

Original Article

Implementation of a Multiplatform System to Improve the Management of the Help Desk Process in the Constitutional Tribunal of Peru

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Abstract - The Constitutional Court of Peru faces challenges in the management of helpdesk processes, which affect the efficiency and quality of the service provided to internal users. To solve this problem, it is proposed to implement a multiplatform system that provides a mixed service, i.e., support from a chatbot and intervention from specialized personnel. For the methodology, a survey was carried out specifically targeting the internal staff of the institution. In addition, an expert validation was carried out to present and evaluate the developed prototypes. The results of the survey showed a high level of satisfaction and acceptance: 93% of the experts agreed, 51.10% considered it "easy" and 23.40% "very easy", 63.80% rated it "quite effective" in solving problems and 61.70% noted a "noticeable improvement" in response times, the respondents recommended the continued use and full implementation of the system, 55.30% recommended it "yes, in general" and 34% "yes, definitely". In addition, 93% of the experts were satisfied with and accepted the prototypes. In conclusion, the implementation of this system has the capacity to significantly improve the management of technological problems and internal user service at the Constitutional Court of Peru.

Keywords - Chatbot, Multiplatform system, Help desk, Process management, Constitutional court.

1. Introduction

The pandemic is a great challenge for everyone, but it is also an opportunity to innovate and revitalize the technical tools used. The strategies of large companies understand the importance of implementing technological improvements that allow them to improve how they serve users and, if not, increase their visibility and popularity in social networks [1]. In addition to applications, developments are also progressing to provide solutions for everyday customer service, such as chatbots and conventional robots equipped with specialized software for interacting with users managing and resolving concerns. The major technical challenge is consolidating these changes and implementing new strategies to improve customer service.

This tool makes it easier for people to access information, and this system makes it possible to create an interaction by providing pre-configured automatic responses [2][3]. This built-in logic opens up a world of possibilities for application integration. In an effort to significantly reduce cost variables and optimize responsiveness in the areas dedicated to internal and external customer service, the Internal and external customer service: the main task is facilitating the relationship between customers and information. Bot chats offer a new type of human-machine interface, which is particularly interesting given that the current form of technological communication with humans is mainly through screens. The advantage is that it does not

require any special technology, just understanding what people want and doing it [4][5]. On the other hand, in 2018, many Spanish companies jumped on the bandwagon of this new trend because they can now make recommendations, resolve doubts, and inform customers.

In this context, it is relevant to analyze how the implementation of chatbots can offer innovative and efficient solutions in the specific field of the Peruvian Constitutional Court. While its main mission is to exercise constitutional control and ensure the protection of fundamental rights, it also faces challenges in managing the Office of Information Technology (OTI) that affect its operation. In particular, the facilities of the Constitutional Court in San Isidro are facing a problem related to technological difficulties.

Given that the average age of the staff of the Constitutional Court is 47 years old, they encounter computer-related problems on a daily basis. In order to try to solve these problems, they communicate with the Information Technology Office by various means, such as telephone calls, e-mails, or searching for specialized personnel in this field.

However, difficulties have been noted in managing these problems by the OTI; telephone calls are not always answered, and e-mails do not receive the attention they



deserve from the staff responsible. As a result, only about 60% of the cases reported by the institution's internal users are dealt with. In addition, the waiting time for a solution is too long, which leads to delays in solving technical problems. This problem is a major challenge for the Constitutional Court. On the one hand, it affects the efficiency and productivity of staff who rely on computer equipment to carry out their daily work. The lack of timely attention to technological problems creates frustration and hinders the proper development of institutional activities.

Furthermore, in a context where technology plays an essential role in judicial and administrative processes, poor management of the helpdesk process exposes confidential data. To address this problem, it is essential to implement measures to improve this process in the Peruvian Constitutional Court. This implies the allocation of adequate resources, both human and technical, to deal efficiently with the technological problems reported. It is also necessary to set up effective monitoring and follow-up systems to respond in a timely manner to the queries and requests of internal users. In view of the problem that currently exists in the Peruvian Constitutional Court, a multifunctional system has been proposed to improve the management of the helpdesk processes, which will result in faster and more efficient response times, providing internal users with an agile and effective solution to their daily needs.

This research aims to find a way to improve the management of Help Desk processes, as implementing this multiplatform system will streamline the process of attention and response to users. With a centralized record of the problems raised, it will be possible to allocate the appropriate resources more efficiently, ensuring a faster and more timely response. In addition, this system will make it possible to keep track of problems, which will help to identify recurring patterns and areas for improvement in the technological infrastructure of the Constitutional Court. In this way, preventive and corrective measures can be taken to avoid future problems and improve the quality of the IT support service.

2. Literature Review

This section will analyze the different research related to chatbots and help desk management services.

