The application of an improvement opportunity model in the reduction of the response time of users from the User Trial program

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Abstract. High-performance teams differentiate themselves by implementing efficient processes that prioritize timely, high-quality deliveries while minimizing resource waste. Achieving this requires analyzing the entire process, identifying key issues, and developing effective solutions. These efforts directly affect the team backlog, as well as the development team, project management decisions, and due dates. When users report problems, addressing them quickly is essential. However, users may not always possess the technical knowledge to provide issue details, causing delays in response time. To mitigate this, technical teams should adopt a standardized communication model that facilitates user comprehension and decreases response time. Using a model based on identifying improvement opportunities can help teams address problems more efficiently, saving time for both team members and the development team. In this research, we demonstrate how a model for identifying improvement opportunities helped one technical triage team to reduce the time needed to assign the issue to the correct technical component to fix then, since identifying the problem, defining the action plan, and the analysis of the results, aligning lean wastes and project management knowledge areas.

Keywords: Lean Project, Process Improvement, Improvement Opportunities Diagnosis Model.

1 Introduction

To achieve maximum efficiency and better market share, organizations resort to different methodologies and tools to raise their level of competitiveness [1, 2]. Thus, as in all other areas of an organization, project development and management have also been essential players in developing actions to improve organizational efficiency, from prospecting a project to its delivery to the end customer [3, 4].

It is in this context that the management strategies advocated by the lean philosophy, or lean manufacturing, are applied, which seeks to identify operational inefficiencies through the investigation of existing waste in the most different processes, with the aim of eliminating them or reducing their impact. processes, as evidenced by the literature in the field [5–9].

Thus, adopting the lean philosophy to boost the activities of a project management process has been widely used, seeking to eliminate process inefficiencies and create value for customers [10–12].

The objective of this study is to optimize the fault screening process based on the diagnostic model using a Lean Project approach to drive process improvements, time reduction, and resource optimization.

2 Theoretical Background

2.1 Lean Thinking and Lean Culture

Lean thinking can be understood as a way to produce more using fewer resources, meeting the customer's needs in the best possible way, making activities more satisfactory, eliminating waste, and adding value to the flow of this product [13, 14]. [15] argues that waste is any resource used in the product chain which does not add any value or benefit to the customer, whereas reducing waste would reduce production costs and increase product value.

[16] argues that the lean philosophy transformed, starting with the Toyota production system (TPS), being renamed lean manufacturing or lean production, until the current status, known as lean thinking, from the works of different researchers [3, 13, 17, 18]. According to [14], the seven production wastes are defined as: (i) Overproduction, which consists of producing more than necessary; (ii) Waiting, which is related to the existence of idle resources within the chain; (iii) Transportation, which is associated with unnecessary movement of materials or resources; (iv) Processing, which is related to efforts that do not add value to the product; (v) Inventory, which involves excess material, whether raw material or finished product; (vi) Handling, which is associated with the movement of personnel and machines that do not add value; and (vii) Rework, which is related to recovery activities for parts with substandard quality.

Another aspect of the lean philosophy is the one that deals with the principle of continuous improvement, where, for its application, a series of tools that help and transform the leaner process was developed over the years and applied in most different organizations and processes [19 –23]. For [16], lean techniques and tools are consolidated, but this cannot be achieved without the effort and involvement of people since they need to be attracted, formed, committed, mobilized, and compensated for the achievement of results, where, for the author, people are a key element in this whole process.

As it is a philosophy that seeks team involvement, organizational culture becomes a key element in this process [3, 24, 25]. According to [26], implementing the lean philosophy will only be successful if aligned with the organizational culture. Still, according to [24], the evolution of an organizational culture consistent with the vision

and strategy leads to an effective and competitive organization. In this context, the work developed by [27] contextualizes the chronological evolution of lean and its advances with respect to constant contemporary demands, showing the versatility of the philosophy when confronted with social and technological advances [28–30].

