Human-computer interaction tests applied to the +LEITE app for android

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Abstract

This article describes the application of two human-computer interaction tests (IHC) in an Android application© called "+Leite", created to help small milk producers measure the efficiency of their production. One of these tests is called Heuristic Assessment which consists of identifying errors based on the 10 Nielsen heuristics (1998) and classifying them into levels (mild, medium, severe and catastrophic), according to the severity of this error. The other test is called the Cognitive Pathway that consists of the evaluator impersonating the application user and plotting a path to be followed to identify usability problems. In these tests, aspects (positive and/or negative) of the software are raised and, with the possession of these data, it is estimated to improve the application.

Keywords: Interface, Tests, Usability;

1. Introduction

With the increasing technological development, it is seen that cell phones are gaining more and more space in people's daily lives. According to Continuous PNAD Statistics - (National Continuous Household Sample Survey), 77.1% of the Brazilian population aged 10 years or older have a mobile phone for personal use. Due to the growing demand, many applications are being created to meet the needs of these users and, therefore, it is important that these applications ensure an interface that meets the user's needs in a simple way, without confusing them during use. This work presents the application of two HCI (Human Computer Interaction) tests, one of which is the Heuristic Assessment and the other is the Cognitive Pathway technique, which will

be applied in a mobile application for Android© called "+Leite", aimed at milk producers, in order to maximize their production. Therefore, it is important that the application is easy to use, so that users do not have problems when using it. In this way, the usability tests were applied, in order to find usability problems that could disturb users and make the tool less efficient.

2. Methodology

To perform the work, two usability tests were performed, one of which was a heuristic evaluation, with the purpose of detecting usability problems in the application interface and the other the cognitive pathway that is a technique used to verify if there are any potential problems for the user and try to predict where there will be interaction difficulties.

2.1 Heuristic Evaluation

The heuristic evaluation uses as a basis 10 heuristics, created by Jakob Nielsen (1998), and it is about guiding the evaluators to systematically inspect the interface simplify to detect complex problems and divide them into small areas, the concepts being:

- 1: System state visibility;
- 2: Correspondence between the system and the real world;
- 3: User control and freedom;
- 4: Consistency and standardization;
- 5: Support for recognition, diagnosis and recovery of errors;
- 6: Error prevention;
- 7: Recognition instead of memorization;
- 8: Flexibility and efficiency of use;
- 9: Aesthetic and minimalist design;
- 10: Help and documentation.

2.2 Cognitive Pathway

Cognitive Pathway is a technique in which an exempt evaluator walks paths through a given interface from the user perspective and verifies if there is any potential problem for it and tries to predict where there will be interaction difficulties. It should be performed by users (the target audience, or other people with characteristics like the target audience) and, if not possible, can be performed by a colleague or developer himself. The evaluation consists of answering 4(four) questions to the question that is testing the software, 3(three) at the beginning of each activity and 1(one) at the end of it [Leandro 2019].

The operation of the Cognitive [Silva & Barbosa (2010) and Baranauskas & Rocha (2003)] propose a sequence of four activities to apply this technique, being possible to verify according to the following table:

Table 1. Sequence of Activities for the application of cognitive pathway (Silva & Barbosa, 2010, p.323).

Activity	Task
Preparation	Identify user profiles; Define which tasks will be part of the Evaluation; Describe the actions necessary to accomplish each task; Get a representation of the interface, executable or not.
Data collection and interpretation	Traverse the interface according to the sequence of actions required to accomplish each task; For each action enumerated, analyze whether the user would perform the action correctly, answering and justifying answers to the following questions: Will the user formulate the correct intention? Will the user notice that the correct action is available? Will the user associate the correct action with the effect they are trying to achieve? If the action is performed correctly, will the user realize that they are progressing toward completing the task? Report an acceptable story about the success or failure to perform each activity that makes up the task.
Consolidation of results	Synthesize results on: What the user needs to know to accomplish the task. What the user should learn while performing the tasks. Suggestions for fixes for the problems encountered.
Results reports	Generate a consolidated report with the problems found and correction suggestions.

3. Results and Discussions

Two tests were carried out based on the aforementioned methodologies and through the discussions made between the applicators, the results regarding the usability of the application were obtained, where it was possible to observe many usability problems and it was also possible to observe that the heuristic evaluation test was the most pointed out errors, but the cognitive pathway test that pointed out the problem in more detail and where it gets in the way.