Sam Ratulangi University has used a fundamental tool in these times, and that is the technology that will provide a system that will help to give information to the students [6]. One of the main problems in the university facilities is about the problems of getting information about a certain topic because there is little information on how to solve these problems. In this particular case, the institution does not have a service that allows it to cover and solve these problems, which are becoming increasingly common. That is why created an application with this tool; the purpose of this system is to provide answers on how to use the system.

One of the systems that help users in a simple and easy way is the chatbot because they are dynamic and give quick

answers because they understand the questions and gives possible solutions [7][8]. Also, the way they interact with users is as if they were talking to a person, and practically, they would help remotely and as more questions are asked, the knowledge database would store the answers. Also, the author [9] mentions that variable options have been implemented to communicate in the chat. It is text and audio voice, the latter allowing a more realistic simulation between one person and another and not from a machine to a person.

The author [10] mentions that the use of chatbots is more important than ever in institutions today because of their great potential to automate certain processes, especially when it comes to customer relations and sales. Similarly, the use of chatbots for some business processes is not widely used, although it is a very interesting tool [11][12]. The aim of this research was to look for new functions that would help users provide a better service to a company's employees. Nowadays, it is as indispensable as a help desk management system, and combining the two makes the management of attention optimal and easier. On the other hand, bot chats and other similar computer systems are gaining importance in the development world, and more and more companies, institutions and their websites on the Internet have some kind of robot variant in charge of solving queries, giving advice, answering doubts or guiding the user. Moreover, they consider that this technology is limited in terms of providing adequate answers; the key is to monitor and control so that the user has a better interaction.

In conclusion, a thorough literature review has been carried out, including different studies and research, as each author has different methodologies and objectives. In addition, all the aforementioned research does not include human intervention, which implements this technology limited and not very useful for the users, so this research will be based on a mixed helpdesk management, i.e., the implementation of a chatbot and the intervention of specialized personnel by receiving service tickets.

3. Methodology

To develop a multiplatform system, it is necessary to implement a methodology that helps to develop each phase of the software development in a sufficient and organized way, and as in any project development, there are inevitable changes in the functional requirements; therefore, it is important to have a methodology that adapts to this type of events; the agile methodology Scrum is presented as the most appropriate alternative for this type of projects. As in any methodology, Scrum has a series of stages or phases that must be carried out in order to develop all the processes optimally; these phases are Initiation, Planning, Implementation, Review and Launch. To begin, talk about the components of the agile Scrum methodology.

3.1. Scrum

The Scrum methodology is a dynamic approach to project development, particularly software development. It is based on iterative and incremental principles and focuses

on delivering value quickly and continuously. Scrum is characterized by a flexible and adaptive structure that allows teams to respond efficiently to project changes and requirements [16]. Instead of a traditional approach of detailed planning and rigid execution, Scrum encourages collaboration, constant communication and self-organization of the team. At the beginning of each iteration, a meeting is held with the entire Scrum team to review the list of deliverables and allow the development team to select items from the list to work on during the next sprint.

3.1.1. Scrum Master

The Scrum Master supports and guides the team to ensure that Scrum principles and approaches are implemented efficiently. His main objective is to promote and maintain a collaborative working environment in which the development team can function optimally [17]. The Scrum Master is responsible for guiding the team in implementing and adopting Scrum. This includes providing guidance on Scrum rules and roles and facilitating the meetings and ceremonies of the process, such as sprint plans, sprint reviews, and retrospectives. The Scrum Master also works to remove any obstacles or impediments affecting the team's progress, always trying to find the best solution.

3.1.2. Team

According to [18], the Scrum development team is composed of professionals with different skills and roles who are responsible for performing the work necessary to deliver the product or service increments in each sprint.

3.1.3. Sprint Backlog

Typically, sprints last one to two weeks, although the duration can vary depending on the project's needs. During each sprint, the development team works together to complete a set of tasks and achieve a specific goal [19]. On the other hand, the sprint backlog is a list of tasks and activities that the development team has agreed to perform during the current sprint. These activities are selected from the previously executed backlog, characterized by a prioritized list of requirements and product features that must be addressed during the project. The sprint backlog is created during the sprint planning meeting, where the team selects the most relevant and feasible tasks to achieve the established goal. Now, talk about each phase this methodology has; this is shown in Figure 1.

3.1.4. Start

In this phase, the needs or goals of the project are identified, and the Scrum team is formed [20]. A kick-off meeting is also held to establish the product vision and outline the roles and responsibilities of the team members.

3.1.5. Planning

During this stage, the team and the product owner work together to establish and prioritize the product items in the Product Backlog [21]. Next, the team performs sprint planning and selects the product backlog to be addressed during the sprint. They also estimate how much work can be done and set sprint goals.