2.2 Lean Project Management

In Project Management, applying the Lean philosophy aims to improve project management processes, such as lean construction, lean manufacturing, and lean thinking [11, 31–33]. In this sense, in addition to eliminating waste, it aims to generate value since project management requires a large number of skills, such as the application of tools, techniques, and skills, and focus on achieving the goals expected by the client.

However, the search for improvements in project management causes a constant creation and updating of management methodologies. This diversity of methodologies is justified, as each one has specific benefits for each type of project, for example, the Kanban, waterfall, and Scrum framework methodologies.

The definition of projects can be observed from several perspectives. In this context, different authors agree that projects can be seen as a single event with a deadline that aims to meet pre-defined objectives and, for that, requires dedicated planning for its execution [34-36]. Still, according to [36], project management requires a large number of skills, such as the application of tools, techniques, and skills, and focus on achieving the goals expected by the client.

[37] classify projects into two categories: value-driven projects and plan-driven projects. Still, according to [37], Industrial projects, civil constructions, and equipment manufacturers are more suitable to the category of projects directed to the plan since there is an excellent effort in the project planning phase, and this planning is decisive in the success of the project. As for software, these are projects usually categorized as value-oriented because there are many uncertainties during the first steps of the project, so the greater focus in this type of project is on the value to be achieved.

3 Methodology

This section has described the set of techniques, procedures, and approaches that led the activities developed in this research to find a solution to the proposed problem.

Related topics will be shown: nature of the research, classification according to the objectives, way of approaching the problem; classification according to procedures; research universe and sample; procedures for data collection, procedures for data analysis, and research steps.

- The nature of the research can be classified as applied, as it aims to develop knowledge from the application of a diagnosis model of opportunity for improvements in failure management processes in the triage team
- The research develops theoretical depth on the topic addressed (exploratory) and describes the object of study, establishing the relationships between the variables (descriptive), where in this research, they are characterized by the relationship of

waste in processes versus area of knowledge in project management. For this reason, the objective of the research is classified as exploratory-descriptive.

- Through an exploratory character, the research seeks to understand the organizational processes and events existing in it, evaluating waste in the processes of triage of failures and impacts in areas of knowledge of project management. In this way, the approach to the problem is classified as qualitative.
- The classification procedures of this research begin in the bibliographical research stage, later in the documentary research, and finally in the action research. The bibliographic research is related to the consultation of books and academic works to enrich the research by highlighting authors and institutions that are references in the subject. The documentary procedure was characterized by studies previously carried out by other teams and previously achieved results, in addition to reports from participants of previous initiatives. Finally, action research allows the researcher to be actively involved with the triage team and its processes, participating collaboratively in the search for a solution to the problem.
- For the universe and sample of the research, the study was carried out in the triage team containing eight people and a project initially. Subsequently, the team expanded the practices in more projects to triage failures.
- The procedure for collecting data for this research consists of applying the improvement opportunity diagnosis model to the triage team, identifying opportunities for improvement in its process, and reducing impacts on important knowledge areas of project management. From then on, indicators could be defined that needed to be optimized with an action plan for two months.
- Procedures for data analysis: The data from the triage team were analyzed in a cyclical and exploratory way every fortnight to assess whether the actions defined in the proposed plan were helping the team to achieve the expected results.
- Research Stages: the research will be developed according to the flow shown in Fig. 1.

Fig. 1. Research Methodological Steps.

4 Results and Discussion

4.1 Definition of the triage team's value stream

The triage team is responsible for analyzing, addressing, and monitoring issues reported by users participating in the User Trial program. This program provides device samples to users before their launch to identify and reproduce problems from an end-user perspective. Once a problem is identified, the triage team performs an initial analysis before forwarding it to the appropriate tech team for resolution.

By utilizing the improvement opportunities diagnosis model (that helps to identify problems in the process, aligning with lean waste, the impact on knowledge areas of project management, and define action plans), the triage team started activities aimed at identifying areas for improvement within their processes. The first step involved defining the team's value stream, which begins with the reporting of an issue or failure by a user or device. This information is then collected through the user of automated log tools or manual input from the user, with the process concluding when the problem is successfully fixed by the technical team according to the reported issue. Fig. 2 shows the value stream defined by the triage team.