3.1 Results of heuristic evaluations

Using the concept of Heuristic Evaluation, tests were performed, which were applied by 3 specialists who have a good theoretical basis in the question of systems in a theoretical and practical way, and the results obtained were the following:
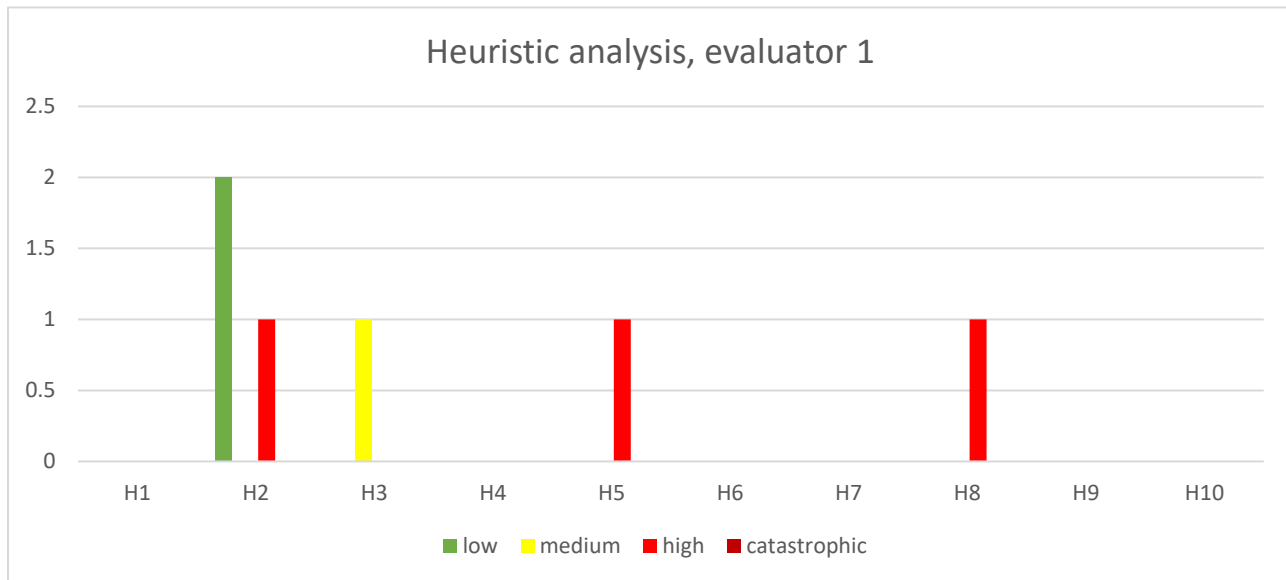

