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Hotel Housekeeping Optimization System

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Summary
This article discusses the challenges of housekeeping teams in the hotel industry and how the implementation of an application can contribute positively to the optimization of tasks and processes. With main objective of developing a prototype of mobile system to standardize routines and improve communication between employees from different sectors, mainly housekeeping staff, supervisors, and receptionists. The applied methodology was based on bibliographic review, analysis of existing systems, system modeling and prototyping with digital tools and feedback from interviewees. The results indicate that the proposed system has potential to reduce rework and improve efficiency in working hours in the hotel environment.
Keywords: *housekeeping; applications; systems; hospitality.*

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I. Introduction

According to Lüthy (2025) there have been significant changes in the hotel industry due to technology. The use of paper for notes and checklists has been replaced by applications. In this context, the housekeeping department (responsible for cleaning and organizing environments) can also benefit from technological advancements.

The housekeeping sector is vital for guest satisfaction, and the quality of stay is directly related to the comfort of environments and their hygiene. Soon, adopting a system for the housekeeping department will significantly improve team organization. Lack of quality is related to disorganization (DANTAS, 2020). Given that if the housekeeping sector does not evolve in its services, the hotel will be quite compromised, since the loyalty of the guest and the quality of service of the housekeeping team are directly related.

Another point to consider is the COVID-19 pandemic, which has reinforced the need for stricter cleaning and hygiene protocols. Its impacts of it should also be considered when discussing the need for digital systems in the hotel sector. From this new need, there was an increase in the demand for systems that enable organization optimization and task monitoring. Thus making the use of digital tools essential to maintain high standards of quality and safety.

Taking this into account, the hotel sector faces the challenge of balancing innovation with adaptation to emerging demands as a consequence the automation of housekeeping processes appears as a strategic and necessary solution. Being that the implementation of digital systems becoming key allies in the operational routine of hotels. Such features facilitate the control of tasks, reduce rework, improve communication between sectors and make the service to guest demands much more agile. In addition, it is important to take into account the positive impact of these technologies on the organizational climate and employee well-being. Because the use of efficient tools that support employees in their roles tends to reduce stress and more satisfied in the work environment. In this context, this article aims to generate a prototype of an application to benefit the cleaning routines in small and medium-sized hotels, thus increasing efficiency and customer satisfaction. In which will be addressed the modeling of the system, the use of technologies for development, as well as the presentation of mockups and usability assessment of the prototype by professionals.

II. Theoretical Reference

To form the theoretical foundation, a comprehensive bibliographical research was carried out on the concepts of housekeeping management, process optimization and the use of technologies applied to hospitality. Academic sources such as books, scientific articles and publications specialized in the area of hospitality and service management were consulted.

Housekeeping In Hospitality

According to Sarkar (2021), the governance sector (housekeeping) performs an essential function in the operation of a hotel, since it is responsible for hygiene, organization and preservation of environments. A clean and organized hotel ensures greater guest satisfaction, generating loyalty and thus higher income for the company.

Areas such as lobbies, corridors and public restrooms are also taken care of by employees in this sector (VERMA, 2024). This emphasizes the extent of the actions exercised by this sector and its influence on the customer experience.

Being a service-intensive sector, employees face many obstacles: overworking hours, high pressure, low motivation, rigid physical tasks and high turnover (SINGH 2019). It is necessary to adopt a management to benefit not only the guests, but also the employee.

Management Systems

Time management software shares an effective solution to improve hotel operations, by allowing a quick and efficient adaptation to the sector. They offer additional benefits, such as transparency in the division of tasks and ease to comply with established standards (MARTINS, 2023). These systems are recognized as tools for multipurpose solutions focused on the overall improvement of hotel operations, which provide real-time task management, approval of room statuses (contributing to improved efficiency), minimizing service disruptions and integration to various hotel departments.

According to Dawson (2024), hotel management systems are essential tools that integrate several operational functions of a hotel, including reservations, billing, and, crucially, housekeeping management. They allow managers to monitor occupancy, schedule cleaning, and allocate resources more effectively. Which helps optimize hotel operations, improving efficiency and communication between teams. They help automate routine tasks, allowing employees to focus on activities that add more value to the service.

Use Of Technology In Hotels

As already mentioned, quality is an important value for hotels. Technological innovations are no longer just for device support and have been inserted in almost all professional aspects. However, care must be taken not to affect the guest experience. Santos (2024) conducted a study in the Amazon region and found that slow systems and electronic locks presented failures that generate dissatisfaction among guests.

Hotels need to be up-to-date with their technologies, as this interferes with the quality of service. In a study based on TripAdvisor reviews, Paixão and Salazar (2021) demonstrated that service bots and room service were well rated by guests.

Therefore, technology is inevitable for hotel work routines. However, care and attention must be taken through the maintenance of systems and devices. This shows that humans are still responsible for ensuring service quality and technology is only a work tool.

Applications For Housekeeping

Currently, technology is used on a large scale in society, and the housekeeping sector is no different. Applications have been developed to provide efficiency and organization in service operations. This way, teams can communicate in a standardized manner, reducing errors in task distributions and real-time monitoring by management.

Apps like RoomRaccoon structure this sector, which monitors hotel cleaning and maintenance tasks and updates room status (ROOMRACCON, 2024). In view of this, the team ensures quality in the delivery of tasks, leaving the hotel clean.