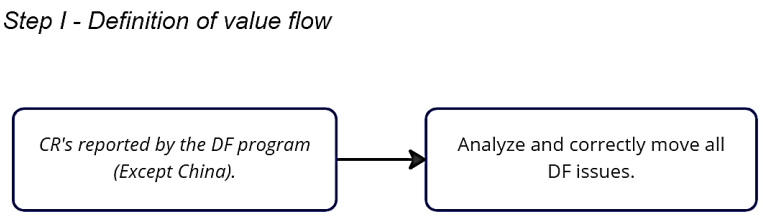

Fig. 2. Definition of the triage team's value stream.

The second step was identifying problems that directly impact the value stream identified in the first step. The question to be answered was: Which problems do we face during the execution of the value stream? The identified problem is shown in Fig. 3.

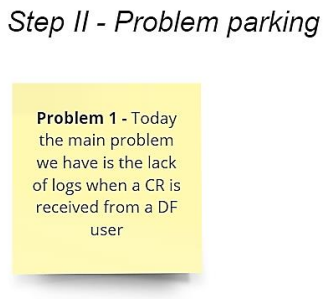

Fig. 3. Identification of the problem that affects the team's value stream.

Logs and information contained in change requests (CRs) are often insufficient for the tech team to analyze and fix reported problems. To address this gap, the triage team must contact the user who reported the bug and request additional logs. However, this process often results in a significant waste of time as users may take several days to provide the requested logs. Some users may not possess the technical knowledge to quickly collect this information, resulting in further delays. This delay in receiving detailed information on reported bugs can lead to an accumulation of CRs in the triage team backlog, thereby increasing the amount of time it takes to address the problem properly.

Using the improvement opportunities diagnosis model, the triage team analyzed problem number 1 and identified some waste in the stream, including waiting for information, unnecessary movement of information, and rework due to inaccurate problem assessment caused by a lack of information details. These events represent Lean waste and impact important knowledge areas of project management. Problem 1, which affects the triage team's ability to obtain detailed information and logs related to failures, highlights communication problems among stakeholders, leading to delays in problem resolution for the development team. Problem 1 shows that the triage team spends seven days to assign correctly an issue to the proper tech teams. Figure 4 illustrates the relationship between problem 1, Lean waste, and the impacted on project management knowledge areas.

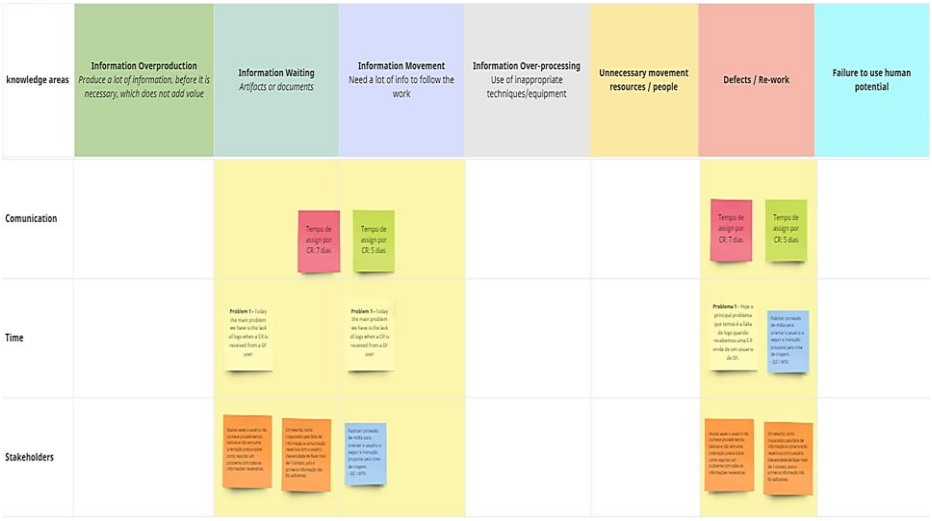

Fig. 4. Application of the improvement opportunities diagnosis model board for the triage team identify and detail the problem 1.

