



Web system for the dynamization of inventory management and marketing strategies in peruvian supermarkets

Sistema web para la dinamización de la gestión de inventario y estrategias de marketing en supermercados peruanos

Reyes-Riveros, Anderson Jhanyx^{1*}; Castillo-Sarmiento, José María Hermes¹; Santos-Fernández, Juan Pedro¹; Alcántara-Moreno, Oscar Romel¹; Sánchez-Ticona, Robert Jerry¹

¹Universidad Nacional de Trujillo, Trujillo, Perú

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Corresponding author*: ajreyesr@unitru.edu.pe

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ABSTRACT

Faced with the demand for innovative approaches in supermarkets, where efficient inventory management and marketing strategies are crucial for relevance and competitiveness, the importance of a web-based system supported by the agile Scrum methodology is highlighted. The central objective is to explore the importance of this system for streamlining inventory management and marketing strategies in supermarkets, demonstrating its ability to address current challenges and offer future flexibility. Scrum methodology was implemented, with the system design based on technologies such as HTML, CSS, PHP, Node.js, Laravel and SqlServer express, ensuring agile and adaptive development. The results include defined roles, prioritisation of the Product Backlog, planning and estimation through story points, positive evaluation of economic indicators and efficiency in performance testing using JMETER. The discussion highlights the need to align system choice with information systems tactics, emphasising the assessment of economic indicators and load and stress testing. In conclusion, the Scrum-supported web system has been successful in improving inventory management and marketing strategies, enhancing user experience with positive economic indicators and efficient load testing.

Keywords: warehouse; JMETER; Scrum; information system

RESUMEN

Frente la demanda de enfoques innovadores en supermercados, donde la administración eficiente de inventarios y estrategias de marketing es crucial para la pertinencia y competitividad, se resalta la importancia de un sistema web respaldado por la metodología ágil Scrum. El objetivo central fue explorar la importancia de este sistema para dinamizar la gestión de inventarios y estrategias de marketing en supermercados, demostrando su capacidad para abordar desafíos actuales y ofrecer flexibilidad futura. Se implementó la metodología Scrum, con el diseño del sistema basado en tecnologías como HTML, CSS, PHP, Node.js, Laravel y SQL Server Express, garantizando un desarrollo ágil y adaptable. Los resultados incluyen roles definidos, priorización del Product Backlog, planificación y estimación mediante puntos de historia, evaluación positiva de indicadores económicos y eficiencia en pruebas de rendimiento utilizando JMETER. La discusión destaca la necesidad de alinear la elección del sistema con tácticas de sistemas de información, enfatizando la valoración de indicadores económicos y pruebas de carga y estrés. En conclusión, el sistema web respaldado por Scrum ha tenido éxito al mejorar la gestión de inventarios y estrategias de marketing, elevando la experiencia del usuario con indicadores económicos positivos y pruebas de carga eficientes.

Palabras clave: almacén; JMETER; Scrum; sistema de información



1. INTRODUCTION

At the crossroads where market dynamics and technology converge, supermarkets are in a constant search for innovative solutions to face the ever-evolving challenges of retail (Samoggia et al., 2023). According to Jones et al. (2023), in an era where consumers are increasingly informed and demanding, efficient inventory management and marketing strategies are not just isolated components of a supermarket's operation. Instead, they are essential elements that ensure relevance and act as the threads shaping the fabric of a complete and satisfying shopping experience.

On the other hand, Jaime & Andrade (2021) highlight the vital importance of a web system infused with the agile Scrum methodology. This system not only addresses these critical aspects but also offers a dynamic and adaptable approach. Inventory management in supermarkets has evolved from a simple logistical task to a delicate art that balances supply and demand in real-time. According to Chuanpeng & Yi (2021), the complexity arises from the need to anticipate buying trends, efficiently manage the flow of perishables, and adapt to seasonal demand. Additionally, Montororing & Widyantoro (2022) point out that the lack of integrated tools has left supermarkets vulnerable to operational challenges, where the lack of visibility and coordination can directly translate into lost revenue and clientele.

Moreover, inventory management, while vital, is only half of the equation, as Ayala et al. (2021) assert. Ginantra et al. (2022) also affirms that the competitive landscape demands that supermarkets not only offer quality products but also build and maintain a relevant presence in the consumer's mind. This is where marketing plays a crucial role. Marketing strategies are essential for maintaining a prominent position in the consumer's mind, as Ponce et al. (2022) emphasize. Additionally, Liu & Liu (2023) state that the lack of integrated tools has left many supermarkets dealing with uncoordinated campaigns and slow responses to market dynamics. For Benmoussa (2022), the lack of a seamless connection between inventory management and marketing strategies has left many supermarkets dealing with uncoordinated campaigns and missed promotional opportunities.

According to Leung et al. (2018), the existing gap lies in the lack of an integrated outcome that optimizes both inventory management and marketing strategies. Rosin et al. (2023) points out that the absence of a platform that unifies these critical elements has resulted in disjointed decisions, logistical challenges, and ultimately a loss of competitiveness. This lack of integration translates into a fragmented customer experience and missed opportunities for supermarkets aiming to stand out in the saturated retail market.