The Flexkeeping mobile system allows governance management to analyze the location of your team in real time at the hotel. Triggering tasks in a practical way as voice command and an activity control through checklists can also be exploited (FLEXKEEPING, 2024), avoiding possible delays or rework by employees.

Therefore, the implementation of technology in the administration of the housekeeping sector is extremely important to optimize processes and ensure quality. The use of applications, as mentioned above, allow a clean communication between the team, a greater control in the services provided and a faster response to the requirements of the sector. Thus, the employees, organization and monitoring of their tasks generate an increase in productivity and a more structured work environment.

Challenges In Housekeeping Sector Management

Guest satisfaction and hotel staff performance are directly linked to the quality of housekeeping sector management. Despite being an essential operational area, it faces recurring obstacles such as the need for constant rework, communication failures, high employee turnover and lack of expertise among employees, in addition to resistance to the implementation of new technologies.

One of the main obstacles in this area is rework resulting from poorly executed tasks, which may result from inadequate staff training or last-minute changes in room assignments, causing inefficiencies, wasted resources, and additional stress on the team.

Internal communication is also a challenge, since the absence of clear flows of communication between different sectors generates delays in cleaning housing units, mismatches of service orders and failures in preparing environments for the entry of new guests.

Second Ataíde (2011). Factors such as poor remuneration, high workload, including reduced number of breaks, allowing little family contact, lack of feedback, professional recognition, and standardization in work processes; lack of material necessary to perform quality work; reduced number of employees in the sectors; inadequate growth policy; and lack of efficient leadership in the housekeeping department. These factors are presented to employees as factors contributing to employee demotivation and inefficiencies in the work environment.

Resistance to the adoption of technologies, in turn, is still an obstacle present in many teams, especially among employees with less familiarity with digital resources. This barrier hampers the implementation of systems and applications that could optimize management and simplify processes.

III. Methodology

This is a descriptive study, which sought to understand the activities related to the housekeeping sector in hotels. The research is applied, technological production, characterized by proposing a housekeeping management system, as well as creating a prototype of it. The approach was to raise qualitative data through bibliographic research in books, articles and magazines with content focused on the central theme, aiming to theoretically support the development of the project.

Analysis Of Existing Systems And KPIs

We analyzed existing applications, such as RoomRaccoon and Flexkeeping, to understand the functionalities and interfaces and suggest improvements through our study. In addition to this, we used the Booking.com platform to establish metrics to our line of research. Metrics such as average room cleaning time, response time, guest satisfaction and laundry control were useful to understand where the challenge of housekeeping operations lie. The analysis of these systems and their metrics allowed us to identify the main points of attention for the development of our system.

Stakeholders

After the analysis of existing systems, the mapping of stakeholders was carried out. The objective is to identify who would be impacted by the proposed system. The identification of these stakeholders followed the methodology of reflection and questioning described by Nunes (2023), where we were guided by the critical analysis of those involved from guiding questions. Table 1 presents the main stakeholders related to the project.

Table 1. Stakeholders of the housekeeping system

Stakeholder	Relationship with Housekeeping
Housekeeping team	Directly impacted by practices and processes.
Hotel management	Responsible for the management and evaluation of sector results.
Guests	Direct beneficiaries of the quality of services.
Department of maintenance	Involved in technical support.
Suppliers of cleaning products and equipment	Interested in the hotel's demands for its products.
Other hotel departments	Indirectly impacted by guest reputation and satisfaction.

Source: Authors, 2025

There are several groups directly involved in the system, such as the department itself, supervision and reception. Suppliers would be affected indirectly. Therefore, understanding the needs of the actors was the difference that provided the construction of a system that not only optimizes the work routines of those involved, but that mainly guarantees a more assisted and positive experience in the hotel.

Elicitation Of Requirements

With the mapping of stakeholders completed, the next step was to organize the essential functionalities for the system. The basis for this was the housekeeping methodology proposed by Dantas (2020), which suggests standardized operating routines. We also use the requirements engineering principles described by Sommerville (2018). Table 2 shows the expected functionalities of the system, focusing on the actions that it should perform to support the routine of the teams.

Table 2. Functional requirements of the housekeeping system

ID	Functional Requirement	Description
RF01	Record and assign cleaning tasks	Allow supervisors to assign tasks to housekeepers according to the status of housing units (UH).
RF02	Update room status in real time	The housekeepers should update the status of the rooms (clean, dirty, maintenance, etc.) after performing the task.
RF03	View list of assigned tasks	Housekeepers access the task list with details of each UH and specific guidelines.
RF04	Use digital checklists for cleaning	Provide checklists based on the ABC method for standardization of cleaning routine.
RF05	Record task execution time	Automatically or manually record the time spent on each task performed.
RF06	Generate productivity and performance reports	Compile data and generate reports with indicators by employee, task type or HU.
RF07	Send notifications between teams	Facilitate communication between housekeeping staff, supervisors, maintenance and reception via messages or alerts.
RF08	Control stock of materials	Record consumption, generate replacement alerts and track stock of materials and trousseau.
RF09	Request maintenance or replacement of equipment	Allow users to report technical issues or request equipment replacement.
RF10	View and filter the status of all rooms	Allow real-time supervision of the status of all UHs by reception and housekeeping .
RF11	Carry out final inspection of the UH and confirm release	Supervisors must validate the quality of cleaning and release the unit for new guests.

