Abstract— **System Development Life Cycle (SDLC) method changes in an organization can occur due to the encouragement of various internal and external factors. These changes have certain stages in accordance with the culture or habits of the company's HR. The purpose of this study was to know the stage of changes and the factors driving and inhibiting the changes of SDLC at PT SVM. So that, it could be analyzed the impact of the method changes for the project done. In this study, the authors used the Lewin's Framework to analyze HR behavior on SDLC changes from Waterfall method to *Scrum* method. Techniques for the data collection or information were FGD and personal interview with PT SVM. The results of this study indicated that the stage of changes made by PT SVM were in accordance with the Lewin's *Framework*.**

Keywords-Management Changes; Lewin's Change Theory; Waterfall to Scrum

I. INTRODUCTION

PT SVM is an information technology consultant and developer company established in 2004. Currently, it has offices located in Surabaya and Jakarta supported by competent, innovative, and professional young experts with experience in their fields. SVM has focus areas in the Education and the Government sectors. SVM company has several teams consisting of spiderman, P-man, X-man and Flash teams. The author cooperated with PT SVM especially the P-man team which acted as a source of data and information for this research. In the process, PT SVM used one of the SDLCs to develop an information system that was going to be created. At first, SVM used SDLC Waterfall as a reference in working on the projects. Working on the project by using SDLC Waterfall was done through several stages and sequentially, so that Waterfall was also known to have linear properties [1].

The problem occurred when using the Waterfall method was at the time it entered the testing phase, it was very difficult to go back and changed something in the concept stage. To change something, you had to go back or repeat the early stages of working. In Waterfall, it is usually assumed that the team has almost perfect information about the project needs, solutions and system goals to be created [2]. Therefore, from some of these constraints the SVM company sought a solution and found an SDLC method that was considered better than Waterfall, Scrum. Scrum is the latest method in software engineering [1]. From the changes in SDLC in the company, the author conducted a study to find out the stage of changes that occurred in the behavior of existing human resources in the SVM company. Based on the formulation of the problem, the author applied the 3 stages of Kurt Lewin's change model, namely Unfreezing, Moving / Changing, and Refreezing [3] [4]. With this model, it is expected to be able to find out more about the driving and inhibiting factors of changes, in accordance with the stage of changes made by PT SVM. In addition, it is also possible to know the impact of the changes in the method for the project. Thus, with this research, it could be concluded what steps must be carried out in implementing changes in accordance with the Lewin Framework. The advantages and disadvantages at the time of the changes can be used as a reference when the changes will occur again.

II. LITERATURE REVIEW

Literature review of this study was taken from indexed literature journals. Researchers selected the journals so that theories obtained supported the title and topic of this study.

A. Changes

Everyone experiences a paradigm of change in everyday life, from a simple detour on the way to work to change the entire product line in a factory setting [5]. Understanding and managing changes are the latest topic [6]. Change requires an understanding of why change is needed, what changes are proposed, how change will be implemented, who is affected, and how it impacts. Change is something that cannot be avoided because of external impulses and because of internal needs. Change also has the opportunity to face resistance (rejection), both individually and organizationally, because it is the most difficult thing to be able to abandon old habits that have been firmly attached. Lewin argues that a successful change process involves three steps: Unfreezing, Changing / Moving, and Refreezing [3] [4]. This approach is relevant to understanding how organizations are formed and grow in response to new behaviors (such as Scrum) from individuals who inhabit the organization [7].

1) Unfreezing

The first phase, unfreezing, is characterized by a decrease in current conditions, forcing the organization to re-examine its objectives. Unfreezing or searching is a stage that focuses on creating motivation to change [4]. Individuals are encouraged to replace old attitudes to attitudes that management wants. Unfreezing is an organizational effort to overcome individual resistance and group suitability. The search process is a power struggle between the driving factors and the inhibiting factors for change from the present situation. To be able to accept a change, an individual's readiness is needed. This search is intended so that someone is not bound by the desire to defend himself from the present situation, and is willing to open up.

2) Changing / Moving

After it becomes clear that something must change, new ways are developed to facilitate these changes. In this second phase of change, people accept new directions and actively take part in them. Time and communication are important aspects to make this phase successful [7].

3) Refreezing

Refreezing is a freezing stage where the changes are stabilized by helping workers integrate behaviors and attitudes that have changed into a normal way of doing things. This is done by giving workers the opportunity to show new behavior and attitudes. These established attitudes and behaviors need to be frozen, so that they become new norms that are acknowledged. With the formation of new behaviors and attitudes, it is important to consider whether it is still in line with the ongoing development of the environment or not. Sustainable change in the environment, still requires the organization to continue to change and develop as well. If it turns out that changes are needed again, then the Unfreezing process will be restarted [4].

