MOBILE APPLICATION BASED ON EXPERT SYSTEMS FOR DECISION MAKING OF MICROCREDIT REQUESTS. CASE STUDY

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ABSTRACT

The originality of this proyect is that it is the first bank that gives an immediate response to its clients that request micro-credits through the proposal of an application that helps decision-making based on expert systems in the requests of microcredits made by clients, thus reducing the waiting time that is normally four and up to six days, in addition to filling a endless documents that the client must submit as requirements in any bank and for the existing problem of not being able to evaluate a client creditily in the place of his micro business. The methodology that was used for the development was the agile SCRUM methodology, the same one that is attached to the project since each cycle is the functional delivery of a part of the project to the client. It was possible to reach the expectations set for the elaboration of the project: the mobile application satisfies the needs of the users, allowing to consult information online, which will be used for the analysis and evaluation of a microcredit application, taking into consideration that there is no tool in the area of microfinance that offers these services to the business advisor.

Keywords: request, microcredit, mobile application.

1. INTRODUCTION

The credit analysis process in Banco D-MIRO has been generated manually for years, as this was considered a strength due to the informality of microfinance. The little confidence in models generated for decision-making, added to everything that involves the analysis of a client's credit, for the approval of a credit operation. In addition, the need to document credit operations by taking as much documentation as possible is what has limited the development of microfinance.

The aspects that drive to generate this project are the problems that microentrepreneurs face when they have to close their business to go to a bank to apply for a loan, because that generates losses to it, in addition to the uncertainty of knowing if it qualifies or not and if the amount that the bank can deliver reaches to cover its investment needs.

Mobile applications are currently technological tools used to improve, facilitate and potentiate the activities that a person performs in their day to day, these are increasingly used by companies to generate added value to the service they provide, achieving a higher level of efficiency in its personnel offering fast and timely services, achieving with this the loyalty of its customers an important factor for the growth of a company [1], [2].

Mobile technology is a strategic ally for all companies, because it allows you to organize information quickly and have it available 24/7 (24 hours a day, 7 days a week). Likewise, mobile devices have become an essential part of our lives and allow to optimize and optimize response times [3], [4].

The objective of this research project is to develop a tool that allows to reduce response times, improve the level of productivity of a credit officer, improve customer retention by having more information at the time of the visit, which facilitates a credit operation is viable, helping in this way that Banco D-MIRO S.A. can optimize response times, customer satisfaction because it allows you to know immediately if the customer is subject to credit and improve the level of efficiency of a business adviser in the area.

2. PROBLEM APPROACH

2.1 LOCATION OF THE PROBLEM IN A CONTEXT

One of the biggest problems the bank faces when visiting a microcredit client is not having all the information necessary to carry out an efficient credit assessment and thus improve the response time and determine if a person is subject to credit or not. The uncertainty that can be generated in a client after the visit of the business advisor to not have at that time an answer on his request for microcredit is one of the factors that have generated the development of this research, since a microentrepreneur projects his investment and the growth of your business in this credit request added to this while currently delaying the response to the application submitted is what generates interest in the development of a mobile application to help solve this problem.

Response times for the approval of a microcredit proposal, can reach 4 working days which is currently a time that makes us lose competitiveness. The uncertainty of the client not knowing if he is subject to credit does not allow him to be free to apply in another institution if he does not qualify in BANCO D-MIRO, and he has to wait until he is given an answer within several days. See Fig. 1.

Knowing if the amount you are requesting is viable or if you qualify becomes vital since not meeting your need increases the loss of time in the client perceiving this as a bad service that can even generate losses of business opportunities for the client. To analyze the current problems, a survey was conducted to 51 credit counselors that make up the different agencies throughout the city that D'MIRO has, to consult the business department about the process they are currently carrying out to grant a microcredit to their clients.

3. OBJECTIVES

3.1 GENERAL OBJECTIVE

Develop a mobile application, with the use of open source tools that allow decision-making for micro-credit requests received in the area by business advisors, for the Banco D-MIRO S.A.

3.2 SPECIFIC OBJECTIVES

- Identify the problem through a survey of business personnel for the collection and analysis of information, as well as functional and non-functional requirements of the system.