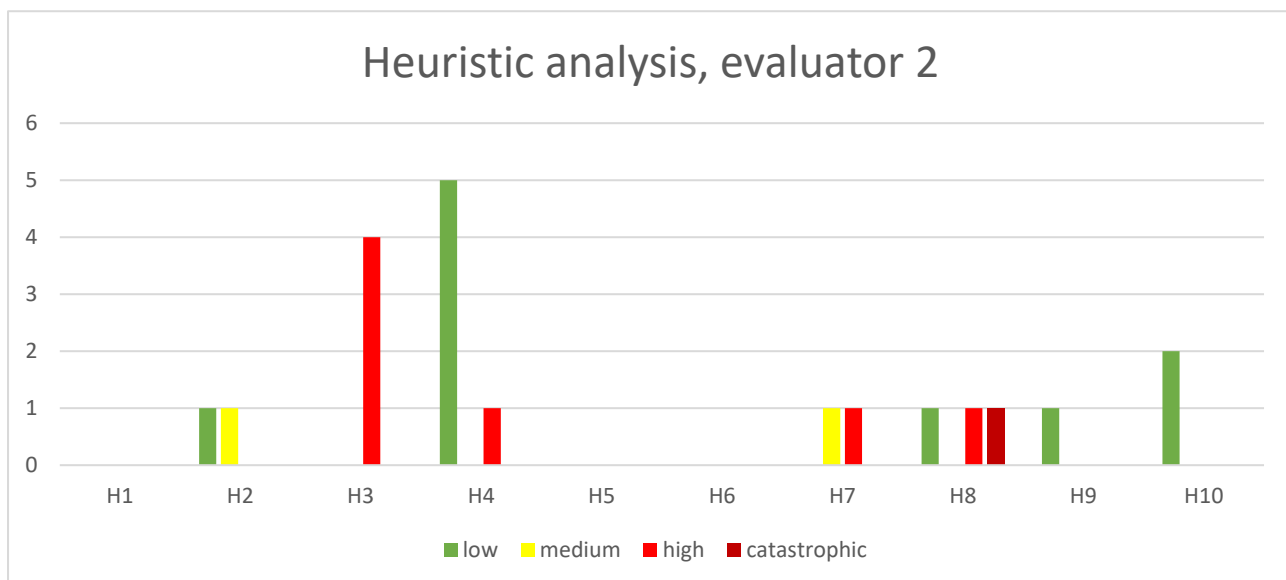Figure 1. Heuristic analysis, evaluator 1.
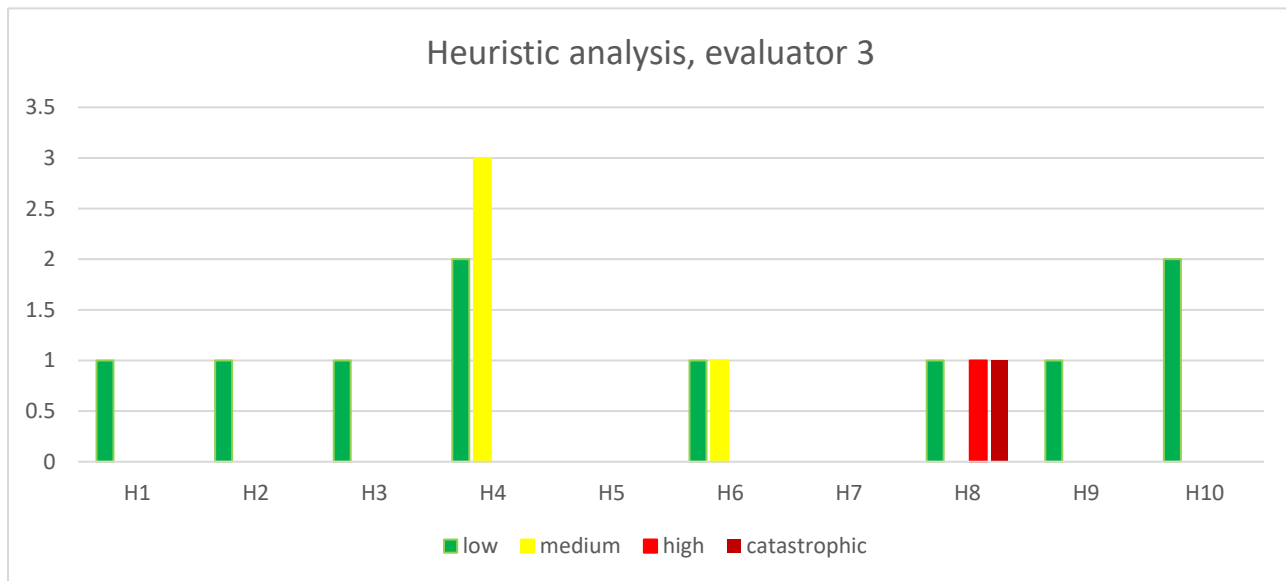