Therefore, the main objective of this article was to develop an online system to streamline inventory management and marketing strategies in Peruvian supermarkets using the Scrum methodology. We will delve into how this comprehensive approach not only addresses current challenges but also lays the foundation for a future operation characterized by flexibility and efficiency. This study aims to demonstrate that the strategic adoption of a web-based system, supported by the Scrum methodology, not only meets current operational challenges but also represents an investment in the adaptability and continuous improvement of supermarkets in the dynamic retail environment.

2. MATERIALS AND METHODS

2.1. Web System Design and development

With the purpose of developing the web system, the free template Atlantis Lite was used as the starting point for the interfaces (views), This design was chosen for the system, applying UML notation in the creation and development process. The following materials were considered: HTML Version 5 for the website structure; CSS (Cascading Style Sheets) Version 3 for customizing the website; programming languages such as PHP Version 7.3.26, Node.js for JavaScript Version 20.2.0, Laravel framework Version 10.0; and SQL Server Express Version 2022.

The design followed the MVC pattern for a structured organization, dividing the application into model, view, and controller. Additionally, Yücenur (2023) highlights that this approach offers security, speed, and lightweightness, and SQL Server Express provides modern features for efficient data management, according to the methodology and tools emphasized in the literature.

2.2. Methodology

During the execution of the research focused on revitalizing inventory management and marketing strategies in supermarkets through a web application using the Scrum methodology, various approaches and tools were used to ensure the robustness and applicability of the proposals, aiming to achieve the proposed objectives. (Ventocilla Gomero et al. 2021).

SCRUM was the methodological strategy employed to develop the software, which constitutes a systematic approach to task and responsibility allocation in a development project, as indicated by Parada et al. (2020). Additionally, Toledo González et al. (2023) emphasizes that its ability to adjust and adapt as valuable information is acquired has established its position as one of the most used methodologies in software development.

SCRUM was designed to accelerate (in terms of both speed and adaptability) the value delivery by a team as stated by Neyra Gonzales et al. (2020). Furthermore, in another study, Kuz et al. (2018), report that the Scrum methodology consists of an agile process composed of five events distributed in Sprints (time-boxed iterations lasting 2 to 4 weeks), three distinct roles, three artifacts, and five values. This methodology includes phases such as User Role, Backlog (situational analysis), Sprint Backlog, Development, and Completion, which were employed in this study, as evidenced in Figure 1.

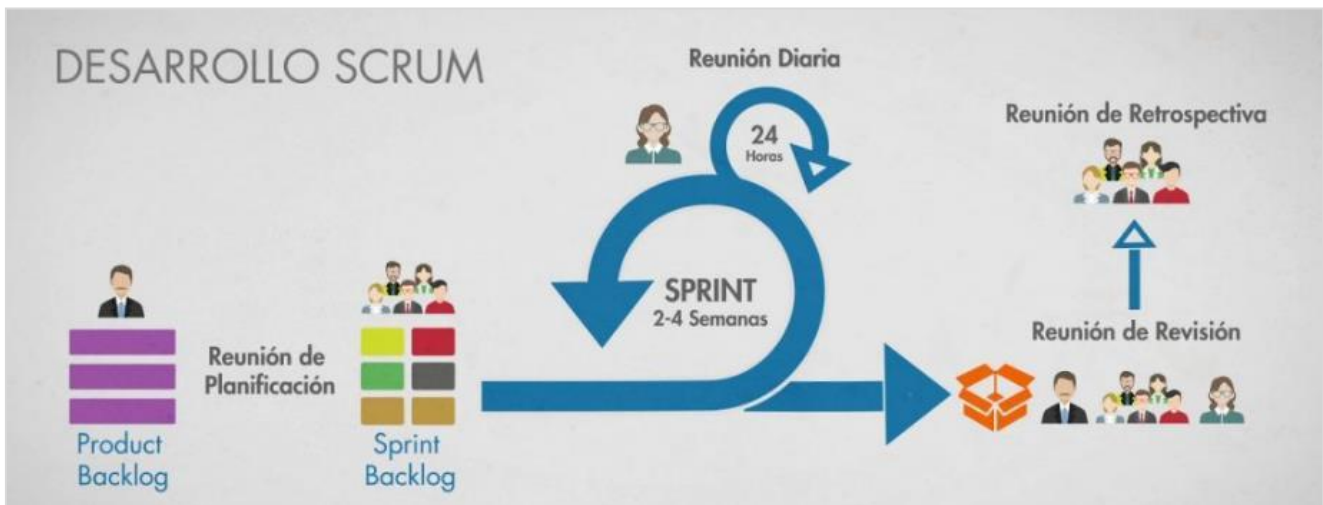


Figure 1. Scrum phases as designed by Alatawi (2022)

3. RESULTS AND DISCUSSIONS

3.1. User role

During this phase, the roles were defined as further explained below in Table 1.

Table 1.

Human Resources Roles

Recursos Humanos	Roles
Anderson Reyes	Product Owner
José Castillo	Scrum Master
Juan Santos	Equipo Scrum
Oscar Alcántara	Equipo Scrum

3.2. Prioritized Product Backlog

As Martin et al. (2023), Point out Product Backlog is a cornerstone tool in the Scrum methodology, providing a clear overview of the items to be addressed during development and serving as a guide for sprint planning and the incremental delivery of value to the customer. The product backlog for development consisted of user stories, organized according to implementation priority for both the inventory and marketing subsystems. The prioritized product backlog is presented in Table 2.

Table 2.

