Journal of Technology and Innovation 13[31]1-12: e11331112
Article

Web system for the administration of users and processes in a cab company

Sistema web para la administración de usuarios y procesos en una empresa de taxis

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Classification:

Area: Engineering and Technological Development
Field: Engineering
Discipline: Systems engineer
Subdiscipline: Computer Science

https://doi.org/10.35429/JTI.2026.13.31.1.1.12
History of the article:
Received: January 10, 2026
Accepted: March 31, 2026

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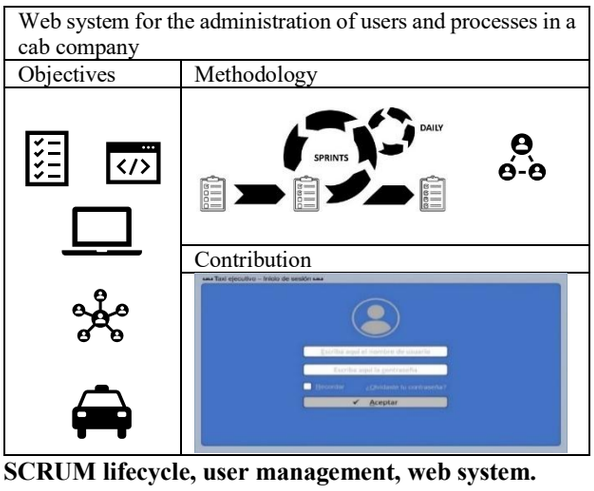
Abstract

In the context of an increasingly digitized business environment, organizations are optimizing their processes to maximize performance in their core operational domains. This paper presents the design and implementation of a customized user administration and process management system for a cab company. The development process followed the SCRUM framework, ensuring iterative progress and stakeholder involvement throughout the lifecycle. Additionally, established usability principles were integrated into the system design to enhance organizational efficiency, support informed decision-making, and facilitate the achievement of end-user objectives. The resulting solution is a fully customized system that addresses the company's specific operational requirements, thereby strengthening its management capabilities and control mechanisms.



SCRUM lifecycle, user management, web system.

Resumen

En el contexto de un entorno empresarial cada vez más digitalizado, las organizaciones están optimizando sus procesos para maximizar el rendimiento en sus ámbitos operativos principales. Este artículo presenta el diseño y la implementación de un sistema de administración de usuarios y gestión de procesos adaptado a una empresa de taxis. El proceso de desarrollo siguió el marco SCRUM, lo que garantizó un progreso iterativo y la participación de las partes interesadas a lo largo de todo el ciclo de vida. Además, se integraron principios de usabilidad establecidos en el diseño del sistema para mejorar la eficiencia organizativa, respaldar la toma de decisiones informadas y facilitar el logro de los objetivos de los usuarios finales. La solución resultante es un sistema totalmente personalizado que responde a los requisitos operativos específicos de la empresa, reforzando así sus capacidades de gestión y sus mecanismos de control.

Administración de usuarios, ciclo de vida SCRUM, sistema basado en web.

Area: Promotion of frontier research and basic science in all fields of knowledge

Citation: Barrón-Adame, José Miguel, Quintanilla-Domínguez, Joel, Ojeda-Magaña, Benjamín and Aguirre-Puente, José Alfredo. [2026]. Web system for the administration of users and processes in a cab company. Journal of Technology and Innovation. 13[31]1-12: e11331112.

Introduction

In parallel with advances in information and communication technologies, information systems—particularly web applications—have transformed how organizations of all sizes manage internal processes, access and disseminate information, conduct business, deliver instruction, and communicate [Hernández & Vega, 2017]. A web-based user and process management system centralizes and optimizes internal operations by consolidating user, role, and workflow administration [Ali et al., 2025]. Its design emphasizes user experience [UX] through intuitive, responsive interfaces that ensure accessibility and usability [Sukamto et al. 2020]. Demand for these applications has increased markedly as the Internet has become the primary platform for information dissemination and service delivery [Hernández Claro & Greguas Navarro, 2010; Miniaoui et al. 2026].

For a website to be effective, it must demonstrate a high level of usability. Usability is defined as the extent to which a system enables specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a given context of use [Muhammad et al., 2020].