After detailing the problems that impact the value stream of triage team processes and their relations with the lean waste and the knowledge areas in project management, the next step was the definition of a series of action plan to mitigate the problem identified as described below:

1. The team observed that during the information request process, the users took a long time to answer due to the difficulty in understanding the technical step-by-step sent (by mail), which leads most of the population to postpone the answer or even not answer. Based on the product history that the team has worked on, it was identified that users took around seven days to answer the email providing the new information. As an action for this problem, the triage team created a series of self-explanatory videos for each type of log that was necessary to request to the user by using the most simplified and objective way. The videos were stored and organized in a web portal with easy access for all users. The initial expectation with this action was to reduce the user's response time to an average of 5 days.

2. Another observed opportunity was the creation of email templates with standardized requests to the users according to each type of failure encountered. Each team member used to write the email to request information using their own words. Soon, creating the email templates, it was possible to gain time during the information requesting process to the users, as it is shown in the example in Fig. 5.

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Hi,

Regarding this issue:

Would you please confirm if you are still seeing this problem? If so, Network team needs more logs to analyze the problem.

Please follow the instructions below and create a new logs in case the issue still reproduces:

1. open the collect log tool
2. go to config options
3. go to "setup system"
4. go to "mask_option"

After that, try to reproduce the issue and raise a new log.