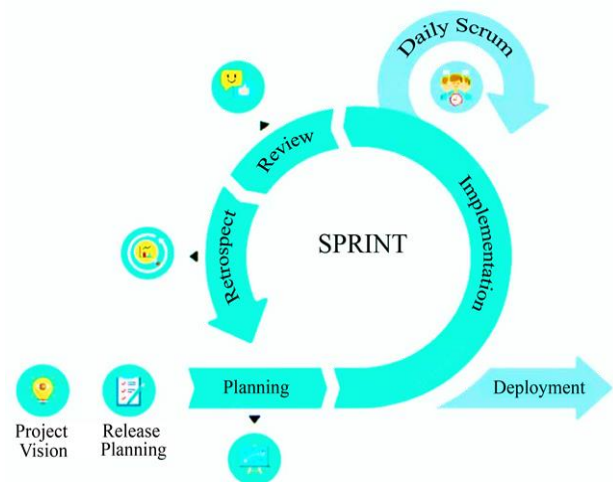


Fig. 1 Scrum

3.1.6. Implementation

In this phase, the needs or goals of the project are identified, and the Scrum team is formed [20]. A kick-off meeting is also held to establish the product vision and outline the roles and responsibilities of the team members.

3.1.7. Review and Retrospective

At the end of each iteration, a product review shows the product owner and other stakeholders what has been achieved [23]. Feedback is received, and potential fixes are discussed in the Product Backlog. Then, the Scrum team conducts a sprint retrospective, an internal meeting to review the progress of the work process and identify opportunities for improvement in future sprints.

3.1.8. Launch

In this phase, the Scrum team delivers a completed product or feature to the customer or end-user [24]. Releases can occur at the end of a sprint or after several sprints, depending on the scope and needs of the project.

In the specific scope of the implementation to optimize the management of help desk processes in the Constitutional Court of Peru, sprints have been established as an effective strategy. This allows an agile and efficient management of the activities. During each sprint, several tasks and activities are planned and executed with the aim of achieving incremental and functional deliveries of the system. These early deliveries make it possible to obtain early feedback and make adjustments to the development, which facilitates adaptation to possible changes in the requirements or needs of the Constitutional Court.

As mentioned above, the first phase is the initiation. To do this, we need to have all the requirements of the customer, i.e., what functionalities they want the system to have; this is shown in Table 1.

Now, make the product backlog, which is the second step that has to be done. This list is ordered by priority according to the customer, shown in Table 2, together with the corresponding estimate.

Table 1. Requirements

N°	Item
1	The system must have an authentication section (login) in which you must use your username and password.
2	The system shall have a chatbot where users can enter their problems.
3	The system shall allow the generation of a service ticket.
4	The system shall allow the user to show the generated ticket as compliance.
5	The system shall display a list of the generated tickets that need to be attended to.

Table 2. Product Backlog

N°	Item	Priority	Estimate
H1	As a user, I want to have an authentication (login) section in the system to access my personalized functions. I want to use my username and password to log in securely and protect my personal information.	High	5
H2	As a user, I want to have a chatbot available in the system so that I can log in and describe my problems or queries. I want to receive automated responses and guidance to resolve my concerns efficiently.	High	2
H3	As a user, I want to have the ability to generate a support ticket in the system. When I face a problem or have a query that cannot be resolved through the chatbot, I want to be able to create a ticket to request personalized assistance.	Medium	3
H4	As a user, I want to be able to view the generated tickets and confirm my compliance with them. After a ticket has been created, I want to receive a notification or have access to a section where I can review the content of the generated ticket and confirm that its information is accurate.	Medium	3
H5	As a user, I want access to a list of generated tickets that need to be attended to. I want to be able to see a list of the tickets pending attention, ordered in a clear and understandable way so that I can track their status and know when they will be attended to.	Under	5

Next, the estimation of the effort time that each user story will require will be carried out using a technique called planning poker, as shown in Table 3.

Table 3. Planning poker

Item	Estimate	Time
1	5	7 days
2	2	16 days
3	3	15 days
4	3	6 days
5	5	10 days
Total	18	54 days

Now move on to the second phase, planning, for which it was decided to divide the activities into sprints, a total of 3 sprints, as shown in Table 4.

Table 4. Sprint backlog

N°	User history	N° Item
Sprint 1	H1	1
	H2	
Sprint 2	H3	2
	H4	
Sprint 3	H5	3

The third phase will be done next, which is the implementation; it is about making the sprint development schedule, as shown in Figure 2. On the other hand, in the review and retrospective phase, meetings will be held to know what has been done with difficulty and how the sprint development is going.

Nombre	Duracion	Inicio	Terminado
Implementation of a multiplatform system	54 days?	13/07/23 08:00 AM	26/09/23 05:00 PM
SPRINT 1	23 days?	13/07/23 08:00 AM	14/08/23 05:00 PM
Login	7 days?	13/07/23 08:00 AM	21/07/23 05:00 PM
Chatbot	16 days?	22/07/23 08:00 AM	14/08/23 05:00 PM
SPRINT 2	21 days?	15/08/23 08:00 AM	12/09/23 05:00 PM
Generar ticket	15 days?	15/08/23 08:00 AM	04/09/23 05:00 PM
Visualizacion del ticket	6 days?	04/09/23 05:00 PM	12/09/23 05:00 PM
SPRINT 3	10 days?	13/09/23 08:00 AM	26/09/23 05:00 PM
Listado de tickets	10 days?	13/09/23 08:00 AM	26/09/23 05:00 PM

Fig. 2 Sprint timeline

3.2. Technological Tools

This section will mention the technologies that will be used throughout the development of the multiplatform system.