Source: Authors, 2025

These requirements involve from the distribution of tasks to the final stage of inspection of rooms. The first focus is to facilitate the daily routine: organizing what needs to be done, sharing responsibilities among employees, keeping room status up-to-date and following a cleaning pattern with the use of checklists.

The system also helps to better organize the time of the team. One of the available functions is the recording of the duration of each activity, which allows you to observe the performance on a daily basis and track the progress of employees more clearly.

Communication between sectors is also benefited. With the support of technology, information transfer becomes more agile, which facilitates the progress of activities and reduces delays. This, together with more precise control of the materials used, contributes to reduce errors and rework.

The design also took into account technical characteristics that affect day-to-day use. Table 3 presents these points, which include data security, simple navigation and stable performance under different conditions of use.

Table 3. Non-functional housekeeping system requirements

ID	Non-functional requirement	Description
RNF01	Usability	Simple and easy to use interface.
RNF02	Responsiveness	Adaptation to different screen sizes.
RNF03	Offline operation	Basic use even without internet.
RNF04	Low consumption	Optimized to save battery and data.
RNF05	Security of access	Login access with permissions by profile.
RNF06	Secure storage	Data safely saved in the cloud.
RNF07	Performance	Screens load quickly (up to 2s).
RNF08	Compatibility	Support for updated Android and iOS.
RNF09	Updates	Allows updates without prejudice to use.
RNF10	Language	Interface in English.

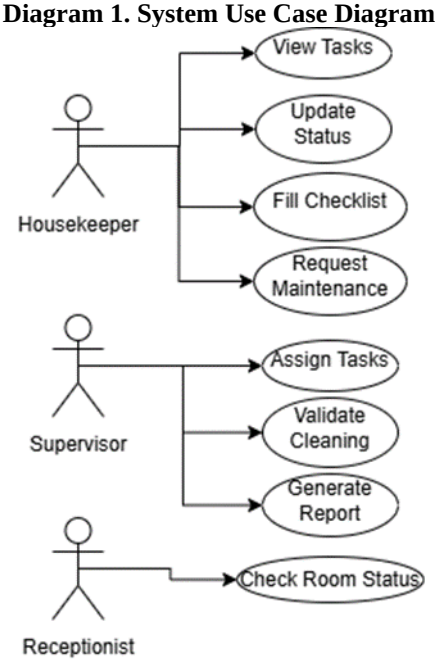
Source: Authors, 2025

The system needs to work well in different devices and situations. Therefore, features such as offline operation, reduced battery consumption and stable performance have been included. This ensures that the system continues to work even in places with limited connection. The system also includes features to protect information, update without crashes and work on different types of devices. Using the Portuguese language throughout the interface makes the system more accessible and welcoming to those who work with it on a daily basis.

Modeling Of The System

In this study, we aim to visually represent the structure of the functionalities proposed by our application, as seen in the system requirements section. We first made the use case diagram and then the activity diagram based on the studies conducted by Guedes (2018). We used the housekeeper as a representative example of the employee role. For the management position, the supervisor. The receptionist was also included, as this role interacts directly with the system. Each user profile has its own actions in the system, as can be seen in Diagram 1.