B. Software Development Life Cycle (SDLC)

One of the basic things in software engineering is SDLC, which describes activities that occur from the formation of a system to the stage of system implementation and maintenance. At SDLC there are two classifications of methods, traditional and modern or agile. Waterfall and Vee are examples of traditional methods, while Scrum and Kanban are examples of Agile methods [2]. This report explained the Waterfall method and the Scrum method.

1) Waterfall Method

In the late 1950s, there were many trial-and-error methods in managing software development projects. The initial method used to find better ways to collect and define project needs, analyze problems, and carry out systematic implementation of problems. Some methods were incremental and iterative and others were linear and sequential, known as "Waterfall Models" [1]. The Waterfall Model assumes that the team has almost perfect information about project needs, solutions, and ultimately goals. Therefore, changing needs is not driven, and becomes an expensive affair.

This method is carried out in 7 main stages, namely, (1) System Requirements; (2) Software Requirements; (3) Analysis; (4) Design; (5) Implementation; (6) Testing; (7) Operating [1]. This method uses a systematic and sequential approach that starts at the level of software requirements to the operating level. It is rigid and does not easily respond to changing needs.

2) Scrum Method

In 2001, Agile was introduced in response to the failure of the Waterfall software development methodology. One model based on the Agile movement is known as Scrum. Scrum, based on the empirical process control theory, is an iterative and incremental project management methodology for controlling risk and optimizing project predictability. Transparency, inspection and adaptation that defined below, are three important factors in the Scrum process [2].

- Transparency: The process must be visible to everyone involved in the project.
- Inspection: Scrum users must frequently check Scrum modules to detect problems at an early stage.
- Adaptation: If the project manager determines that some aspects of the project are unacceptable and outside the scope of the project, the process can be adjusted to avoid further problems.

It should be noted that it is very important to apply these factors during different project development phases.

III. METHODOLOGY

The methodology contained the stages of this research. The stages began with data collection 1, literature search and title determination; data collection 2, writing of results and discussion.

A. Data Collection 1

The data collection phase 1 was conducted using a Focus Group Discussion (FGD) method. We did this activity when

the first time visited PT SVM. This FGD was conducted at the SVM office on April 24th, 2018. There were several teams in PT SVM, but in this study we worked together specifically with the P-man team. P-Man team had 11 members consisting of several divisions. When we conducted the FGD, there were only 7 members present because the other members were on official trip. The list of questions that submitted was as follows:

a. What is the variation in requirements that causes the project to expand?
b. Is there any limitation to meet the changing needs that are requested by the client?
c. How to overcome the resource shortages?
d. How do bureaucratic procedures work with banks (external parties)?
e. How to maintain system security against financial data in order to gain the client trust?

B. Units

The second data collection stage was carried out by interview. This interview was conducted to complete the data of the problems that had been selected in accordance with the literature obtained. This interview was carried out in two ways, directly and indirectly. Direct interview was conducted by visiting the SVM office and met the P-Man team leader, Ms. Via. The following is a list of questions asked:

a. When and what project was the last time using the Waterfall method?
b. What are the advantages and disadvantages of the project that still uses the SDLC Waterfall?
c. What is the project that is currently being worked on when SDLC changes from Waterfall to Scrum?
d. What are the disadvantages and advantages that occur when the SDLC Waterfall change into Scrum?
e. What is the reaction of SVM colleague when there is a change?
f. What are the processes or stages of changing SDLC?
g. What did PT SVM leaders do to make changes?
h. What are the driving and inhibiting factors for SDLC changes?

Next, indirect interviews were conducted via Whatsapp platform. Indirect interviews were carried out because of the limitation of working time. In conducting the interviews via Whatsapp, we conducted a personal interview with each member of P-man. The list of questions asked is as follows:

a. What are the advantages and disadvantages of SDLC Waterfall?
b. Do you accept or reject the introduction of the Scrum method?
c. How did you react when you accepted or refused?
d. Are there any obstacles from SVM colleagues when there is a change?
e. When the author conducted an FGD, it was said that PT SVM had made changes from Waterfall to Scrum, the changes were done slowly, how was the process or stage?

f. What is the advantages and disadvantages of the Scrum method compared to the methods used before?

C. Results

At the results stage, data that had been obtained from the FGD and personal interviews with PT SVM employees, especially the P-Man team, would be displayed. The data displayed was processed data to make it more concise and in accordance with what is needed.