Optimal web design therefore incorporates several key criteria, including ease of use, navigability, accessibility, simplicity, clarity of content, accommodation for color-vision deficiencies, visual presentation and graphics, and the integration of emergent technologies. High usability reduces cognitive load, facilitates task completion, and increases user comfort and overall satisfaction [Aziz et al., 2020].

Despite substantial development efforts, many contemporary systems continue to exhibit suboptimal usability because design priorities frequently emphasize internal quality attributes—such as performance, reliability, and scalability—over user-facing concerns.

Consequently, essential aspects of interaction design—maintaining user engagement, adapting interfaces to individual user characteristics through personalization and adaptive techniques, and ensuring the rapid retrieval and presentation of requested information—are often marginalized [Mvungi & Tossy, 2015].

This misalignment between engineering-centric metrics and user-centered objectives undermines task efficiency, increases cognitive load, and diminishes overall user satisfaction.

This paper presents the development of a web-based user administration and process-management system for a cab company. The system was implemented using the Scrum lifecycle, and a set of established usability criteria was integrated into both the design and evaluation phases. The remainder of the manuscript is structured as follows: Section II presents the state of the art. Section III details the materials and methods; Section IV presents the findings and accompanying discussion; and Section V offers the study's conclusions and implications.

State of the Art

Literature provides substantial evidence of the benefits derived from applying agile methodologies to web application development [Kirovska & Koceski, 2015; Poppendieck & Poppendieck, 2003; Schwaber & Beedle, 2001]. Notable domains in which such approaches have been successfully implemented include business-to-business [B2B] and business-to-customer [B2C] e-commerce platforms, social networking services, as well as educational and entertainment systems [Abdul-Aziz et al., 2012]. [Fitriani et al., 2022] designed and developed an e-commerce module for a Village Information System using an agile methodology. The system implements role-based control interfaces for administrators, sellers, and buyers, with role-specific functionality customized to the informational needs and activities of each user group.

The agile practices adopted included Sprint Planning, Sprint execution, Sprint Review, and Sprint Retrospective. The authors conclude that the resulting e-commerce platform constitutes a novel feature for rural communities, providing villagers with an accessible mechanism to market local products online. [Wulansari et al., 2022] developed an *e*-commerce website using the Scrum methodology. The development lifecycle comprised three sprints to complete the product backlogs for both administrator and customer roles.

ISSN: 2410-3993.
RENIECYT: 1702902

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The system defines two principal user classes—administrators and customers—each of whom authenticates via a login mechanism and is subsequently presented with role-specific functionality.

The authors conclude that the proposed Scrum-based web system can assist small and medium-sized enterprises [SMEs], particularly traditional retail shops, in managing product catalogs and sales data.

Moreover, the platform streamlines the ordering process for customers and enables effective monitoring of order progress. [Anis & Mohd Safar, 2022] developed a web-based hostel management system. The objectives of the project were to design and implement the application and to evaluate its functionality and usability. The Waterfall model was selected as the development lifecycle. Key system features include user registration, authentication, an administrative dashboard, user-data management, and PDF generation. The platform enables hostel applicants, school administrators, and hostel managers to perform their respective tasks entirely through the system, thereby obviating the need for in-person meetings during the application process.

In contrast, the scientific community highlights the necessity of rigorous measurement criteria to evaluate "quality of use" attributes—most prominently usability—in web applications [Hasan & Abuelrub, 2011]. [Diniz et al., 2005] proposed a user-centred model for evaluating and constructing digital business environments that operationalizes usability through three categories: layout, data entry, and user-on-command.

The layout category comprises design principles such as consistency, visibility, and timely feedback; the data-entry category addresses error prevention, forgiveness, and error recovery/handling; and the user-on-command category covers searchability, the provision of multiple pathways to accomplish identical tasks, and interface personalization/customization. [Abdul Majid et al., 2014] identified four primary usability criteria for evaluating e-commerce websites: Ease of Use, Customized Design, Emotion, and Content.

Each criterion was further operationalized into subordinate dimensions: Ease of Use encompassed viewing, selection, addition, and removal actions [i.e., core transactional interactions]; Customized Design encompassed product presentation, accessibility, and service provision; Emotion captured the users' affective responses to the interface and interaction; and Content referred to the structure and layout of information. Framing these criteria as measurable usability dimensions facilitates systematic evaluation and targeted design interventions for commercial web platforms.