Diagram 1. System Use Case Diagram



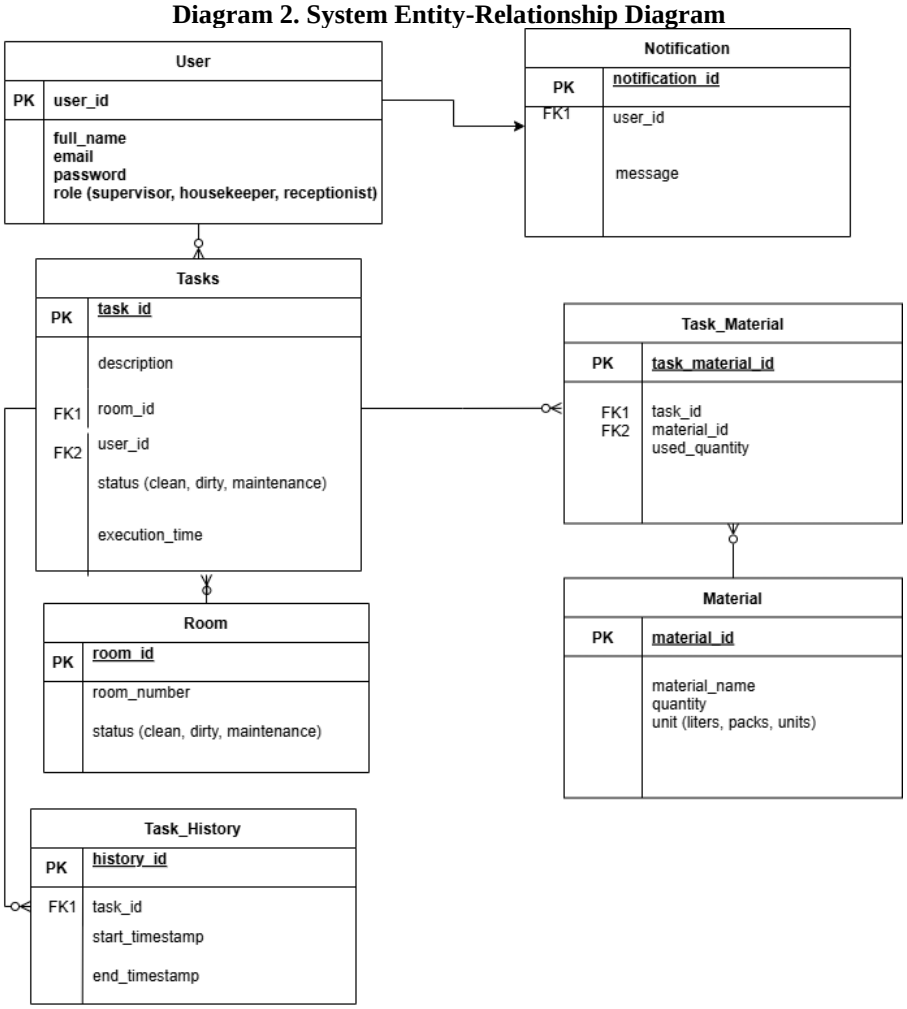
Source: Authors, 2025

It is observed in the diagram that profiles have specific actions in the system: record tasks, update room status and inspect housing units. The way the functions were distributed aims to make tasks more organized and make the exchange of information between teams simpler and more direct.

Development Tools And System Structure

We planned the system so that the user interface can communicate with a centralized backend, where a client-server architecture was designed, ensuring the coordination of operations in real time. The frontend can be developed using Flutter, because it has high performance and ensures support for dynamic interfaces and uncomplicated maintenance. For backend execution, Node.js and Express provide an efficient server with high performance processing of user requests, ensuring scalability and fast responses. Using MySQL to develop the database is a viable strategy for organizing the structure of information, producing integrity and efficiency in data storage, as can be seen in Diagram 2. The system infrastructure can operate in a cloud-based environment, granting remote access and secure data storage.

Diagram 2. System Entity-Relationship Diagram



Source: Authors, 2025

The Entity-Relationship Diagram shows how data will be structured in the system. The entity "User" connects to tasks, notifications and histories, allowing you to follow the actions performed by housekeepers, supervisors and receptionists. The "Housing Units" connects to tasks, notifications and histories, allowing you to follow the actions performed by housekeepers, supervisors and receptionists. The “Housing Units record the cleaning status of the rooms, while the entity "Materials" manages inventory control. With this structure, it is possible to better track tasks, improve communication between teams and use resources more efficiently within the hotel.

Tools To Develop And Validate The Prototype

The system screens were created in Figma, a common tool in interface design, allowing to simulate the experience as if the application was already ready. We shared the prototype with a sample of 18 people from a hotel in Manaus.

After testing the prototype, participants were invited to evaluate it through a form in Google Forms. The questions of the form followed the guidelines of Nielsen (1994), which deal with usability in systems. Among the criteria evaluated were visual clarity, ease of navigation and control during use. The questionnaire used simple language, with closed questions on a scale from 1 to 5 and others open for comments.

The answers were organized in Google Sheets in table and chart format to facilitate the analysis of prototype data. The graphs and main screens will be presented in the next topic, results.

IV. Results

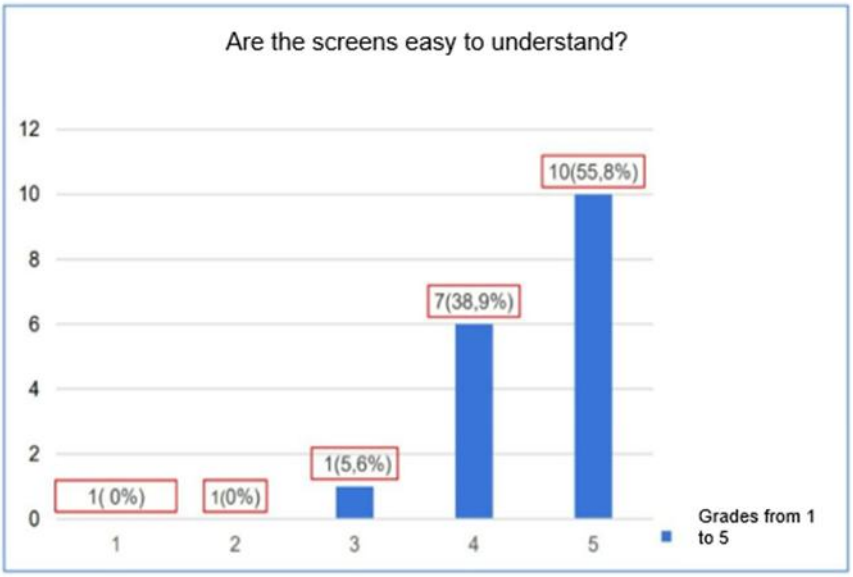
This section presents the main information collected from the survey. First, we show the data collected with the form answered by hotel professionals. Then, the screens of the prototype were presented, focusing on the most frequent actions of the system and how they fit into the routine of the housekeeping sector.

Quantitative Analysis - Form Graphs

The main data of the form were summarized in five graphs to facilitate the visualization of the results. Each one represents one of the aspects evaluated such as understanding the interface, ease of monitoring tasks, perception of the digital checklist, communication between sectors and general evaluation of the prototype.