Product Backlog Priorizado Marketing e Inventario

User Story	Description	Priority
HU1	Access the system as a marketing administrator	1
HU2	Access the system as an inventory administrator	1
HU3	Enter the main page	1
HU4	Manage product classes	2
HU5	Manage merchandise reception	2
HU6	Manage expiration dates	2
HU7	Check stock	3
HU8	Manage product restocking on shelves	3
HU9	Manage product promotions	3
HU10	Manage surveys	3
HU11	Manage special events	4
HU12	Generate PDF reports	4
HU13	Generate graphical reports	4
HU14	Send reports	4
HU15	Database optimization	4

3.3. Planning and estimation

Using the story points method, the total user stories for each subsystem were counted. The Marketing Subsystem and Inventory Subsystem accumulated 48 story points, which equates to 31.5 days, all separated into 4 Sprints, as shown below in Table 3.

Table 3.

Planning and estimation

Sprint	HU	Description	Points	Time (days)
First Sprint	HU1	Access the system as a marketing administrator	2	1.5
	HU2	Access the system as an inventory administrator	2	1.5
	HU3	Enter the main page	3	2
Second Sprint	HU4	Manage product classes	5	3
	HU5	Manage merchandise reception	5	3
	HU6	Manage expiration dates	5	3
Third Sprint	HU7	Check stock	3	2
	HU8	Manage product restocking on shelves	3	2
	HU9	Manage product promotions	3	2
Fourth Sprint	HU10	Manage surveys	3	2
	HU11	Manage special events	3	2
	HU12	Generate PDF reports	3	2
	HU13	Generate graphical reports	3	2
	HU14	Send reports	3	2
Story points / Time estimation			48	31.5

It is important to highlight that development of the web system began on September 11, 2023, and ended on October 24, 2023, totaling 31.5 days, as no work was performed on Saturdays or Sundays.

3.4. Economic Indicators

Additionally, an assessment of the economic indicators associated with the two subsystems, inventory management and marketing strategies, was conducted to assess their profitability. This analysis provided a series of results based on various economic indicators, offering a clear perspective on the economic potential and financial viability of the developed system, as shown in Table 4.

Table 4.
Economic Indicators

Economic Indicator	Obtained Value	Condition	Status
VAN	S/.1 263.66	VAN > 0	Approved
TIR	19.37%	TIR > 6	Approved
B/C	1.16	B/C>1	Approved

Therefore, based on these indicators, we can affirm that the web system for the Dynamization of Inventory Management and Marketing Strategies in Supermarkets is economically viable, as evidenced by the economic assessment indicators.

3.5 Development phase

At this stage, the development of the web system progressed, meeting the established tasks and deadlines. Security, a fundamental aspect of information systems, was addressed by considering the robustness of the software structures. Figure 2 provides a detailed explanation of the developed system’s component diagram.

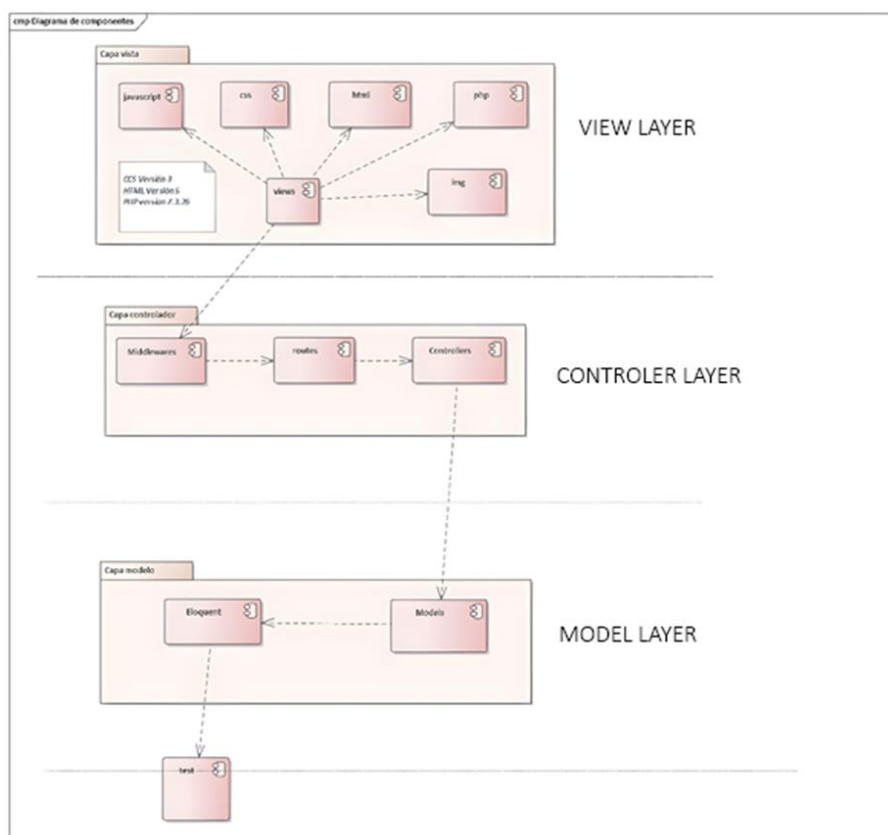


Figure 2. System component diagram

Additionally, the deployment diagram presents the hardware and software infrastructure, highlighting the distribution of its components across various servers and their intercommunication. This illustration shows the incorporation of network components, such as switches and routers, which facilitate the efficient transmission of information between different parts of the system, as visualized in Figure 3.