Thanks in advance,
```

Fig. 5. Non-standard email template used by triage team members**.**

4.2 Publication of media on the portal and standardization and automation of the email sent to the contact

The results of the action plan were observed initially with only one product during an experiment conducted. In this experiment was added a label to identify all incoming problem reports that lacked information, as shown in Fig. 6. The purpose of this label was to distinguish the CRs with no information and to analyze the metrics related to them (such as time, duration, etc.). Once the user provided all the necessary information, the label was removed, and the CR time without information was recorded. This way was possible to create a routine to count the time when the CR was waiting for some details.

Fig. 6. Label template used to track bugs that are missing information.

One of the measures taken to improve communication was the creation of a media portal, which supported email communication and simplified instructions, as depicted in Figure 7. Analysis of labels added and removed from reported problems over two months revealed that the average user response time decreased from seven to five days. Following this period, the approach suggested by the model was shared with the team for application in their respective products.

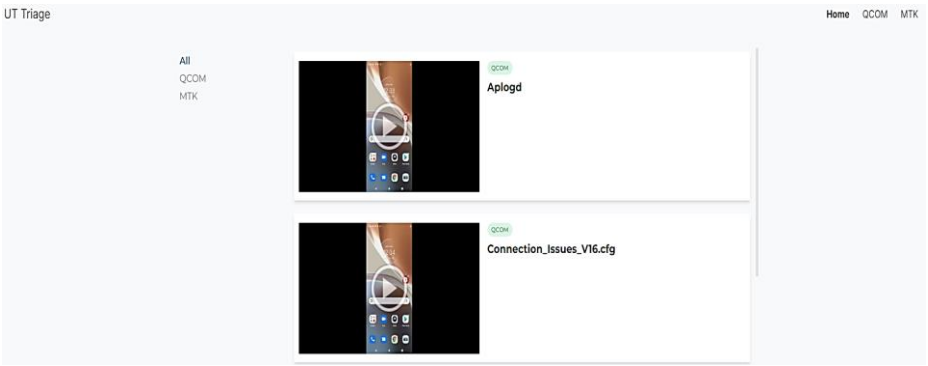

Fig. 7. Portal with media for user guidance to configure the log collection tool.

The team also implemented email templates, which resulted in a significant time gain during the communication process. The standardization of the email instructions was used by the entire team, and what used to be done manually and inconsistently gained a template and automation for sending the emails, as shown in Fig. 8. As result, it was observed that there was a 50% reduction in the time it took to send emails to users with clear and concise information.

Hi, {username}

The team is asking you to reproduce the issue and provide new logs since the logs reported are not enough for this case.
Please check this tutorial video [Link here] or follow the instructions below:

1. Go to App -> Settings -> Log information
2. Activate: Toggle to enable it
3. Max log size: Change to 200
4. Config file: Set " "
5. Apply the change
6. Trigger a new report right after capturing/reproducing the issue
7. Reply here sharing the new logs

⚠ WARNING:
These settings affect your battery life and device performance. So, do not report such issues while using this setting.
After testing, you can disable the logs.

For future reference, always use this log for network-related issues.

Fig. 8. Automatic email template created by the triage team.

The time-saving experiment utilizing email automation is depicted in Figure 9. The table below was filled by five volunteers who followed these steps: a chronometer was

initiated when the email composition started, and it was stopped once the email was sent. Two emails were sent - the first one was entirely manual, with the user's email, the content, and necessary attachments typed in by the user. In contrast, the second one used automation that automatically inserted the email address, text, and a link to the media portal. The data shows that the average time spent contacting the user was 1 hour, 8 minutes, and 6 seconds with automation, while without automation it was 1 hour, 59 minutes, and 54 seconds. This indicates a time savings of 43.21% with the use of automation.

	You can use the following CR for testing: IKSWT-21451		Sum		Average	
	with automation	without automation	with automation	without automation	with automation	without automation
Person 1	1:00:46	1:33:22	5:40:28	9:59:28	1:08:06	1:59:54
Person 2	1:13:35	2:05:37				
Person 3	1:03:17	2:26:42				
Person 4	0:58:53	1:17:02				
Person 5	1:23:57	2:36:45				

Fig. 9. Demonstration and comparison of results after using automatic emails by the triage team.

5 Conclusion

Nowadays, organizations are constantly seeking ways to optimize their internal processes and improve the delivery of value to their customers. To achieve this goal, they tend to focus on their internal processes and look for opportunities to enhance their efficiency. A study group was formed to create a transversal approach that would encompass all areas of the organization, including project and support areas, and stimulate process improvement.

To conclude the studies, a comparative analysis was conducted between the initial scenario of the object of study and the results obtained after the completion of the activities defined in the action plan. This analysis revealed two crucial points. Firstly, when the problem identified by the triage team was related to waste, it was evident that the negative impact of the problem was on the result delivered by the triage team at the end of the process. Secondly, when the problem and waste were linked to the knowledge area of project management, it clarified how to quantify waste within the project's flow. The team identified time wastage as a significant problem during the process.

At the end of the research, the team observed improvements and gains in the entire process they executed. The triage team had a well-defined process until that moment, but they had never questioned whether it was the best way to carry out the process or if there was a need for change. The team was aware of the delay in getting an answer from the users, but they had never applied a model that could identify and propose changes in different areas of project management knowledge, especially the time area.

After implementing the improvement opportunities diagnosis model, visible benefits and gains were observed. An internal movement was witnessed within the team, as all team members actively sought new opportunities for improvements. This model

proposes an integration between stakeholders in a common direction, which is to seek improvements for all the processes the team manages.

This study was limited to the internal triage team process, where the main result expected was to reduce the time to assign an issue to a tech team. The result was achieved after the improvements and actions, defined during the initial analysis using the model, to be applied by the team, but as future research, the improvement opportunities diagnosis model can be used in other contexts like project offices, purchasing teams, human resources as well as support processes inside the companies.

It is essential always to identify problems and areas for improvement in a process so that the team or the organization can work effectively. The result of a simple improvement can be reflected throughout the entire value stream, benefiting other teams as the necessary information moves more quickly from the beginning of the process, as was observed in the study. By continuously looking for opportunities to optimize processes, organizations can increase efficiency and deliver better value to their customers.

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