Agile Scrum methodology

Agile methodologies have gained widespread adoption in software engineering as a strategy for enhancing product quality and accelerating delivery cycles [Dahbi & Benmoussa, 2019; Fuertes & Sepúlveda, 2016]. Among these, the Scrum framework has emerged as one of the most prominent approaches, specifically designed to support agile software development processes through iterative and incremental delivery models [Sasmito & Zulfiqar, 2020]. Scrum provides a structured yet adaptable framework for managing software development projects, encompassing product definition, backlog prioritization, sprint planning, and incremental release management to facilitate continuous value delivery [Kabanda & Brown, 2017; Murshed et al., 2018; Sommerville, 2011].

Traditional system development methodologies are often regarded as less efficient and less effective due to their limited flexibility in accommodating change and their heavy reliance on extensive documentation. In contrast, agile methodologies prioritize team cohesion and active collaboration with clients, enabling rapid adaptation to evolving requirements and the delivery of high-quality, functional products [Kabanda & Brown, 2017].

Within the agile paradigm, Scrum has become the most widely adopted framework, favored for its emphasis on iterative and incremental development rather than rigid, purely technical processes [Febrianto et al., 2020; Sommerville, 2011]. [Figure 1] illustrates the Scrum workflow, outlining its sequential and cyclical stages for continuous value delivery.

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Box 1

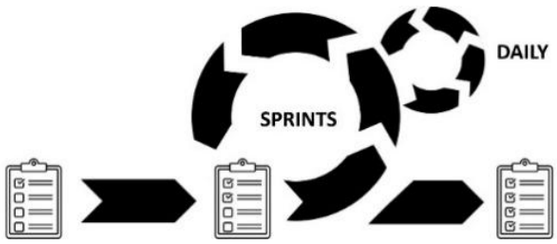

Figure 1
SCRUM workflow
Source: Own elaboration

The Scrum methodology emphasizes adaptability, ensuring that deliverables align with the precise and evolving needs of the customer. Consequently, each increment must be reviewed and refined to accommodate short-term requirement changes. In the context of this work, the application of Scrum is structured into the following stages: definition of Scrum roles, creation of user stories, formulation of the product backlog, and sprint planning [Wakil et al., 2015].

Usability

In contemporary system design, usability constitutes a critical dimension of the overall user experience, as it is directly associated with user satisfaction. According to [ISO, 2019], usability is defined as the extent to which a system can be employed by specified users to achieve defined goals with effectiveness, efficiency, and satisfaction within a given context of use. [Nielsen, 1994] identifies five key attributes that a system's user interface should embody—*learnability*, *efficiency*, *memorability*, *error management*, and *satisfaction*—while later emphasizing that usability represents "a quality attribute that evaluates how easy user interfaces are to use, or methods for improving ease of use during the design process" [Karthik & Vaishnavi, 2022; Nielsen, 1999]. Below are the key web design criteria for usability that have been applied. [Conte et al., 2007].

- Visibility of system status.
- Relationship between the system and the real world.
- User control and freedom.
- Consistency and standards.
- Error prevention.
- Recognize before remembering.
- Flexibility and efficiency of use.
- Aesthetic and minimalist design.
- Help users recognize, diagnose, and correct errors.
- Help and documentation.

Materials and methods

Materials

For the development of the web-based system, Microsoft® SQL Server was employed as the primary relational database management system [RDBMS], while the application layer was implemented in C# and developed within the Visual Studio integrated development environment [IDE]. MySQL is noted in the literature for its ease of use in designing large relational schemas and for its common integration with PHP-based technology stacks. C# is a modern, general-purpose, object-oriented programming language developed by Microsoft and formalized through international standardization bodies [ECMA, 2022], which facilitates language conformance, portability, and interoperability across .NET implementations [*Santoro et al., 2019*].

The database was implemented on an Apache HTTP Server using Structured Query Language [SQL] with MySQL as the relational database management system. Its schema was derived from the entity–relationship diagram produced during the design phase. PHP functioned as the primary server-side scripting language for application logic, while JavaScript provided client-side interactivity. Presentation and layout were implemented using HTML5 and Cascading Style Sheets [CSS], maintaining a clear separation of concerns between data, logic, and presentation to enhance maintainability and extensibility.

Methods

The SCRUM life cycle was used to develop the web system. Each of the sprints is described below.

Project Backlog: In this phase, user stories are elicited from stakeholders through targeted requirement questions—for example, "How do I want it?" and "What do I want it for?".