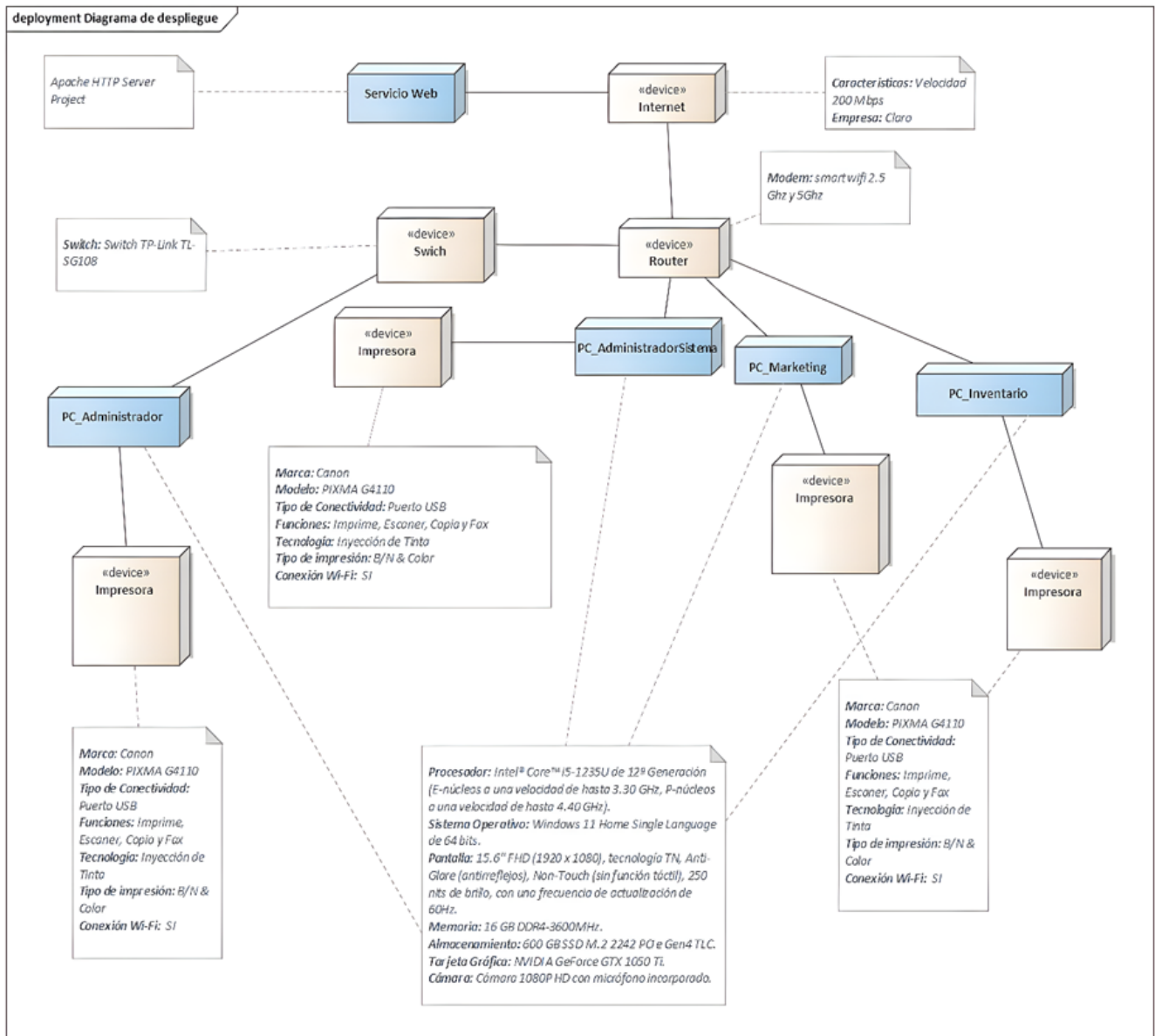


Figure 3. Deployment representation

Similarly, the system representation was developed using UML notation. In this context, use case diagrams were employed to effectively visualize the system's functionality. Figure 4 presents the system's use case general diagram, illustrating the actors and the actions they can perform according to their roles in the administration of marketing strategies and inventory management.