D. Discussion

We analyzed the results obtained from the previous stages. From the literature obtained there is a model of Lewin's change in the form of a framework consisting of three stages, Unfreezing, Moving, Re-freezing. The data presented in the results would be identified into the 3 stages of the Lewin Framework.

IV. RESULTS

The results explained the data obtained from the stages of data collection. Based on the data collection, it was known that PT SVM had made SDLC changed from Waterfall to Scrum. The change certainly had supporting and inhibiting factors. All of the research data were outlined based on the following questions:

A. Advantages and Disadvantages of Waterfall

According to the employee A, the advantages of using Waterfall method were fewer meetings and static method flow, so there was no much change in meeting client needs. Employee A said that "Less meeting and static program flow did not change much". In line with the opinion of employee A, employee B revealed that the Waterfall method process was in sequence, so each process would not be overlapped. Employee B stated "Excess Waterfall, has a sequential process from analysis to support each process has with its specifications, so the system can be developed according to what was desired (on target) and each process cannot be overlapped".

Besides, employee C stated that there was a lack of Waterfall when the process was delayed relatively. He explained "When using the Waterfall project, it will be more delayed if, at the end, there is a flow that changes from the results of the initial survey. Same with the Waterfall, it is all done before it is given to the client". In addition to employee C, employee B believes that, "The disadvantages of the process tends to be long and long, the use of expensive methods usually requires a lot of research and also supporting research to develop systems by using the Waterfall method. In Waterfall, a good management was needed because of the development processes that result in the next stage". Employee A also stated that "Changes cannot be accommodated, if at the time of socialization there was a discrepancy between the programs made with conditions during socialization, the program might not be used." Employee A also added that "Conflict disputes often occur and blame each other when using Waterfall."

From the results of the interview, it could be concluded that the advantages of Waterfall were in the sequence process and fewer changes in project needs. While the lack of Waterfall was the execution of the project exceeded the deadline because if there was a change, it must repeat the process. Conflicts which often occurred and disputes within the team were also a lack of Waterfall. The possibility that the program might not being used also increased because consulting with clients only occurred at the end of the Waterfall stage.

B. Strengths and Disadvantages of Scrum

We conducted interviews to get the advantages and disadvantages of Scrum. According to employee D, the Scrum method was superior to the Waterfall method. Employee D said that "Scrum was indeed superior to Waterfall". Employee D added that each member knew more about the focus of his work. He stated that "By using the Scrum method, all members know what the focus of their work, the completion of the project can be estimated, and making the project completion can be an evaluation material when the sprint is finished. So, the obstacle to the completion of the project can be known and a solution for a better future can be found". When using the Scrum method there was no more conflicts and disputes in the team. This was reinforced by the opinion of employee A, who said that "When using the Scrum method, the team members help each other to complete the given task and there is no one blaming each other when using SDLC Waterfall".

In addition, to reveal its strengths, employee A also mentioned the shortcomings of the Scrum method. Employee A said that "When handling a lot of projects, sometimes, the clients requests suddenly. It will make the other project also backward settlement. So, at the beginning it disrupted the sprint plan, this happens because this Scrum is good to be worked on a product rather than a project ". In line with the opinion of employee A, employee D revealed that "the lack of Waterfall is it takes a longer process because every changing process was in a difficult path".

Based on the explanation, it can be concluded that the Scrum method was generally superior to the Waterfall method. However, Scrum also had drawbacks in which the working process on the project would be longer because the demand of client needs increased each time. So, it was needed to conduct consultations.

C. Driving and inhibiting factors for changes

In making changes, surely, there were driving factors and inhibiting factors of these changes. The advantages of the Scrum method were one of the factors which driving the change in SDLC to PT SVM.

V. DISCUSSION

PT X changed SDLC method from Waterfall to Scrum as it aimed at improving the company's performance in the execution of the project. There were several stages occurred in that problem. The author classified the stages that were mentioned in a project before into Lewin's Framework covering three stages, they were Unfreezing, Changing / Moving, and Refreezing. Lewin states that those who have these three steps will be success in the changing process [3] [4].

A. Unfreezing

Unfreezing is the awareness step to all parties in the organization about the important of changes. The first stage focused on individuals or groups who resisted the changes. Project manager should provide them better information to understand the changes and give them expectations about the changes that was about to be implemented.

In this stage, PT SVM identified the factors that could help them. One of the factors related to PT SVM was SDLC Waterfall which they used previously; it had some weaknesses such as the difficulty in accommodating. At the time of the socialization, if there was a discrepancy between the projects made under the conditions during the socialization, the bad possibility's project would not be needed. In addition, the process that often brought up conflicts between personnel that each individual would blame each other.