Planning sprints: During this phase, a detailed plan and execution structure for each sprint are established.

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Effort estimates for user stories were derived—using average completion times or standard estimation techniques [e.g., story points or time-based estimates]—to determine the scope of work assigned to each sprint. Based on these estimates, the sprint backlog was defined by selecting the user stories to be implemented in the upcoming timebox. In addition, task sequencing, sprint duration, resource assignments, and project governance artifacts—such as acceptance criteria, the Definition of Done, and progress-monitoring mechanisms—were specified to guide and control sprint execution.

Prototype solution: In this phase, the primary design concepts for the project were defined and articulated. For the data tier, an entity–relationship [ER] diagram was produced to represent the database's conceptual model based on the project structure; this diagram subsequently served as the basis for the logical schema and for guiding implementation decisions.

Development: In this phase the initial functional increment of the project was produced, comprising implementation of the web application code and the database schema. Work was executed on a sprint-by-sprint basis in accordance with the sprint plan, following an iterative cycle of implementation and verification until the planned scope for each sprint was completed. During each sprint, unit and regression tests were executed on newly integrated functionality to validate correctness, prevent regressions, and ensure that acceptance criteria and the Definition of Done were satisfied before backlog items were considered complete. Testing: During this phase, empirical evidence was collected to inform iterative refinements through a program of functional verification and user acceptance testing.

Functional evaluations included integration and security testing to verify interaction between components and to assess system resilience. User acceptance testing [UAT] was conducted with representative end users, who provided formative feedback on a sprint-by-sprint basis. Test execution results and associated artifacts were documented, outcomes were classified as passed or failed, and identified defects were logged for subsequent remediation and regression verification.

Improve: In this phase, adjustments and refinements were implemented to optimize system functionality and the user experience based on empirical test results. Failed test cases and associated defect reports were transferred to the development team for remediation and prioritized through defect triage. Developers implemented fixes and enhancements, after which the testing team re-executed the affected test cases—including targeted regression tests—to verify resolution.

This iterative remediation–verification cycle continued until the predefined acceptance criteria were satisfied and the relevant defects were closed. All changes, test outcomes, and updated test artifacts were documented to preserve traceability and support subsequent maintenance activities.

Retrospective: During this phase the team conducts a structured retrospective to capture lessons learned from the completed sprint and to identify process- and product-level improvements for subsequent iterations. The retrospective evaluates project progress using stakeholder feedback and objective metrics [e.g., sprint velocity, defect density] to determine whether the sprint goal and the sprint's planned user stories—assessed against predefined acceptance criteria—were achieved.

When objectives are not met, the team performs a root-cause analysis, documents the underlying causes, and defines concrete, time-bound action items with assigned owners; these actions are either prioritized in the product backlog or incorporated into the next sprint. All findings, decisions, and resulting improvement tasks are recorded to preserve traceability and to support continuous process improvement.

Results and discussions

The developed web-based system enables centralized management of user data and operational processes for a cab company. To support core workflows, a secure authentication interface and a main-menu interface were implemented. The main menu exposes administrative and company-level modules as well as additional role-specific modules. The modules implemented for each menu are described below.

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Login interface

The web system's entry point is an authentication interface that requires users to provide a username and password. If an account has not been previously provisioned, an administrator must create the user record through the administrative module. The login interface is shown in [Figure 2]. Database connectivity routines were implemented for this form to authenticate users based on the credentials entered in the input fields.

Concretely, an instance of the MySqlCon class was instantiated to perform queries and manipulate the persistent data store, enabling verification of whether a submitted user account exists.

Beyond username and password validation, the user-management interface allows administrators to perform typical CRUD operations on user records, upload a profile photograph, and toggle employee account activation status. This administrative functionality centralizes user provisioning and lifecycle management [Ali et al., 2025] and, by exposing these controls, supports activity tracking and operational oversight for system users [Fitriani et al., 2022].

Box 2

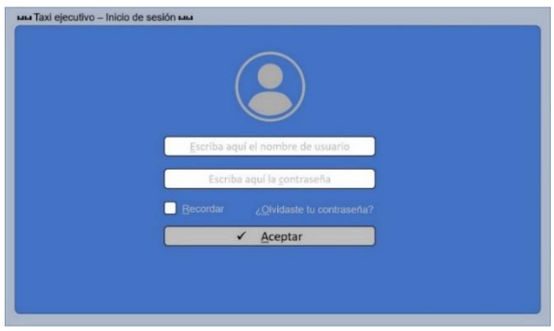

Figure 2
Login interface
Source: Own elaboration

Main menu

An administrator-facing user interface was developed for the web application, comprising three primary menus—Administration, Companies and Company —each exposing role-specific management controls and configuration options. A representative view of the interface is presented in [Figure 3].