As shown in Graph 1 (Figure 1), most participants found the system easy to use, and the options for the answer to this question were from 1 to 5 (strongly disagree to strongly agree). Focusing on the options 'Agree' and "Strongly agree", with 7 and 10 responses, respectively. Validating the proposal of a simple and intuitive interface.

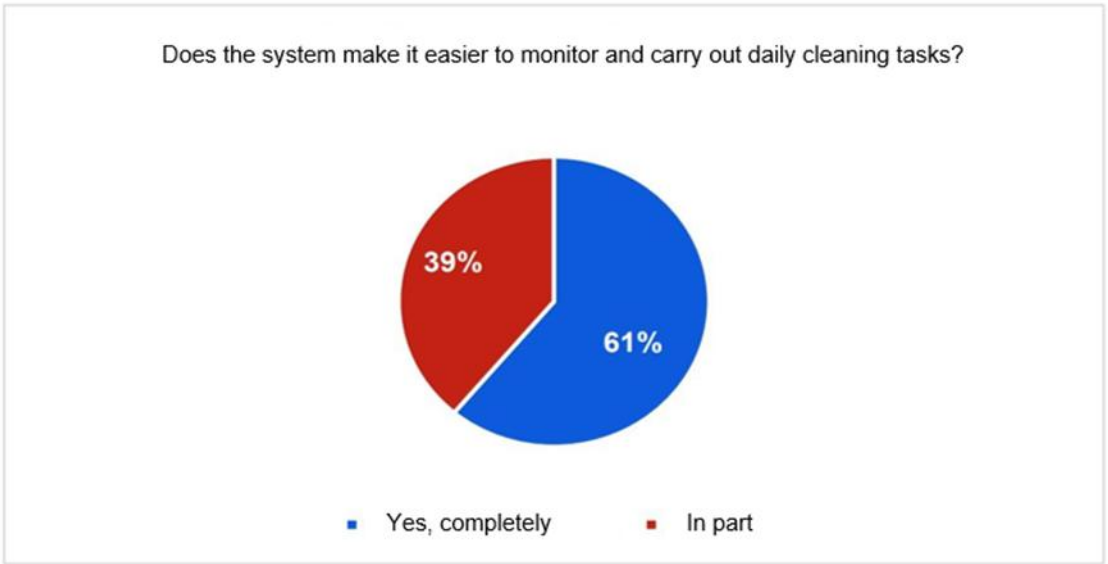
Figure 1. Understanding the interface



Source: Authors, 2025

To assess the ease of following daily tasks through the prototype, a qualitative question was applied to the participants, with the answer options "Yes, completely", "In part" and "No". Graph 2 (Figure 2) illustrates the distribution of the answers obtained. It is observed that most users reported being able to track their activities by fully using the system.

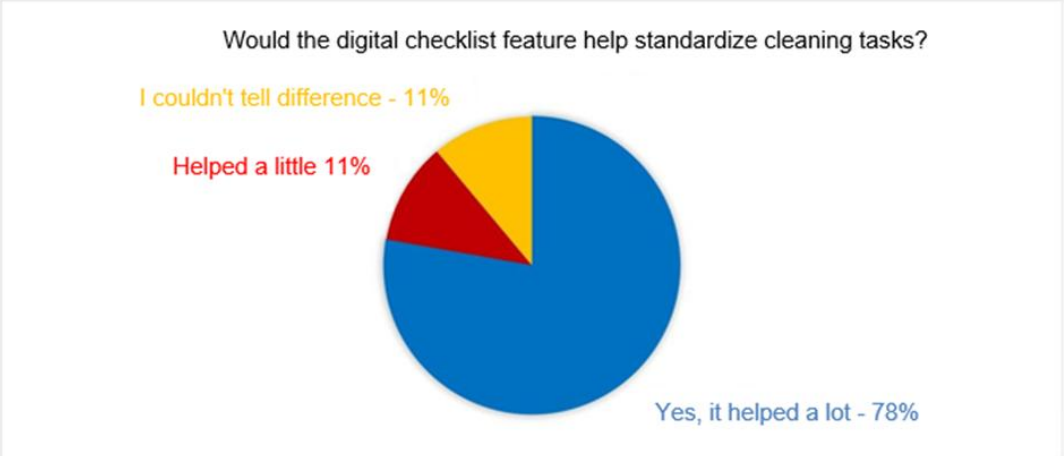
Figure 2. Ease in task tracking



Source: Authors, 2025

To evaluate the digital checklist functionality in the standardization of cleaning tasks, a qualitative question was applied where participants had three answer options: "Yes, it helped a lot", "It helped a little" and "I didn't notice a difference". Graph 3 (Figure 3) shows the distribution of the answers obtained. The analysis shows that most users considered the digital checklist a relevant resource to maintain the quality standard in cleaning routines, mainly due to the strong predominance of the answer "Yes, it helped a lot".