3.2.1. Java

Java is a popular, higher-level, object-oriented programming language widely used in software development [25]. It is noted for its transportability, readability, and adaptability to diverse environments. Java was conceived to be platform-independent, implying that programs written in Java can be executed on different operating systems without requiring major modifications.

3.2.2. Websockets

WebSockets is a bidirectional communication protocol that is instant-on, designed to enable efficient and persistent communication between a server and a client over a TCP/IP connection [26]. Unlike the traditional HTTP protocol, which follows a request-and-response approach, WebSocket enables persistent communication between the two sides, allowing continuous communication without the need for additional requests.

3.2.3. Mongo BD

MongoDB is a popular non-relational database management platform widely used in modern application development. One of its main features is its focus on storing data as documents, which implies that information is stored in flexible JSON documents without a predefined structure [27]. This flexibility provides the ability to easily adapt and evolve the data structure, which is especially beneficial in environments where data requirements are variable or not fully defined.

4. Results and Discussions

This section analyzes the results of the study in detail and provides a thorough discussion of their interpretation and significance. The following is a brief presentation of the key findings and issues discussed in this section.

4.1. About the Application

This section provides a detailed description of the application developed as part of this study. The prototypes created are displayed and provide an overview of the program's features, functions, and highlights in each sprint.

4.1.1. Sprint 1

Figure 3 shows the login screen through the mobile application, and Figure 4 shows it through the computer, which allows users to log in to the system securely. The main purpose of this screen is to ensure user authentication and authorization to use the application features. The login interface consists of two main fields: username and password. Users must enter their respective credentials. The information entered is then verified by clicking the Login button.



Fig. 3 Mobile app login

During the validation process, the authenticity of the data entered by the user is verified. This means that the given information is compared with the records stored in the database. If the credentials match the existing records, the authentication is considered successful, and the user is redirected to the home page.

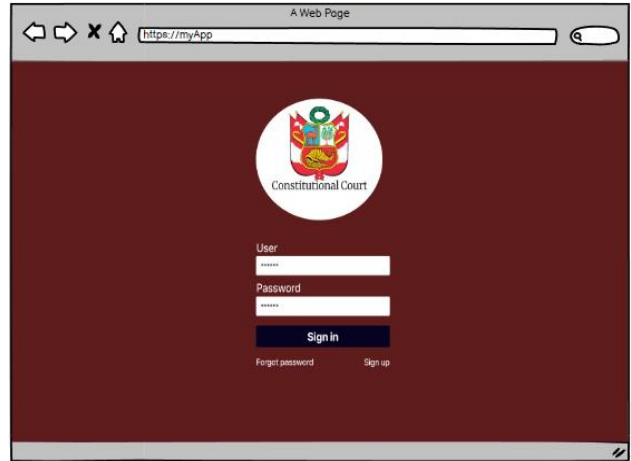


Fig. 4 Login from the computer

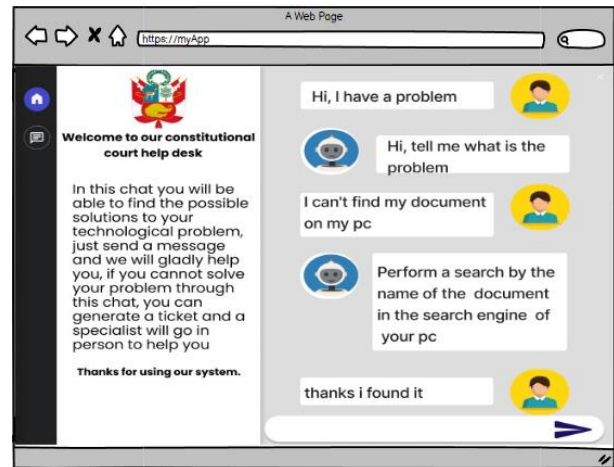


Fig. 5 System from the computer

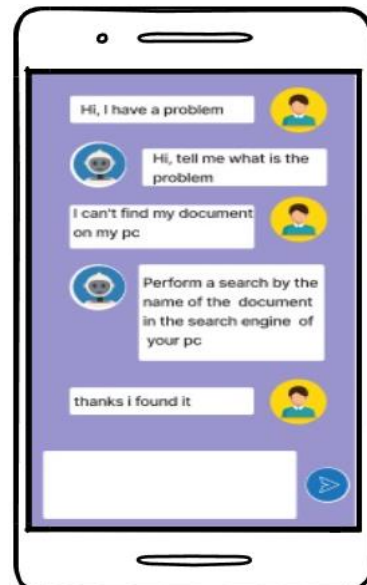


Fig. 6 System from the Mobile App

In the multiplatform system, a chatbot has been implemented to allow users to interact intuitively and solve possible problems that may arise with their technological equipment. This system will be available both in the desktop version, as shown in Figure 5, and in the mobile application, as shown in Figure 6.