Box 3

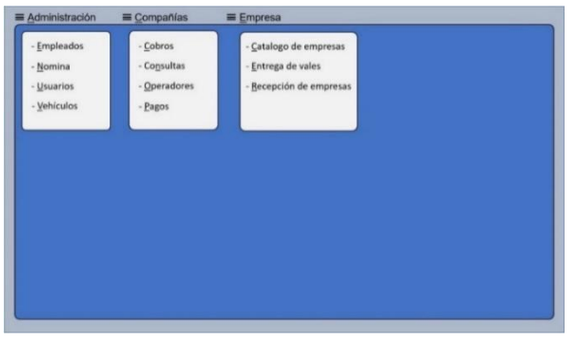

Figure 3
Main menu interface
Source: Own elaboration

The Administration menu manages internal records—employee profiles, payroll information, user accounts, and company vehicles. The Companies menu handles external operational data, including collections, inquiries, operators, and payments. The Company menu oversees corporate catalogs, voucher distribution, and reception functions. By organizing administrative functionality into these coherent menus, the system provides intuitive navigation and streamlined access to operational data, enabling users to monitor resource utilization and track managerial workflows [Anis & Mohd Safar, 2022; Aziz et al., 2020]. The following subsections provide a detailed description of each module in the menus.

Management menu

Within the administration menu, functional modules for employee management, payroll processing, user-account administration, and vehicle asset management were integrated to centralize administrative operations and support organizational workflows.

Employees module: This module enables the creation and management of employee records. It supports operations to create, update, deactivate, or permanently delete employee accounts, with all data persisted to the relational database via an instance of the MySqlCon class.

To facilitate unambiguous identification and personnel verification, the module permits uploading a profile photograph. [Figure 4[a]] shows the employee module.

ISSN: 2410-3993.
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Payroll module: This module captures payroll records for employees already registered in the system. To create a payroll entry, an operator selects an employee, and the system automatically populates the employee's job title. Once a payroll record is committed, it is treated as immutable to preserve data integrity and support an auditable record of transactions. The module also provides functionality to generate a printable report of the recorded payroll data. [Figure 4[b]] shows the payroll module.

Users module: This module enables creation and modification of user accounts and the assignment of privilege levels that determine available functionality via role-based access control.

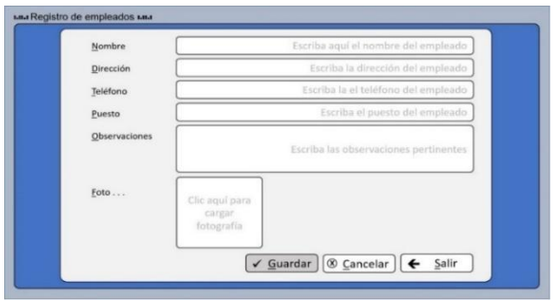
It enforces input validation on form fields and applies the same business rules and verification procedures used in the employee-registration module. All user records and updates are persisted to the relational database and governed by the system's validation and audit mechanisms. [Figure 4[c]] shows the user module.

Vehicles module: This module supports the registration and maintenance of company vehicle records, including the ability to set each vehicle's activation state [active/inactive].

It features an advanced, parameterized search function with an autocomplete capability to expedite information retrieval. All vehicle data are persisted in the relational database and subject to the system's validation and audit rules. [Figure 4[d]] shows the vehicles module.

The implementation of these functional components enables end-to-end process centralization and supports the optimization of internal operations by improving process visibility, reducing redundancies, and increasing control over execution pathways [Ali et al., 2025].

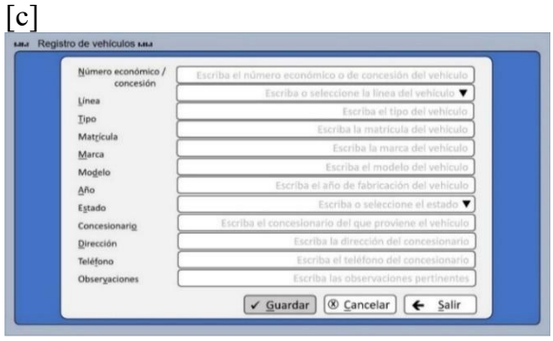
Box 4



[a]

[b]

[c]



[d]

Figure 4

Administration modules for [a] employees, [b] payroll, [c] users and [d] vehicles.