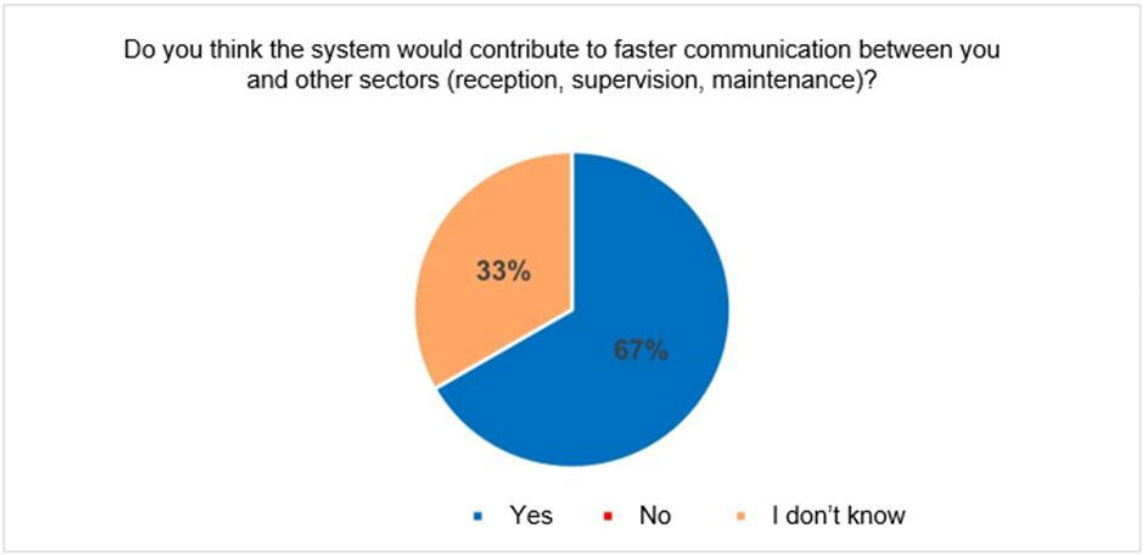
Figure 3. Usefulness of the digital checklist



Source: Authors, 2025

In order to verify whether the prototype contributes to improving communication between the housekeeping sector and the other departments of the hotel, a qualitative question was applied to the participants. Answer options included "Yes, it improved a lot," "It improved a little," and "I didn't notice a difference." In Graph 4 (Figure 4), we can appreciate the proportion of answers obtained, where most users perceived improvements in internal communication after using the prototype, especially among the housekeeping staff, supervision and reception.

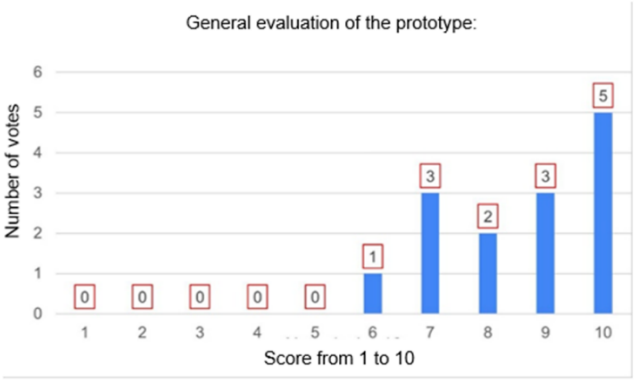
Figure 4. Communication between sectors



Source: Authors, 2025

Finally, Graph 5 (Figure 5) provides an overview of the evaluation of the system. The evaluations ranged from 6 to 10, with emphasis on the maximum score, which appeared five times. Grades 7, 8 and 9 were also common. Only one interviewee chose 6, and none evaluated with a score below that. This indicates a solid acceptance of the prototype, in line with the expectations raised throughout the development of the project.

Figure 5. Evaluation of the Prototype

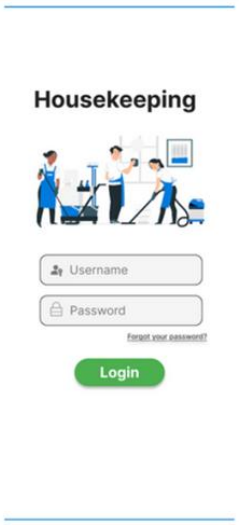
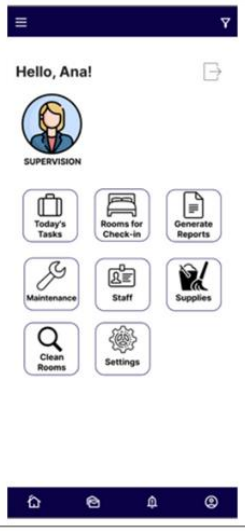


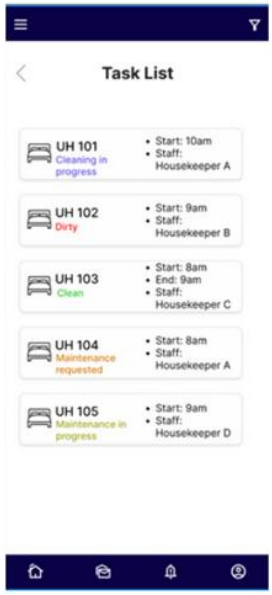
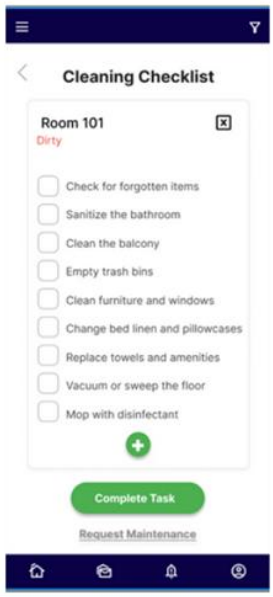
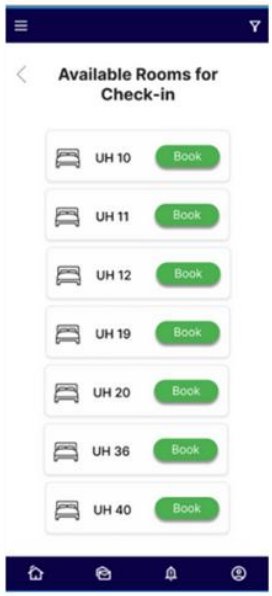
Source: Authors, 2025