Figure 2. Heuristic analysis, evaluator 2.
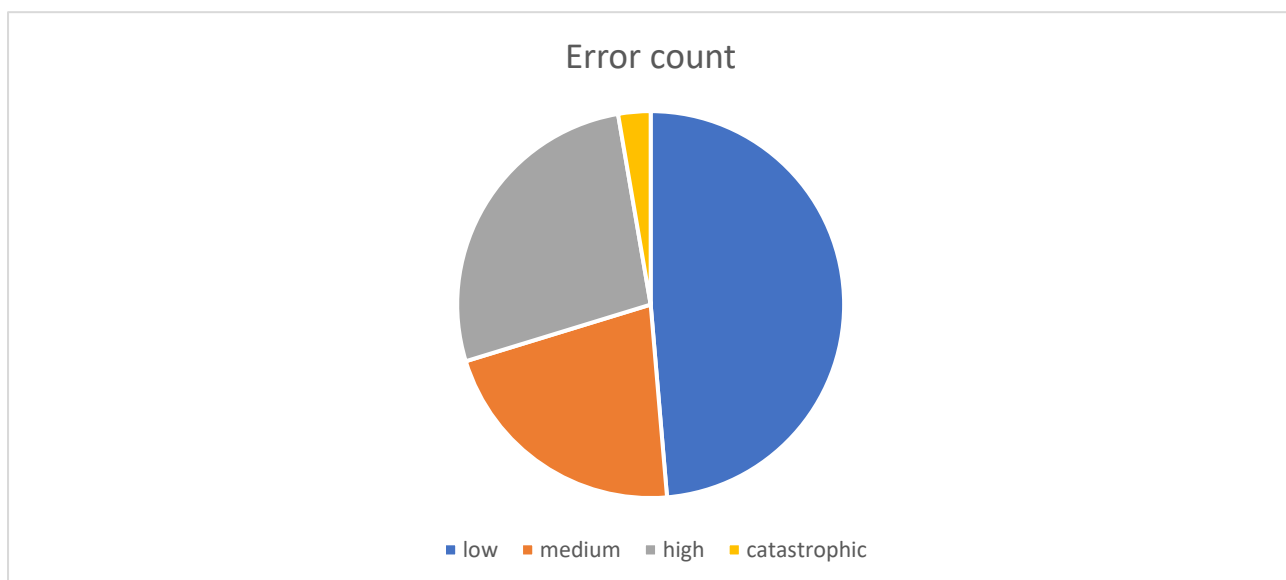
Figure 3. Heuristic analysis, evaluator 3.

Figure 4. Number of errors found.

3.2 Results of heuristic evaluations

Based on the table mentioned above in the Cognitive Pathway methodology, we started the preparation activity, we trace the user profile: Agricultural farmers who need to evaluate the efficiency of milk production of their cows in each property.

To perform these assessments, we suggest the following tasks: Register a property; register 3 cows, and of these, 1 has the date of the last delivery and body condition score 2.5, another will be recorded as "dry cow" and body condition score 3 and the last cow will have body condition score equal to 3.25, but no information about the date of the last delivery or if it is a "dry cow",   to add this information in the future; Carry out an evaluation of the property registered with the cows; Carry out a rapid assessment; And finally check and delete

from the evaluation history the evaluation that had been made in the previous proposed task. For the proposed tasks, the screens used are as follows:
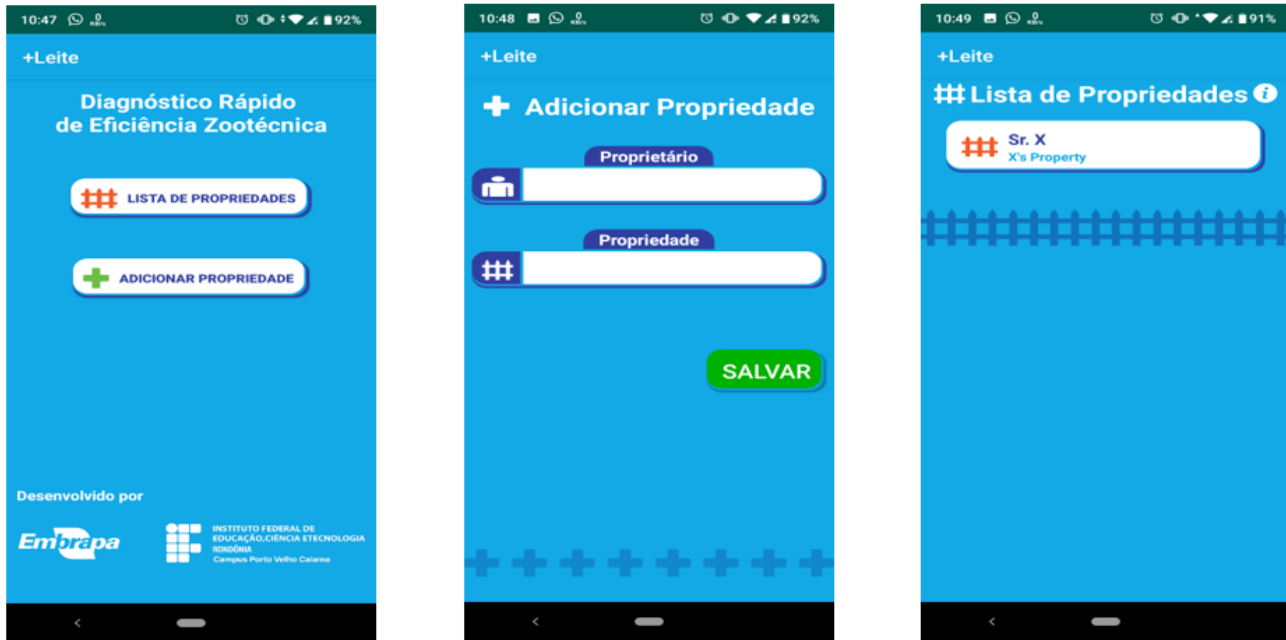