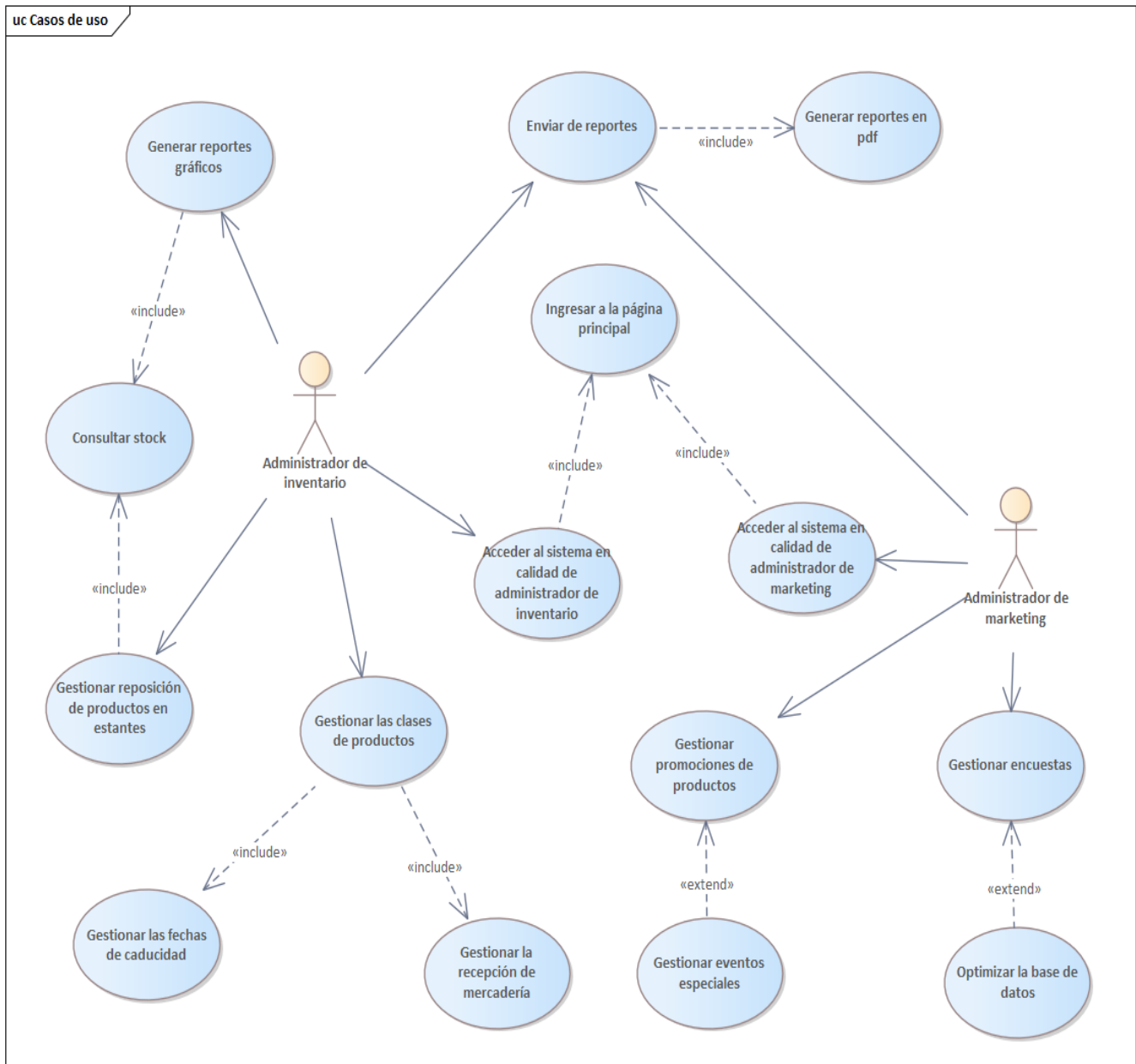


Figure 4. System's use case general diagram

Additionally, a physical model of the database was created, as shown in Figure 5. This model is essential for its ability to provide a detailed graphical representation of the system configuration and the relationships between the tables.