- Design and develop a mobile application, which will allow obtaining the necessary credit information for the evaluation of microcredit applications taken in the area, by the business advisors for the Banco D-MIRO S.A.

- Demonstrate the functionality and operability of the system, through the approval of the proposal with the Zone Sub-Manager of Banco D-MIRO S.A.

4. METHODOLOGY

The SCRUM methodology [5] was applied for the development of the mobile application whose purpose is to make decisions according to the definition of expert systems since these are machines that think and reason as an expert would in a certain specialty or field [6] for requests for microloans received in the area by the business advisors for Banco D-MIRO SA, the roles involved in the methodology is the following: Scrum roles were designated for the designation of the activities that were carried out.
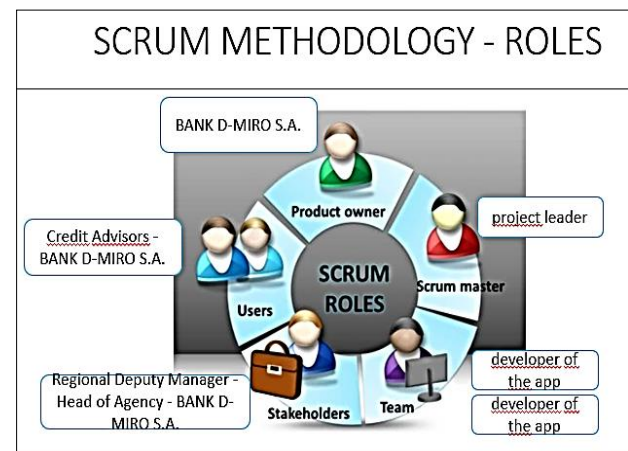

Fig. 1. SCRUM methodology of the project

Then the phases were established that had to be considered within the development stages of the application, which are:

- The design of the application allowed to consult if a client is a credit subject, by consulting diverse sources that include their recurring clients, in which the behavior of their payments is analyzed.
- Next, the client's data should be consulted online through a web service that connects to the Ministry of the Interior, to know if the client has a criminal record (the same as being positive, would be a reason for denial of the requested credit).

- Through the application, the client's credit situation was evaluated through the profit and loss statement where the client's payment capacity was calculated.
- The application had the capacity to suggest credit amounts through the analysis of the payment capacity and the quota that the client can cover.
- Through the application, the documents were stored digitally to the server when all the requirements were approved [7]. See Fig. 2.
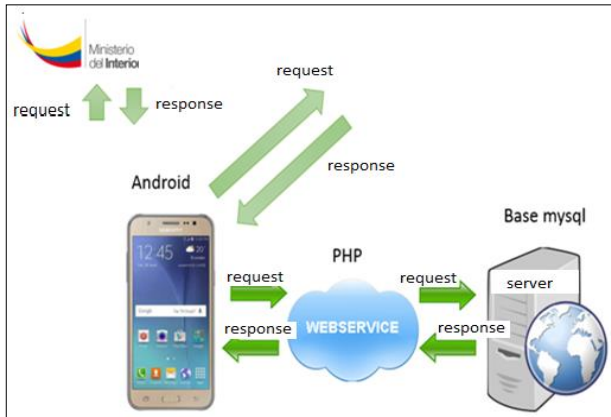

Fig. 2. Architecture of the mobile application

In the development of the proposal, other mobile proposals for SMEs were taken as reference [8], a development environment was presented that meets the technical specifications, the use of free software technologies that allow the coding of the application. The main tools used for development are:

- XAMPP
  - PHP 7.1.12
  - MariaDB 10.1.29
  - Apache/2.4.29
- Android Studio 3.0.1

See Fig. 3

Fig. 3. Mobile application for bank loan request

Applying the validation method "JUDGMENT TO EXPERTS", the same that allows to obtain "an informed opinion of people with experience in the subject", a satisfaction survey was carried out so that the same is filled in by the Sub-Business Manager of Banco D- MIRO, whose objective among other things was that the application implements the basic considerations of usability that any software must take into account. See Fig. 4