4.1.2. Sprint 2

Users can access the ticket creation process if they have exhausted the options provided and still need additional assistance. This process involves following a series of steps to register their request for personal assistance from the IT team. Figure 7 shows the ticket generation process for those users who have not been able to resolve their technical issues and require onsite assistance from the IT team.



Fig. 7 Ticket generation

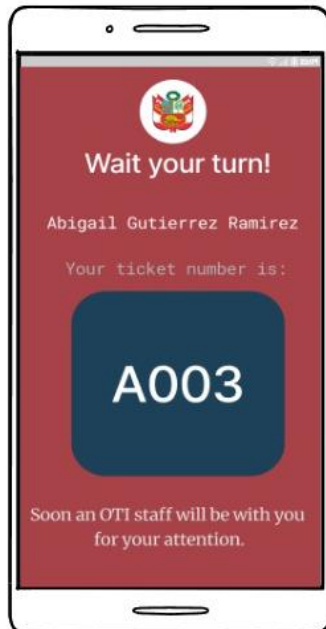


Fig. 8 Ticket

This functionality allows users to request more personalized and specialized attention to resolve their difficulties. This prototype consists of displaying the generated ticket on the screen. Once the relevant data has been collected and processed correctly, the system generates a ticket with a unique tracking number, and Figure 8 shows the result after the service ticket has been generated.

4.1.3. Sprint 3

On the other hand, Figure 9 shows the list of tickets generated by internal users of the Peruvian Constitutional Court, which are viewed by the specialized staff of the OTI in order to respond to their requests.

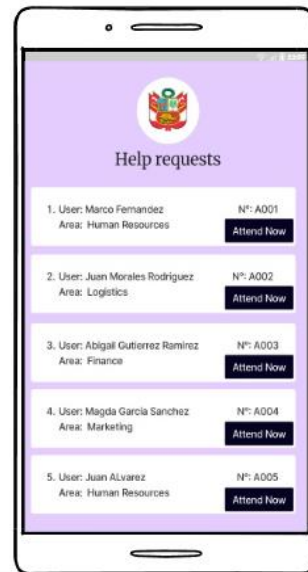


Fig. 9 List of pending applications

4.2. Results of the Expert Validation of the Prototype

In this final results phase, an expert evaluation is performed to validate the prototype. This evaluation is based on four acceptance criteria: consistency, functionality, integration, and usability. Each of these criteria has three levels. The low level, ranging from 0% to 49%, indicates that the prototype is ineffective. The medium level, ranging from 50% to 79%, indicates that the prototype needs to be adjusted to achieve a successful implementation. The high level, ranging from 80% to 100%, indicates that the prototype is satisfactory and has been accepted by the experts, as shown in Table 5.

Table 5. Range of acceptance levels

High	Middle	Lower
100%- 80%	79% - 50%	49%-0%

Table 6. Scoring by experts

Experts	Functionality	Usability	Consistency	Integration	Average	Level
Expert 1	93%	91%	90%	89%	91%	Alto
Expert 2	95%	93%	94%	91%	93%	Alto
Expert 3	91%	92%	90%	90%	91%	Alto
Expert 4	94%	89%	92%	91%	92%	Alto
Expert 5	93%	91%	91%	92%	92%	Alto

On the other hand, Table 6 shows the percentage score given by each specialist, in which they evaluate each acceptance criterion for the prototypes made.

4.3. Survey Results

This section deals with evaluating the prototype of a multiplatform system designed to improve the management of help desk processes in the Constitutional Court of Peru. This system aims to provide an innovative and efficient solution to address and resolve technological problems and requests from internal users of the institution. The system was presented to the users through prototypes that showed its functionality and main features. The purpose of this presentation was to gather the users' perceptions in terms of ease of use, effectiveness in solving problems and queries, and improvement of response times. It should be noted that the evaluation of the prototype was carried out through a survey applied to a group of 47 internal users of the Constitutional Court. These users represent a diverse group of people who have experienced different situations and technological problems in their daily work.

The survey revealed a diverse distribution of opinions, with 51.10% of respondents finding the prototype "easy" to use, while 23.40% found it "very easy" to use. On the other hand, 21.30% of respondents felt that the system was "neither easy nor difficult", and a minority of 4.20% indicated that they found it "difficult" or even "very difficult", as shown in Figure 10.