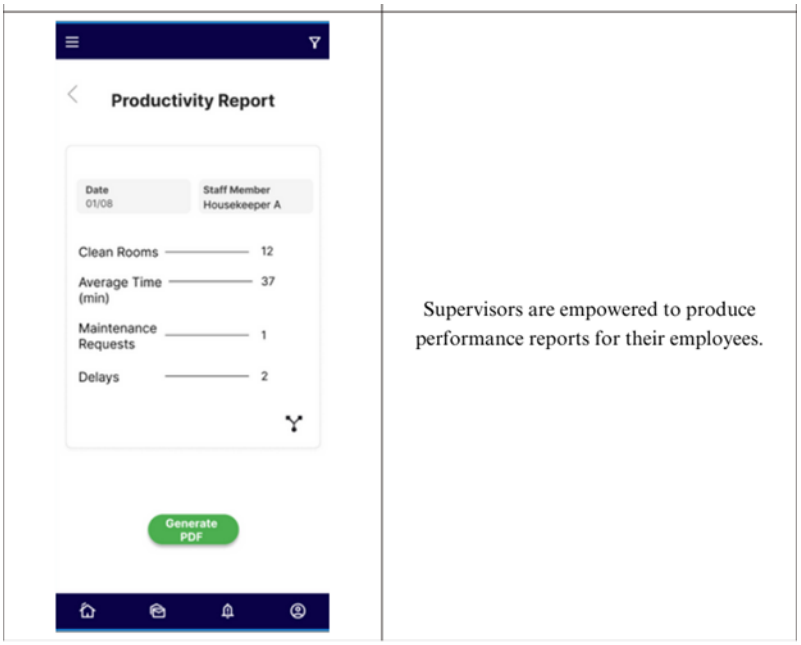
Prototype Validation

The prototype of the system was developed in Figma and also made available for usability evaluation, to verify its functionality, clarity and contribution to the housekeeping team's work routine. The screens were developed based on functional requirements (Table 2) and analysis of existing systems such as RoomRaccoon and Flexkeeping, with a focus on simplicity and efficiency. The model simulates the main screens aimed at the use of the housekeeping staff.

Table 4. Application Screens

Application Interfaces	Description
	Login interface featuring a password reset option
	Application homepage featuring all the application functionalities.

	Daily Task List featuring the housing units designated for cleaning
	The items designated for cleaning in each housing unit are outlined on this checklist screen.
	Once the housing units have been cleaned, they become available for reservation.



Source: Authors, 2025

The login screen allows access by different profiles (maid, supervisor or receptionist), while the supervisor's home screen presents a panel with visual shortcuts to tasks, housing units, reports and material control. This organization contributes to a more intuitive navigation and to the optimization of the sector's management routine.

The system organizes the distribution of cleaning tasks among employees. The list displays, in real time, the status of each unit and who is assigned to each activity. The cleaning checklist, on the other hand, follows the ABC method, helping to maintain a standard in cleaning routines. Users considered these functionalities essential to ensure control, standardization and reduction of operational failures.

The visualization of rooms available for check-in facilitates communication with the front desk and speeds up the release of HUs, while the productivity report consolidates relevant information about the housekeepers' work, such as average time per task and maintenance records. Both screens were seen as useful tools for decision-making and monitoring of activities in real time.

V. Final Considerations

Housekeeping activities are important for a positive guest experience. They are largely responsible for the perception of quality in a hotel. However, it was seen that this sector faces recurring obstacles. Failures in communication, disorganization of tasks and lack of standardization. Faced with these challenges, this study proposed the development of an application as a tool to support the operational routine.

With this scenario, we aimed to build a prototype that could standardize work routines. This allowed real-time monitoring of tasks and facilitates the exchange of information between the different sectors involved. The methodology used was from a literature review to prototyping at Figma, with usability tests with professionals in the hotel area in Manaus.

It can be said that the results obtained were very positive. Most participants gave positive feedback regarding the clarity of the interface. The usefulness of the checklist and the organization of tasks in the application also received highlights. The evaluations were concentrated between notes 7 and 10. The graphs analyzed reinforced the perception that the system significantly facilitates the routine of the teams involved in the department.

The system has the capacity to bring important gains for the institution. By making tasks more organized and improving workflow, productivity tends to grow, and guests are happier. These effects, in turn, positively impact both the professional and social environment. In addition, the proposal paves the way for exploring new technologies applied to hotel management.

Even with the positive results, the study still has limitations, especially regarding its application in larger contexts. It is worth noting that the system is still in prototype phase and has not been tested in real use. For future research, it is recommended to implement the system in partner hotels and track its effects over time. It is necessary to consider the inclusion of new functionalities as operational needs are being identified in the department.