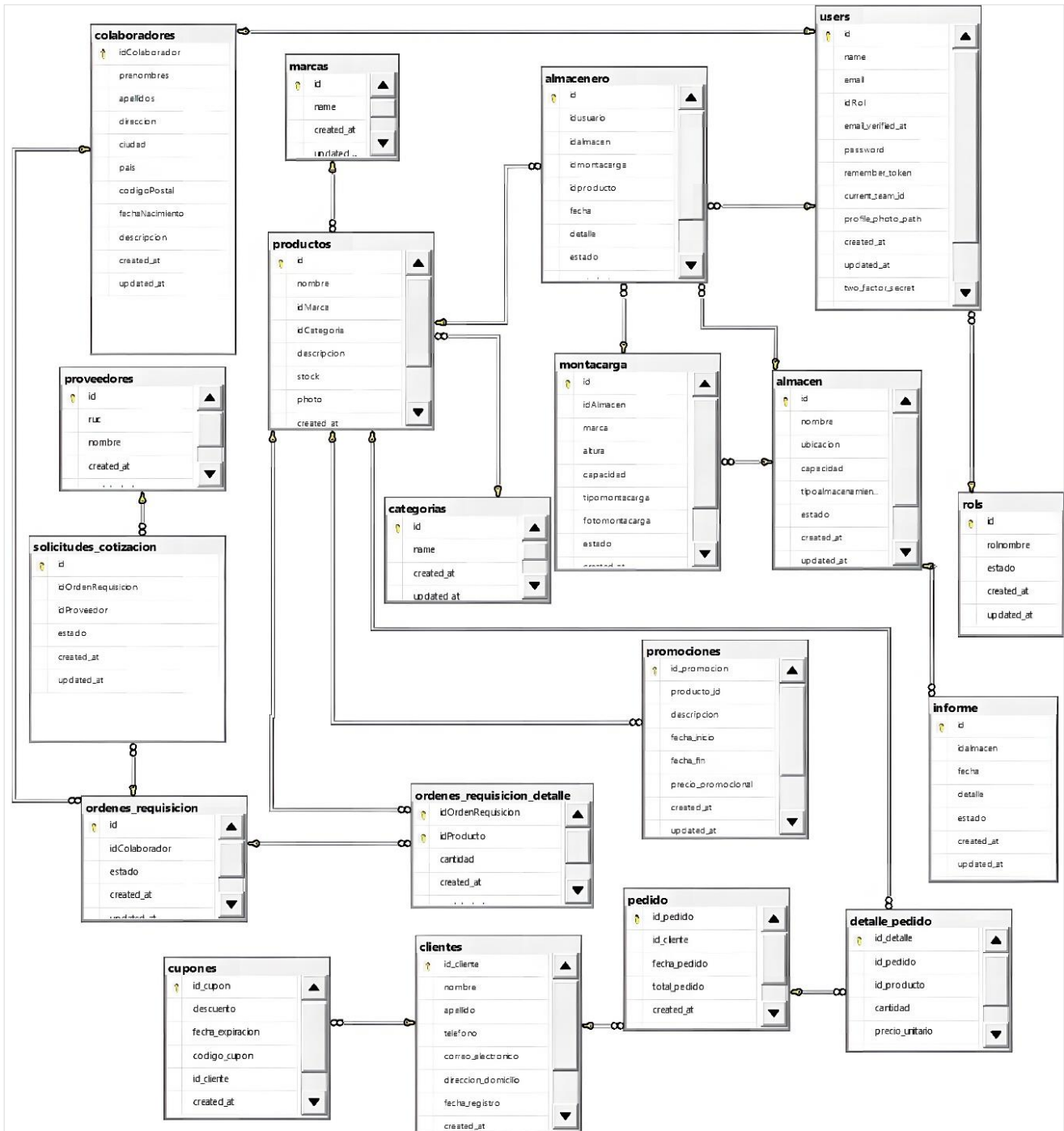


Figure 5. Database model

3.6. Performance Tests

A load test was conducted to assess efficiency of the database for the inventory management and marketing strategies subsystems. We used JMETER version 5.6.3 and Java 19.0.1 for this purpose. The results were promising, demonstrating stable performance. The system's HTTP Proxy server was subjected to load tests with a maximum of 500 threads without any errors (0%). An error occurred only when the load test was conducted with 501 threads (Figure 6).

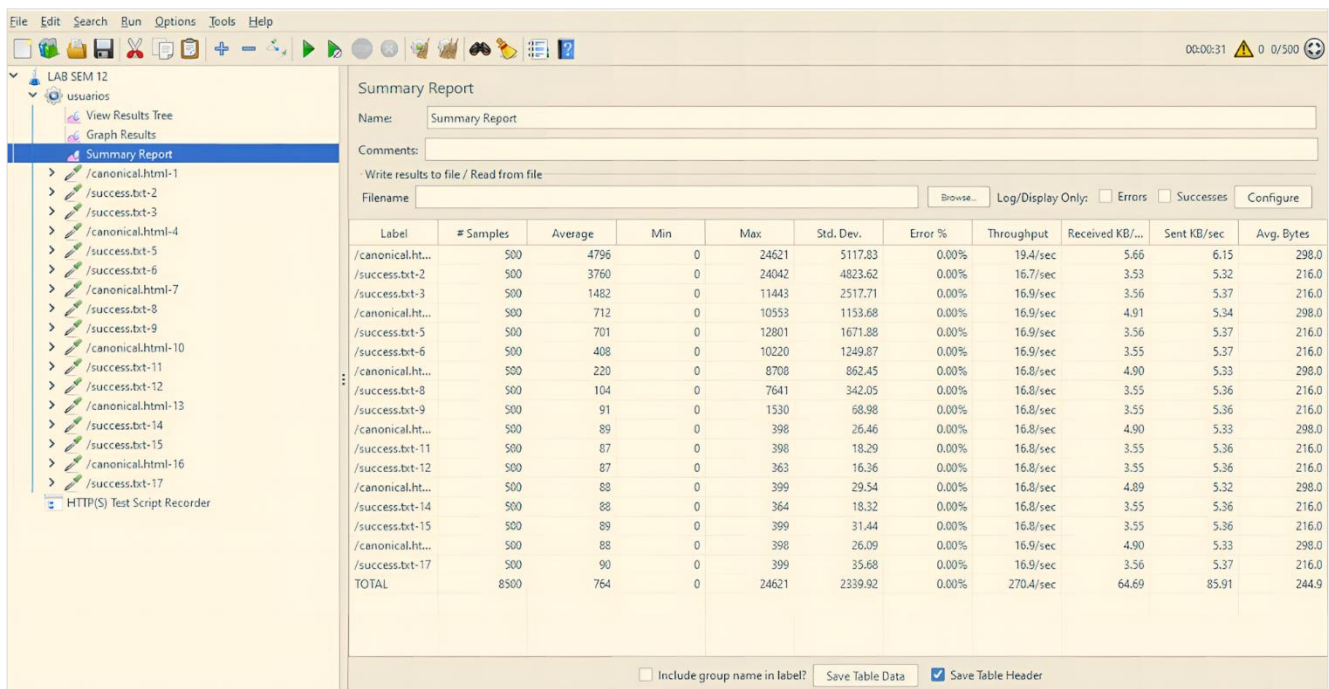


Figure 6. Database performance assessment

Additionally, the system exhibited solid performance, managing over 17,952,564 requests per minute. These results support the effectiveness of our system under high-demand conditions.