These results reflect the diversity of perceptions among internal users and underscore the importance of assessing and understanding their different experiences to tailor the system and ensure an optimal user experience.

The second survey question showed that 63.80% of the participants found the prototype to be "quite effective" to use, while 6.40% found it to be "extremely effective".

On the other hand, 29.80% of the respondents felt that the system was "moderately effective", and a none of the respondent indicated that they found it neither "little cash" nor even "nothing effective", as shown in Figure 11.

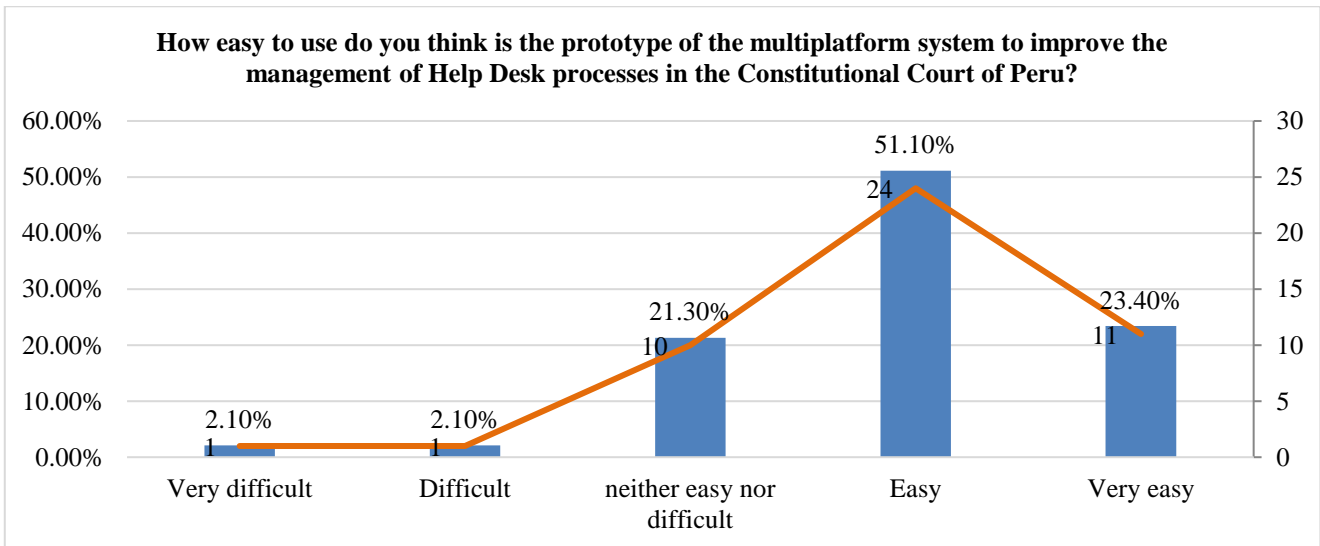


Fig. 10 Difficulty level

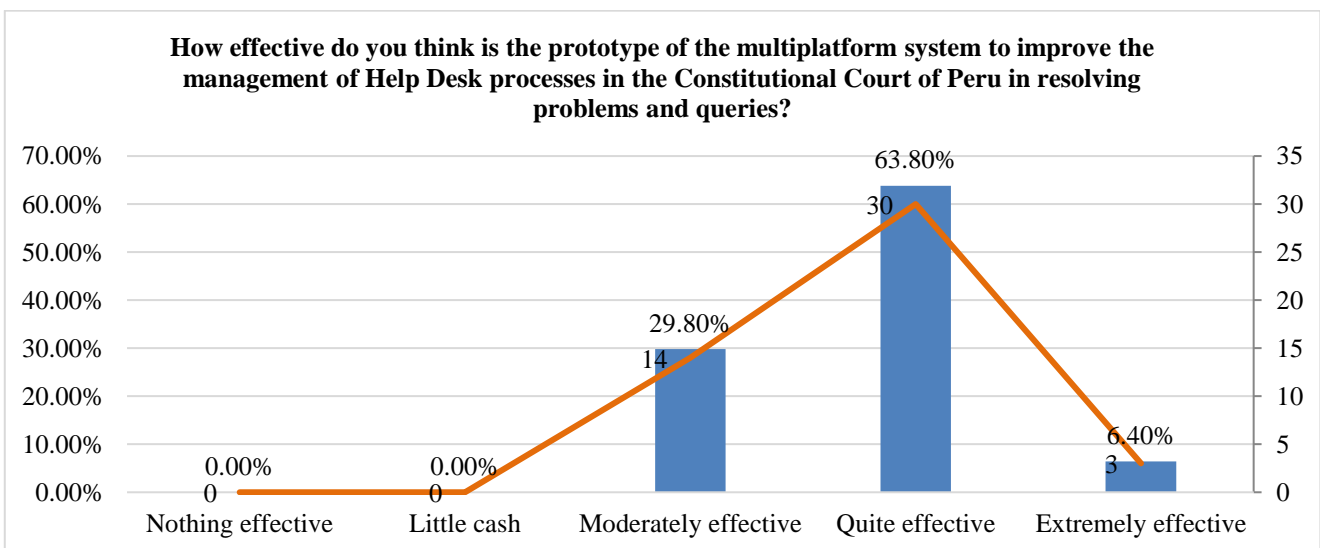


Fig. 11 Effectiveness level

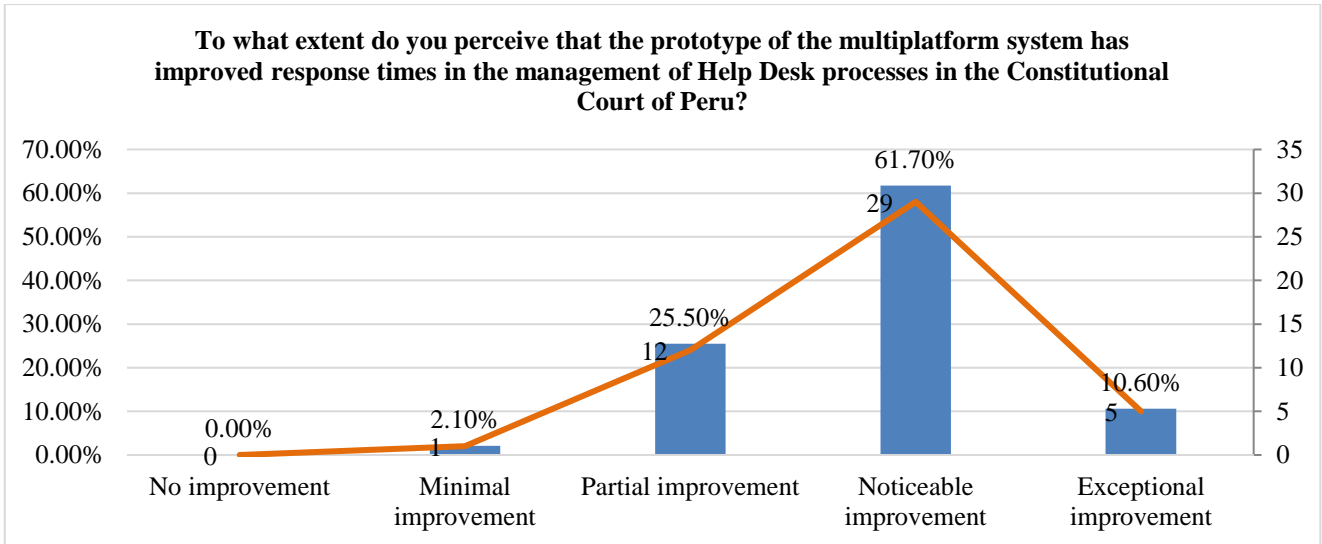


Fig. 12 Improvement time

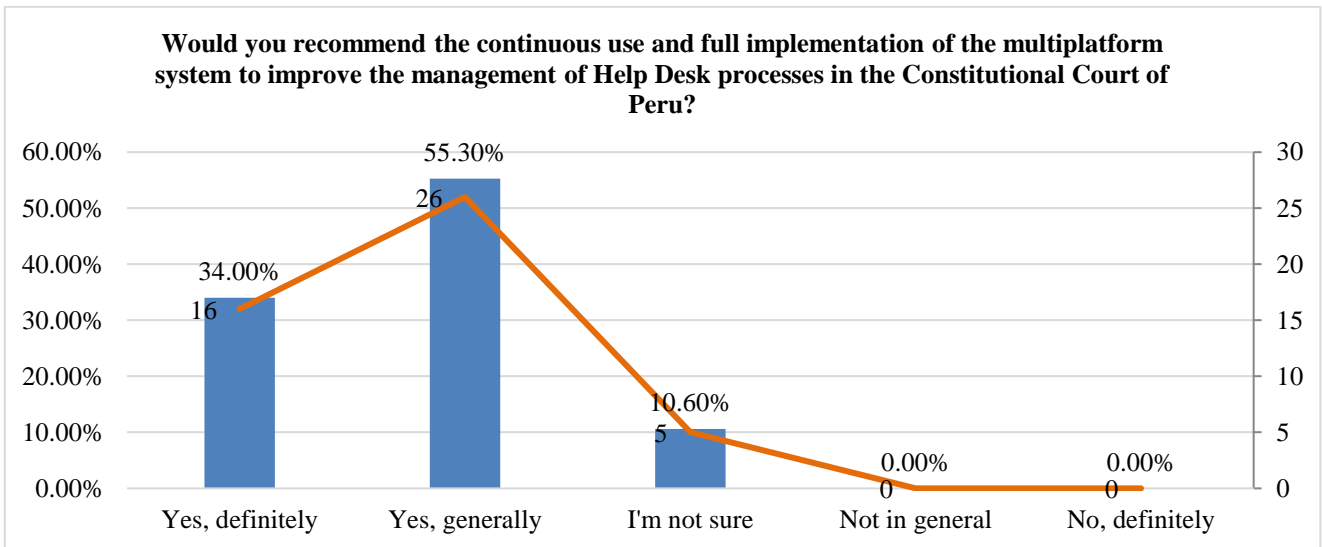


Fig. 13 Continuous use

On the other hand, in question 3, internal users provide valuable insight into the perception of the improvement in response times after implementing the multiplatform system prototype. According to the results collected, an outstanding 61.70% of the participants perceive a "noticeable improvement" in response times after implementing the prototype. In addition, 25.50% of respondents reported a "Partial Improvement", suggesting efficiency gains, although with potential for optimization. 10.60% of users report an "Exceptional Improvement" in response times, indicating a significant impact, as shown in Figure 12.

The survey results reveal a largely positive response from participants. A remarkable 55.30% of respondents stated that they would recommend continued use of the system overall, suggesting that they see significant benefits in their current implementation. In addition, 34% of users were even more confident in their response, stating that they would definitely recommend continued use and full implementation of the system, as shown in Figure 13.

4.4. About the Methodology

The agile methodology uses an iterative and incremental approach where the development process is broken down into short cycles known as "sprints". Collaboration and continuous communication with the customer is a priority throughout the process, allowing for flexible adaptation to changing project requirements. Working groups are cross-functional and self-organizing, which promotes shared responsibility. Early