Source: Own elaboration

Company menu

The company menu constitutes an integrated enterprise system that consolidates key business processes, including accounts receivable management, customer service inquiries, invoicing workflows, operator task allocation, payment processing, and vehicle asset tracking, thereby enabling seamless data flow across functional modules. Each of these modules is described below.

ISSN: 2410-3993.
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Payments module: [Figure 5[a]] illustrates the module dedicated to the registration of financial transactions directed to business units or operational agents. This module enables the selection of a specific unit, which triggers an automated retrieval of associated metadata—including the operator's name, current account balance, and profile image—via database lookup. Users may input transactional details such as payment amount and associated cost descriptors.

Additionally, the module supports the application of redeemable vouchers, which are validated and applied to offset the payment amount, subsequently updating the operator's outstanding balance in real time. Upon confirmation and data validation, the transaction is committed to the backend database, and a physical or digital receipt is automatically generated. This module incorporates the highest number of functional methods within the system, reflecting its central role in the transaction processing workflow.

Query module: The query module, shown in [Figure 5[b]], enables parameterized searches across multiple operational dimensions, supporting administrative oversight and financial auditing. Specific query capabilities include identifying entities that have fulfilled their frequency payments, detecting accounts with outstanding balances [i.e., receivables], and determining the number of operational days accrued by a given unit. This module provides structured search functionality across key transactional domains, including collections, payments, account balances, voucher utilization, and receipt history. By integrating these retrieval functions into a unified module, the system facilitates efficient data interrogation, enhances situational awareness, and supports decision-making processes within the organizational workflow.

Cash closing module: The cash closing module, illustrated in [Figure 5[c]], automates the generation of comprehensive transactional reports in PDF format, summarizing all financial and operational activities executed within the organization over a specified period. Users are required only to define a cash closing date, which serves as the primary temporal parameter for data filtering. The module is integrated with ReportViewer, a server-based reporting platform that enables dynamic report rendering through a graphical user interface [GUI].

This integration facilitates declarative report design and execution, minimizing the need for procedural coding and promoting maintainability, reusability, and rapid deployment within the system architecture.

Operators module: The operator management module, shown in [Figure 5[d]], facilitates the administration of operator records within the system. It supports a comprehensive set of CRUD [Create, Read, Update, Delete] operations, including the registration and modification of operator profiles, suspension or reactivation of operator status, and cancellation of incomplete registration workflows. Additionally, the module enables the upload and storage of operator photographs as part of the digital identity record. In contrast to other functional modules, this module integrates a dedicated vehicle search functionality, allowing for the dynamic association of operators with assigned vehicles, thereby enhancing data coherence and operational traceability within the organizational database.

Payment module: The payment module, illustrated in [Figure 5[e]], enables the selection of a registered unit through an autocomplete mechanism, which triggers the automatic retrieval of associated operator data—including name, current account balance, and profile photograph—from the backend database. This contextual data population enhances input accuracy and system usability. Users may specify transactional details such as cost descriptors and apply available vouchers linked to the unit, which are validated in real time and applied to reduce the payment amount. This functionality supports efficient, error-resistant transaction processing within the financial workflow.

Vehicle module: The vehicle management module, showed in [Figure 5[f]], enables administrators to perform structured queries on the vehicle registry within the system. It incorporates a configurable search filter that supports data segmentation based on insurance status—allowing the display of all registered vehicles or only those currently insured. Query results present a comprehensive set of vehicle attributes, including concession details, dealer information, line assignment, model, manufacturing year, registration number, and operational annotations. This functionality enhances data accessibility, supports compliance monitoring, and facilitates fleet oversight within the organizational governance framework.