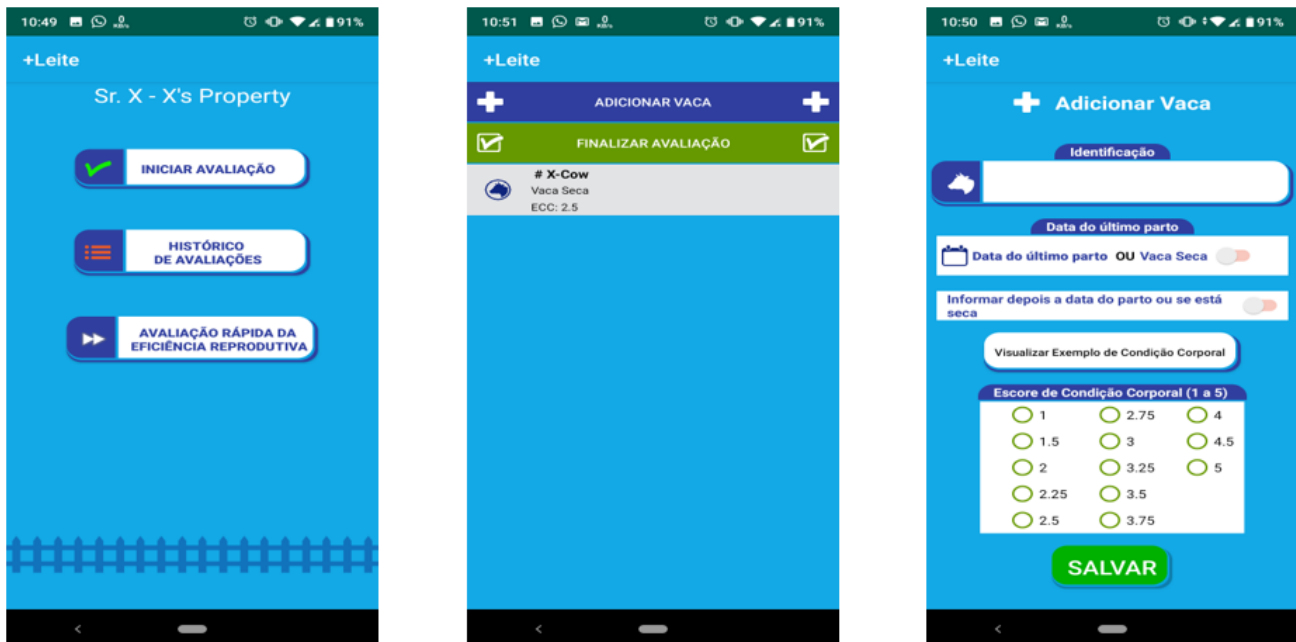Figure 5. Screenshots: Home, New Property and Property List.