3.7. Software functionality

Down below non-functional and functional requirements.

Functional requirements:

- The system must allow marketing and inventory administrators to access the system with specific roles.
- There must be a main page that provides an overview of the system.
- Administrators must be able to manage product classes, merchandise reception, expiration dates, stock, product restocking, promotions, surveys, and special events.
- The system must be capable of generating PDF and graphical reports.
- The system must be capable of sharing reports.
- The system must optimize the database for efficient performance.
- Users should have an enhanced user experience with an intuitive and friendly interface.
- Personalized notifications should be provided to users.
- The system must be able to quickly adapt to market changes and remain competitive.

Non-Functional Requirements:

- The system must ensure user data security.
- It must have stable and efficient performance even under maximum load.
- The user interface must be easy to use and accessible to users of different skill levels.
- The system's response time must be fast for an optimal user experience.
- It must meet established industry quality standards.
- The system must be scalable to accommodate future expansions or updates.
- It must be compatible with different web browsers and devices.
- Regular security tests should be conducted to identify and mitigate potential vulnerabilities.
- The system must be easy to maintain and update.

The successful implementation and launch of the supermarket web system was achieved, enhancing inventory management and marketing strategies, and ensuring quick access to information. Down below there are some visual representations of the web system.

In Figure 7, the main menu displays information and categories for all subsystems visible to all users.

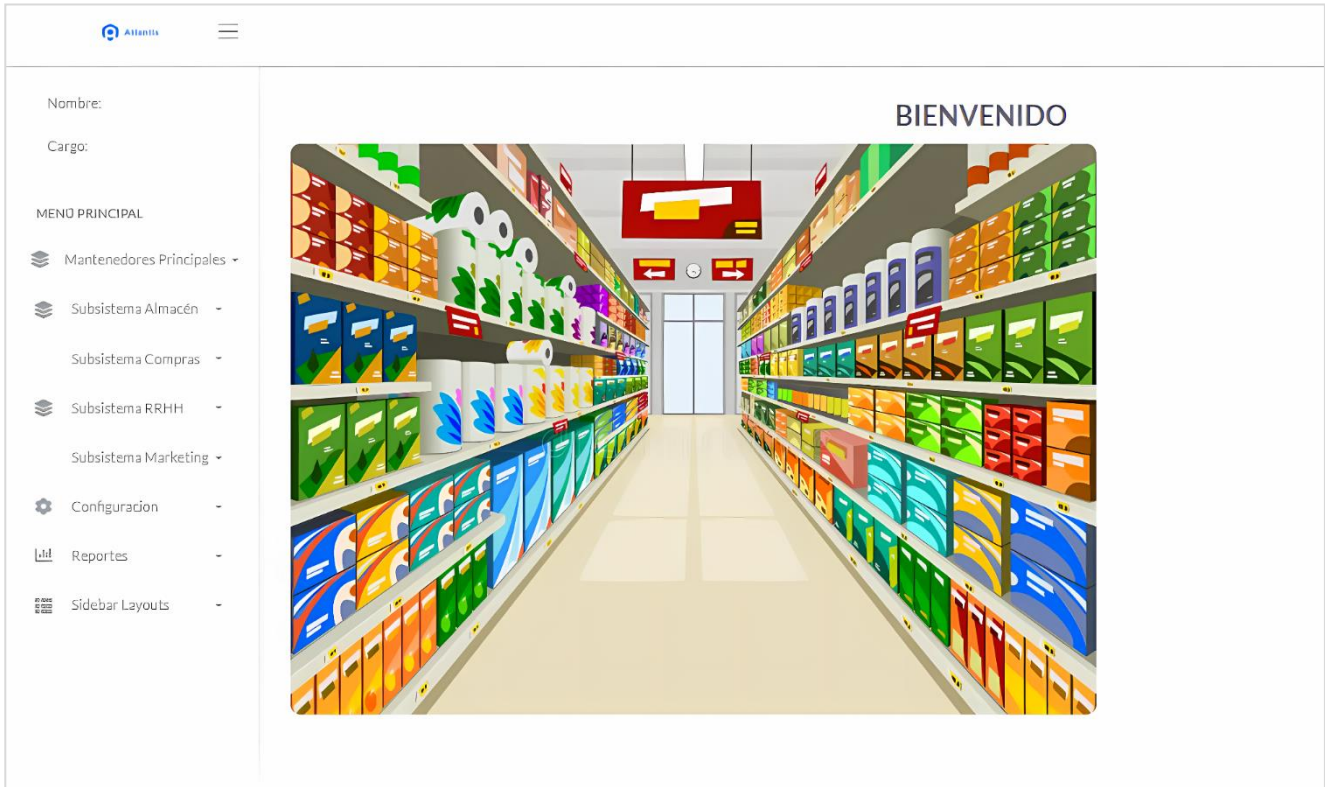


Figure 7. Supermarket main menu

In Figure 8, an inventory subsystem management interface is shown, allowing users to add, edit, and delete different warehouses.