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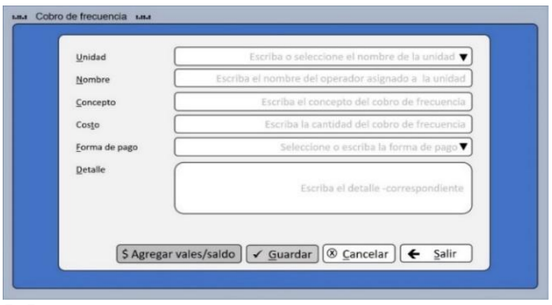
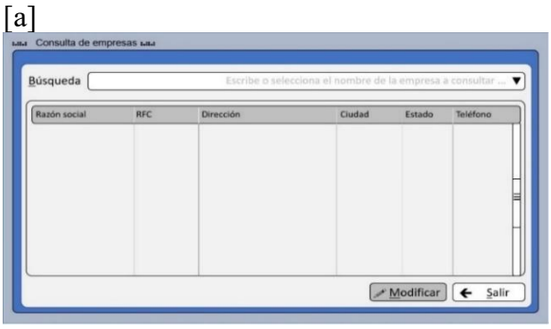
The deployment of these modules enables the centralization of core business processes and supports the systematic optimization of both internal workflows and external operational management, thereby improving process coherence, operational transparency, and cross-functional integration within the enterprise architecture [Ali et al., 2025].



[a]



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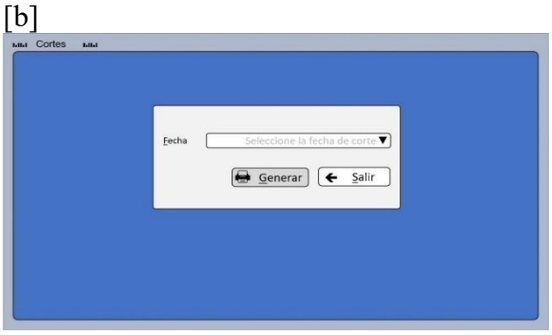

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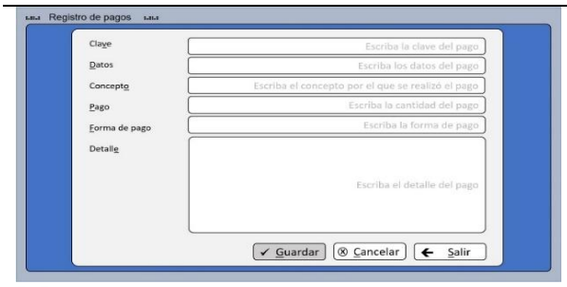
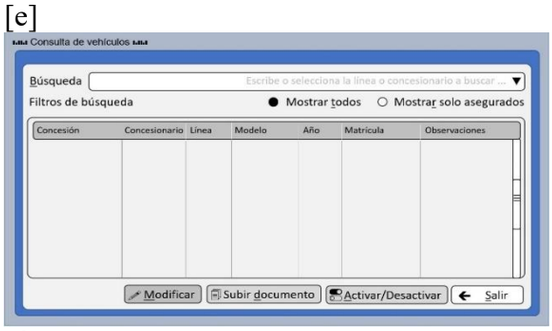


[e]



[f]

Figure 5

Modules of the company menu for [a] recording collections, [b] consulting companies, [c] cash closing, [d] registering operators, [e] recording payments, [f] consulting vehicles.

Source: Own elaboration

Companies menu

Finally, the companies menu has been extended to incorporate three core functional modules: the business catalog, voucher issuance, and voucher receipt management. Each of these components is formally specified and functionally described in the following sections, contributing to the system's capacity for structured data management, traceable transaction handling, and operational accountability.

Company module: [Figure 6[a]] illustrates the module dedicated to the registration and administration of corporate entities affiliated with the executive cab service. This module supports full lifecycle management of company records, including creation, updating, and persistent storage of organizational data. In addition, it enables query operations based on key attributes such as company name or geographic location, facilitating efficient retrieval and data navigation within the system. The integration of these functionalities enhances data accessibility and supports structured governance of business partners in the service ecosystem.

ISSN: 2410-3993.
RENIECYT: 1702902

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https://doi.org/10.35429/JTI.2026.13.31.1.1.12

Voucher registration module: Registered companies within the system are authorized to issue and manage vouchers, which are uniquely identified by a combination of serial number and folio identifier. [Figure 6[b]] shows the module responsible for the registration of vouchers, enabling the association of voucher records with their respective issuing entities. This functionality ensures traceability, prevents duplication, and supports auditability in voucher lifecycle management.