Fig. 4. Expert Judgment Survey

5. RESULTS

- The application was developed with open source tools, for the mobile application we used the IDE of Android Studio development [9], [10], we also used the XAMPP package, which includes the Apache web server [11], the PHP language for the web Services and Mysql for the database, leaving the project fully functional.
- It was possible to reach the expectations set for the elaboration of the project: the mobile application satisfies the needs of the users, allowing to consult information online, which will be used for the analysis and evaluation of a microcredit application, being this of vital importance in the development of it, taking into consideration that there is no tool in the area of microfinance that offers these services to the business advisor.
- It was demonstrated that the mobile application is viable, because it allows users to make inquiries of recurring and new clients in real time, therefore, they can make decisions regarding the microcredit requests that are presented to them, while performing their work

in the zone, optimizing the response time and improving the client's perception of the quality of the service provided by Banco D-MIRO.

- Taking as a basis the surveys prior to the development of the project, carried out to the users, it was determined that the biggest problem they face when receiving a request for a microcredit in the area is the lack of information that allows them to make an affirmative or negative decisión which generates a loss of time for the business officer, since he must wait to reach the Bank to perform the client's consultation.

- The application allows the user to have access to the client's information, it will allow him to verify the identity of the user, his payment behavior in the Ecuadorian financial system, payment history in Banco D-MIRO, level of indebtedness, average quota that cancel at the time of the consultation and generate an Initial Balance with a statement of Losses and Profits that provide all the possible edges on the request for microcredit generating a high level of user confidence in the application.

6. CONCLUSIONS

Tests and validations were generated, prior to the acceptance of the application, which were satisfactory for the user. These were carried out in the presence of the Zonal Sub-Manager of Banco D-MIRO, who after the presentation was satisfied with the results obtained, being This is a solution to one of the biggest problems that a business advisor faces in Banco D-MIRO when this area, thus achieving compliance with the proposed objectives, the proposal being validated and accepted.

It is possible to conclude after the tests, that the project developed, managed to comply with all the proposed scope from the beginning, and that this application can be implemented in Banco D-MIRO, to provide greater support to daily activities that performs a business advisor, being this easy to use and understand.

7. RECOMMENDATIONS

- It is recommended that each business advisor should be assigned a mobile device or tablet to business advisors, which must have unlimited data packages for its proper functioning, the team must have at least 1 Gb of RAM or higher and a 2.4 ghz processor, for the correct functioning of the system the device must have the version of Android 6.0 and up.
- For a second phase in the implementation it is recommended that the web server domain support multiple simultaneous connections. With respect to the expectations raised, these were achieved, however, it is recommended to carry out quarterly reviews to identify new requirements by the user that help strengthen the

application and keep it updated, which will allow it to continue to be useful for the business advisors.

- Regarding the access or use of bandwidth the application works in 4G with a very good response time, it is recommended that it can be optimized for the use of widths of lower bands 3G or less.
- Regarding the viability of the application, in relation to the data query, it is important to recommend connection tests in sectors distant from the city, where the coverage of Banco D-MIRO as a credit zone arrives, in order to determine what will be the response time in these sectors and the challenges of working in distant urban areas, where perhaps the Internet connection is poor.
- Regarding the surveys carried out and taking into consideration the good acceptance that the project had, on the part of the business advisor in Banco D-MIRO, it is recommended to attach a space for online suggestions, this information may be used at any time to determine, if it is necessary to advance the process of maintenance and update of the application, achieving a better level of communication with the user.
- Regarding the access of information, it is recommended to generate users and passwords, for users as a method of verification and authentication of their data as they will have access to sensitive information.
- It is important to recommend to users that although the application provides all the facilities to offer a better service, this will depend on the customer's treatment of the customer, always being friendly and a smile will be the best way to reach a person and that this is willing to deliver all the information necessary for the evaluation of the credit application.
- Regarding the issue of connectivity in remote areas or low signal intensity, it is recommended the inclusion of off line mode which would allow the evaluation of a client despite not having access to the Internet and expect to have connection to perform the evaluation without having lost the opportunity to do business.
- Regarding the access or use of bandwidth the application works in 4G with a very good response time, it is recommended that this can be optimized for the use of widths of lower bands 3G or less, which allows it to cover peri-urban sectors without affect the response time.
- It is recommended to promote the application to other banking entities so that they can optimize the process they offer to their clients, thus avoiding the long wait that these types of processes take today.

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