In 2016, the head of PT SVM published the new SDLC method, Scrum. Unlike the Waterfall which was linear, Scrum was done with a module system which no one could repeat the work from the initial phase. Through the process of using the module, all members could provide any information being worked on. Another benefit would be gained if it was done through modules which were able to determine the factors that become obstacles in the completion of the project so it could be used as material for the construction of the next module. From the advantages of Scrum, it was finally decided to make changes because Scrum was considered to be able to save working time.

Initially there were employees who were reluctant to change because they felt comfortable with SDLC Waterfall, especially the employees who did not use to work with deadlines. However, the introduction of Scrum was first carried out by SVM leaders themselves so there were a number of factors that caused SVM employees felt unwilling if they resisted the changes.

B. Changing / Moving

Changing/ Moving is a concrete step to strengthen the driving force and efforts to weaken the forces of repulsion. In this second step, there were clearer choices for the repellent power.

The application of the new SDLC method (Scrum) took very long time. The initial steps taken to initiate change were through forming teams. The leaders of PT SVM formed 4 teams when they were converted to the Scrum method, which were Flash, Spiderman, X-Man, and P-Man. The SVM

leadership initially applied Scrum to a single team. After the team felt that the Scrum method was more effective and efficient, the team presented the results to all SVM employees, with the plan that the other members would be interested. Then the implementation was carried out on all teams at PT SVM. Besides, to support this change, the leader also assigned several of their employees to attend a seminar on Scrum.

SDLC changes occurred slowly, it means that the new projects were done by using Scrum. Then if the team began to adapt, Scrum was implemented little by little in the old project that was running.

C. Refreezing

Refreezing is a step in implementing the new behaviors to be evaluated and if it strengthened the changes, it was needed to be adopted. Scrum had activities consisting Backlogs, Sprints, Scrum Meetings, and Demo. Backlog is a list of needs that become as client priorities. Sprint is a work unit that is needed to fulfill the integrity that has been set during the Backlog in accordance with a predetermined time as well, with no Backlog count. Scrum meetings were routinely conducted per day for evaluation of what were done, existing obstacles, and completion targets for the next meeting material. The demo was the submission of software increment to the client, demonstrated and evaluated by the client.

Every change must have problems, as well as PT SVM. The obstacles found at PT SVM were seen in the activities of Scrum Meetings and Sprints. At PT SVM Scrum Meetings or called as the Daily Scrum. As the name suggested, Daily Scrum was conducted every day to familiarize the use of the Scrum method as at the Daily Scrum a sprint check was performed to measure the performance that had been done by each employee. The Daily Scrum was a meeting that discussed what each team member did by looking at sprints. The obstacle was changing the habits of employees who initially worked directly on their tasks had to follow the daily Scrum. The leader of PT SVM overcame this by applying the Daily Scrum which was supposed to be every day into every two days. As the employee felt familiar, the leader changed the Daily Scrum schedule to once a day. As it was as the same as sprints in which the sprints schedule was done once every two months and then once every two weeks.

The application of Scrum in PT SVM could be said to be successful or fully successful when each employee had succeeded in changing their habits to participate in Scrum activities according to the schedule set by PT SVM. If the SDLC Scrum method was changed to a newer method in the future, the Unfreezing process could be done again.

VI. CONCLUSION

Creating change is a structured approach to manage the transition of individuals, groups and organizations from the present to the desired future. A successful organization is an organization that can manage change which these changes can become as a earning for all members of the organization or company. Strategic steps that can be taken in managing change are understanding the steps that must be taken when implementing these changes.

The stages of change carried out by PT SVM were identified in the Lewin Framework consisted of three stages. The first stage was Unfreezing when PT SVM made an awareness of each employee about the need to change SDLC from the Waterfall method to the Scrum method. The second stage was Moving/Changing in which this stage required diagnosis and new models of behavior to be explored and tested, by forming a team and applying Scrum to a team then showing the results to all employees. The third stage was Refreezing, which creating new rules for new methods such as Daily Scrum for SVM employees every day before starting to work.

Based on the analysis that has been done, the author is able to draw the conclusion that the stages of SDLC changes from Waterfall to Scrum with Lewin Framework have been successfully applied to PT SVM since it involves three stages, Unfreezing, Changing / Moving, and Refreezing. The advantage of creating change for organizational development is that the organizations can develop their potentials related to the competence and capability of the organization. The stages of change done by using the Lewin Framework can be used as a reference so that organizational changes are well-planned and become the anticipatory for possible resistance. Therefore, the development of organizations or companies can be taken as a superior to competitors.

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