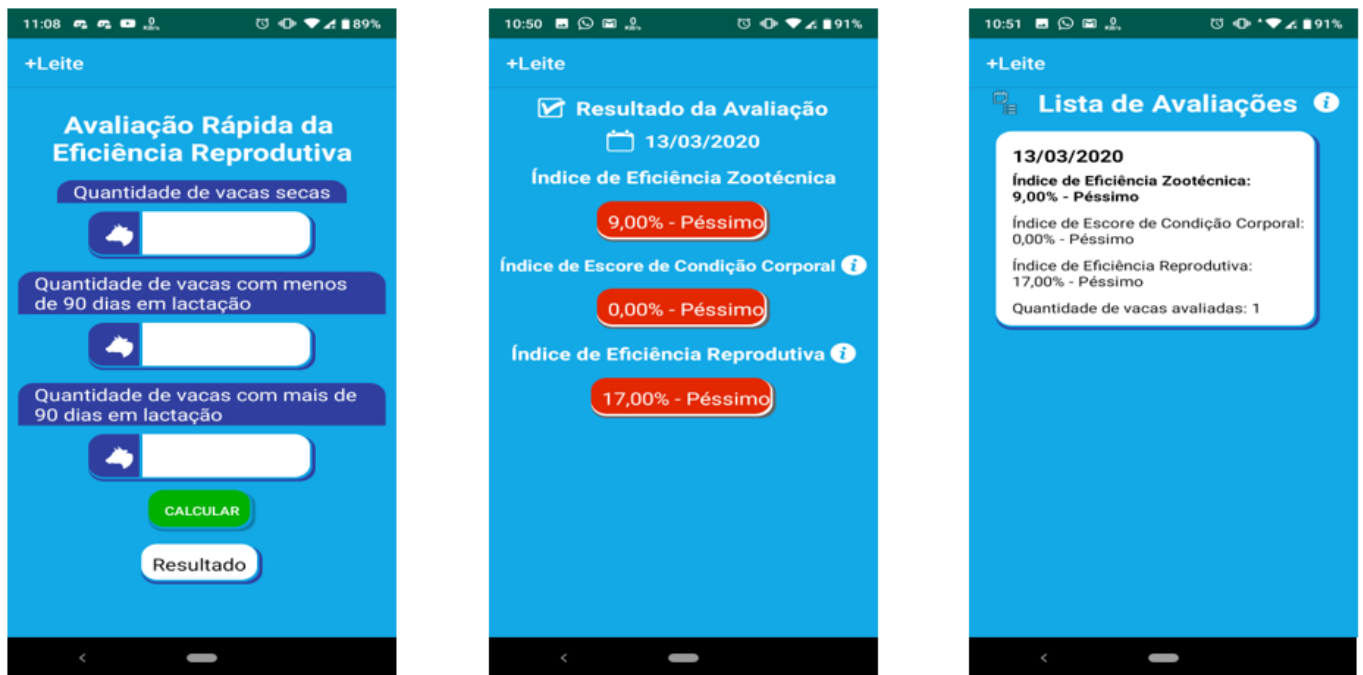Figure 6. Screenshots: List activities, Starts evaluation and Add Cow.

Figure 7. Screenshots: Quick Evaluation reproductive efficiency, Result of Evaluation and Historic Evaluations.

Based on these specifications the activity was performed with 2 people, to the test indicating in the creation of a new property, soon after he was redirected to the list page of existing properties to which he saw and selected the button that indicated his newly created property, after which he was redirected to the page to which it makes available 3 tasks, evaluation, evaluation history and rapid evaluation of reproductive efficiency. after a short period of time observing the interface, the start evaluation page was chosen to which showed a screen on which the only option available was to add a cow and added a cow to the cows in which it was needed in the activities, but it ended up taking a while for the user to understand how the question of inserting the date of the last delivery, because it was necessary to press the word or the calendar icon located on the page, other than this was all going in the normal way, after inserting the 3 cows, he carried out the evaluation, right after that he returned to the previous menu to perform the task of rapid evaluation, not having much difficulty in filling the fields and obtaining the results, then he went to the evaluation history option to check the evaluation that had been made and logo then delete it, it ended up taking a while for the user to figure out how to erase something in the application, since it was necessary to select and keep to appear the option to delete that history and with that the tasks implemented for the user to be completed were completed.

Based on the test then performed, a slight difficulty was observed in the question of understanding and clarity, which ends up generating certain difficulties in some tasks, and it is necessary to have an improvement in visual pair for a better interaction between users for the use of the application.

4. Final Considerations

In the work presented, it was seen that several errors with different levels of severity came to be found, being allowed by the fact that the applicability of HCI tests occurred, which generated a wider investigative range

of design properties, enabling and searches for new methods for an evaluation of the applicability in mobile devices, it also allowed an evolution in the level of perception of errors for selected to perform this task. Based on this research, it is seen that the application "+Leite", still has points to be worked aiming at a better interaction with the user. Some being on the issue of arrangement of functionalities and others within the lack of standardization and consistency of the application.

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