References

[1] Ataíde, M. Rotatividade No Setor De Governança Hoteleira: Um Estudo De Caso. Monografia (Especialização) — Universidade Federal De Minas Gerais, Belo Horizonte, 2011. Disponível Em: Https://Repositorio.Ufmg.Br/Bitstream/1843/54704/1/Mono_Final.Pdf Accessed On: April 08, 2025

[2] Dantas, M. Abc De Housekeeping: Um Método De Alta Performance Para A Governança Hoteleira. Disponível Em: <Https://Abgnacional.Com.Br/Wp-Content/Uploads/2020/04/Ebook-Abc-Do-Housekeeping.Pdf>. Accessed On: February 25, 2025.

[3] Dawson, M. Sistema De Gestão De Propriedades Hoteleiras - Siteminder. Disponível Em: <Https://Www.Siteminder.Com/Pt/Tir/Sistema-De-Gestao-De-Propriedades-Hoteleiras>. Accessed On: March 16, 2025.

[4] Flexkeeping. Hotel Housekeeping Software - Flexkeeping. Disponível Em: <Https://Flexkeeping.Com/Products/Housekeeping-Software>. Accessed On: March 11, 2025.

[5] Galvão, R. Hospedagens Memoráveis: Como Criar Estadias Inesquecíveis Na Era Digital E Da Experiência. Disponível Em: <Https://Plataforma.Bvirtual.Com.Br>. Accessed On: February 20, 2025.

[6] Guedes, Gilleanes T. A. Uml 2: Uma Abordagem Prática. 3. Ed. São Paulo: Novatec, 2018.

[7] Lüthy, Bianca. Hospitality Industry Trends For 2025. Ehl Insights, 04 Jan. 2025. Disponível Em: <Https://Hospitalityinsights.Ehl.Edu/Hospitality-Industry-Trends>. Accessed On: March 30, 2025.

[8] Martins, A. Normativa De Housekeeping: Como A Tecnologia Facilita A Sua Implementação. 2023. Disponível Em: <Https://Eisisoft.Com/Pt/Novidades/Normativa-De-Housekeeping-Como-A-Tecnologia-Facilita-A-Sua-Implementacao>. Accessed On: March 12, 2025.

[9] Nielsen, Jakob. 10 Heurísticas De Usabilidade. Nielsen Norman Group, 1994. Disponível Em: <Https://Www.Nngroup.Com/Articles/Ten-Usability-Heuristics/>. Accessed On: April 18, 2025.

[10] Nunes, T. F. Mapeamento De Stakeholders: Como Fazer? Brasília: Universidade De Brasília; Ministério Da Saúde, 2023. Disponível Em:<Https://Sds.Unb.Br/Wp-Content/Uploads/2023/11/Sds-Como-Fazer-O-Mapeamento-De-Stakeholders.Pdf>. Accessed On: March 22, 2025.

[11] Paixão, T. M. A. Da; Salazar, V. S. Robotização E Experiência De Consumo Em Hotéis Na Ásia: Uma Análise Qualitativa De Comentários No Tripadvisor. Revista Turismo Em Análise, São Paulo, V. 32, N. 3, P. 499–516, Set./Dez. 2021. Disponível Em: <Https://Www.Revistas.Usp.Br/Rta/Article/View/192733 >. Accessed On: April 9, 2025.

[12] Roomraccoon. Roomraccoon Hotel Software. Disponível Em: <Https://Roomraccoon.Com/Platform/Housekeeping>. Accessed On: April 9, 2025.

[13] Santos, S. Da S. A Obsolescência Da Tecnologia Na Hotelaria: Um Estudo Sobre Os Impactos No Atendimento Diante De Sistemas Desatualizados. Revista Brasileira Online De Turismo (Rebot), V. 4, N. 1, P. 1–14, 2024. Disponível Em: <Https://Periodicos.Apps.Uern.Br/Index.Php/Rebot/Article/View/6396>. Accessed On: April 9, 2025.

[14] Sarkar, S. House Keeping Management. Disponível Em: <Https://Baou.Edu.In/Assets/Pdf/Dhtm-106.Pdf>. Acesso Em: March 13, 2025.

[15] Singh, A. Hotel Housekeeping: Modern Practices, Challenges, And Opportunities – An Appraisal. [S.L: S.N.]. Disponível Em: <Https://Www.Researchgate.Net/Publication/332142644_Hotel_Housekeeping_Modern_Practices_Challenges_And_Opportunities_-An_Appraisal>. Accessed On: March 7, 2025.

[16] Sommerville, I. Engenharia De Software. Tradução Luiz Cláudio Queiroz; Revisão Técnica Fábio Levy Siqueira. 10. Ed. São Paulo: Pearson Education Do Brasil, 2018. Disponível Em: <Https://Dn720704.Ca.Archive.Org/0/Items/Sommerville-Engenharia-De-Software-10e/Sommerville%20engenharia%20de%20software%2010e.Pdf>. Accessed On: March 22, 2025.

[17] Verma, S. Introduction To The Hospitality Industry's Housekeeping Department - An Explanatory Study. International Journal Of Novel Research And Development (Ijnrd), V. 9, N. 5, Maio 2024.