Voucher receipt module: The voucher receipt module, illustrated in [Figure 6[c]], enables the systematic recording of transactional data associated with each voucher, including the passenger's name, destination, fare amount, issuing company, and the vehicle responsible for service fulfillment. This functionality supports comprehensive data capture, enhances traceability across service operations, and ensures the integrity of financial and operational records within the system.

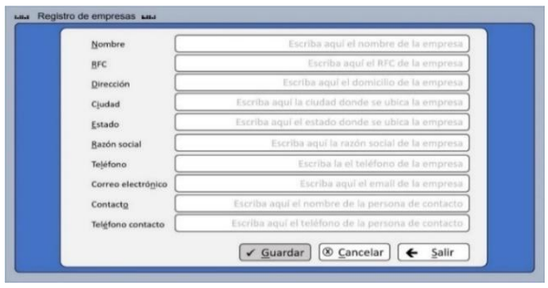
The implementation of these modules enables the centralization of business processes and facilitates the optimization of information management, as well as the coordination of internal and external operational workflows [Ali et al., 2025].

Furthermore, user interfaces serve as critical control points for regulating access, monitoring system interactions, and enforcing role-based behaviors according to user profiles, thereby supporting secure and context-aware information governance [Anis & Mohd Safar, 2022; Fitriani et al., 2022; Wulansari et al., 2022].

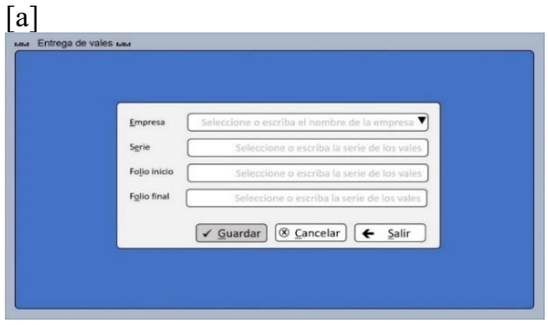
The customized design of the web-based system enhances usability through intuitive navigation and role-specific functionality, aligning with established principles of user-centered design [Abdul Majid et al., 2014; Diniz, 2005].

As such, these interface characteristics are recognized as key determinants of system usability and perceived quality of use [Hasan & Abuelrub, 2011].

Box 6



[a]



[b]

[c]

Figure 6

Modules of the companies menu for [a] company registration, [b] voucher registration and [c] voucher receipt.

Conclusions

This article presents the outcomes of implementing the Scrum methodology and integrating usability engineering principles in the development of a web-based system for user and process management within a cab service organization. The implemented solution demonstrates effectiveness in addressing the company's specific operational requirements, offering a customized and scalable approach to administrative and operational optimization. The application of the Scrum framework enabled an iterative and collaborative development process, supporting continuous refinement through stakeholder feedback and incremental delivery of functional components. Furthermore, the incorporation of core usability criteria—such as ease of use, intuitive navigation, accessibility, conceptual clarity, user-centered design, and the adoption of contemporary technologies—ensured the creation of a cognitively efficient and interactionally robust system.

ISSN: 2410-3993.
RENIECYT: 1702902

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https://doi.org/10.35429/JTI.2026.13.31.1.1.12

This user-centric approach not only enhances system adoption and operational fluency but also contributes to improved organizational performance and decision-making capabilities. Empirical results indicate that the developed system significantly streamlines administrative and operational workflows within the company's management division, reduces processing time and resource expenditure, and strengthens the oversight and coordination of human and material assets. As a result, the solution enhances operational control, monitoring accuracy, and goal attainment, aligning technical implementation with strategic business objectives.

Conflict of interest

The authors declare that they have no conflicts of interest related to the development of the present study.

Author contribution

Conceptualization, formal analysis and writing–original draft were performed by Barrón-Adame, J. M. Aguirre-Puente, J. A. Investigation was conducted by Barrón-Adame, J. M. Methodology was conducted by Aguirre-Puente, J. A. Supervision & Validation were performed by Barrón-Adame, J. M., Quintanilla-Domíguez, J. Writing –review & editing were performed by Quintanilla-Domínguez, J. Ojeda-Magaña, B. Software was performed by Aguirre-Puente, J. A.

Availability of data and materials

This investigation handles sensitive data belonging to individuals and users that cannot be disclosed. The material generated corresponds to software used by the taxi company, which also handles sensitive data belonging to the company and is installed on its computers

Funding

This research did not receive any type of support or funding.

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