and regular delivery of software milestones is the goal, and continuous feedback and improvement are encouraged. Visual tools such as Kanban or Scrum boards are used to track work, and the importance of transparency and collaboration are emphasized as fundamental elements of the agile methodology. Traditional methodologies, on the other hand, follow a sequential and linear approach where development is divided into well-defined phases such as analysis, design, implementation, and testing. Communication with the customer is typically limited to the beginning and end of the project.

Table 7. Comparison of agile and traditional methodology

Agile Methodology	Traditional Methodology
<ul style="list-style-type: none"> • Iterative and incremental approach. • Software development in short cycles called "sprints". • Greater collaboration and communication with the customer throughout the process. • Requires cross-functional and self-organized teams. • Prioritizes adaptation to changes in project requirements. 	<ul style="list-style-type: none"> • Sequential and linear approach. • Software development in defined phases, such as analysis, design, implementation and testing. • Communication with the customer is usually limited to the initial and final phases of the project. • Based on clearly defined roles and responsibilities. • Requires detailed requirements specification prior to project initiation.

Roles and responsibilities are clearly defined, and requirements must be defined in detail before the project begins. The end goal is the final delivery of the entire product, and changing requirements can be costly and difficult to manage. This is best illustrated by the comparison in Table 7.

5. Discussion

Implementing a chatbot in the Constitutional Court of Peru is proposed as an innovative solution to improve the management of technological problems and provide a more efficient service to internal users. This proposal is based on the experience of other studies and research related to this technology and the help desk service. The use of this dynamic tool that provides fast and effective responses to users has been highlighted. It is mentioned that these can simulate human conversations and provide automated customer service. In addition, the importance of implementation in terms of help desk management is emphasized to optimize the service and improve the employee experience.

Similarly, the author [6] implemented a help desk application to provide students with answers on how to use the system. This initiative was motivated by the need to obtain information and solve problems more efficiently. On the other hand, the author [9] highlights the ability to understand questions and provide possible solutions through text or voice. In the context of the Constitutional Court of Peru, the problems related to the management of technological problems and inefficient attention to internal users are identified. The lack of timely response affects the efficiency and productivity of workers and the security and confidentiality of the data handled by the institution. To

solve this problem, propose implementing a multifunctional helpdesk system that combines a chatbot and the intervention of specialized personnel. This would allow a more agile and effective management of technological problems, as well as an adequate follow-up of reported cases.

6. Conclusion

In conclusion, implementing a chatbot at the Constitutional Court of Peru can provide an efficient solution to optimize the management of help desk processes. Providing pre-configured automated responses can simulate a human conversation and facilitate access to information and quick resolution of requests. This integration for help desk management can optimize service and improve the employee experience by providing agile and effective solutions to their day-to-day needs. The agile Scrum methodology is well suited to developing the cross-platform system because it allows for flexible and adaptive project management.

Frequent communication with the customer and regular feedback make it possible to make changes in the development process based on changes in the project requirements. In addition, the agile methodology promotes early and regular delivery of software milestones, which allows for early feedback and necessary adjustments. Therefore, the implementation of a multiplatform system with a chatbot at the Constitutional Court of Peru has the potential to significantly improve the management of technological problems and internal user service. It will provide quick and effective answers, reduce response times and allow for proper tracking of issues, ensuring efficient attention and timely resolution of reported problems.

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