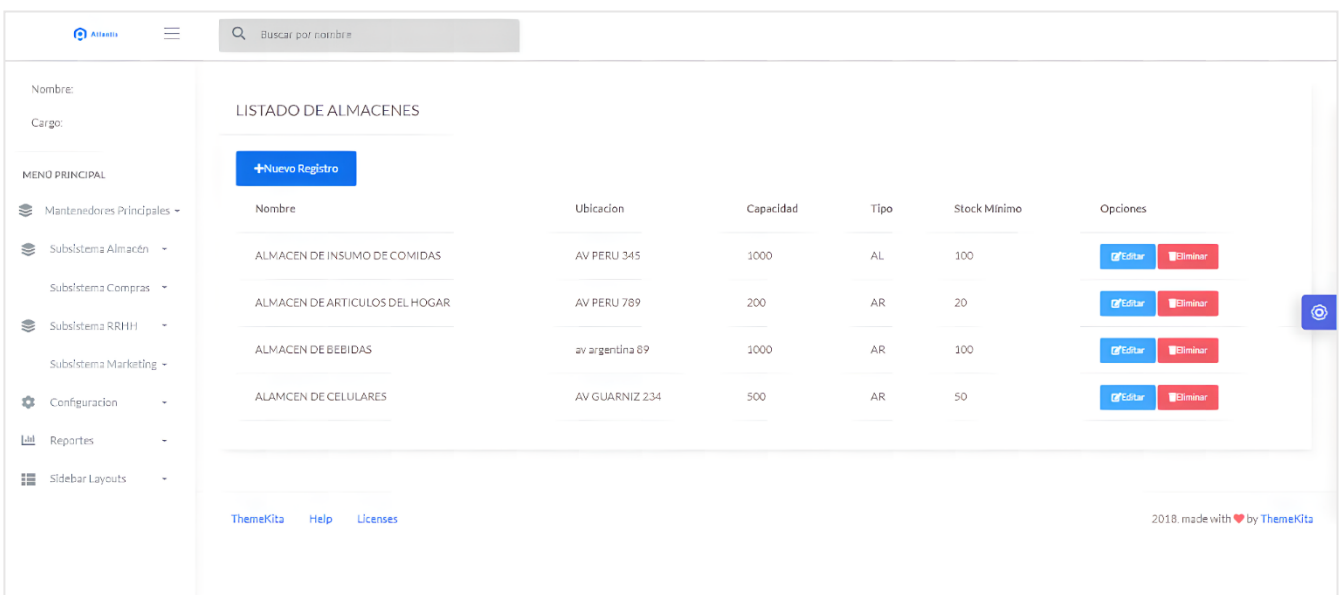


Figure 8. Inventory subsystem view

In Figure 9, a CRUD interface for the Marketing subsystem is shown, where records related to marketing strategies can be added, edited, and deleted, as well as report generation.

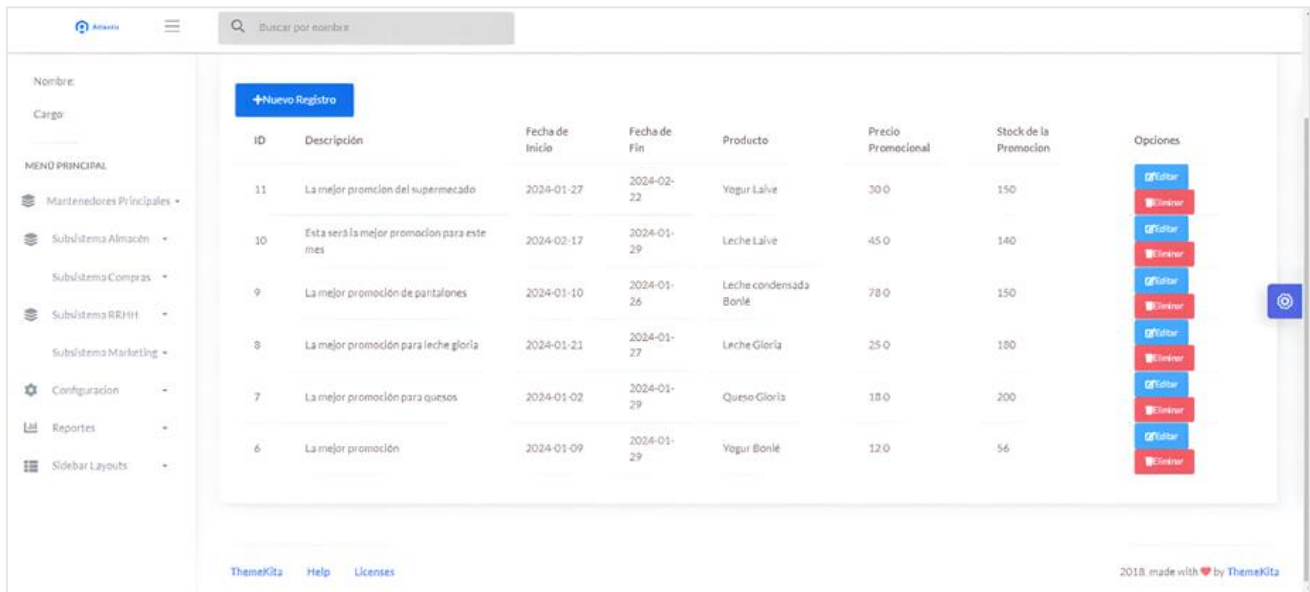


Figure 9. Marketing subsystem view

Reports were created for both the Marketing and Inventory subsystems to facilitate management. Figure 10 shows a report on the list of promotions for the Marketing subsystem, while Figure 11 presents a report on the list of warehouses for the Inventory subsystem.

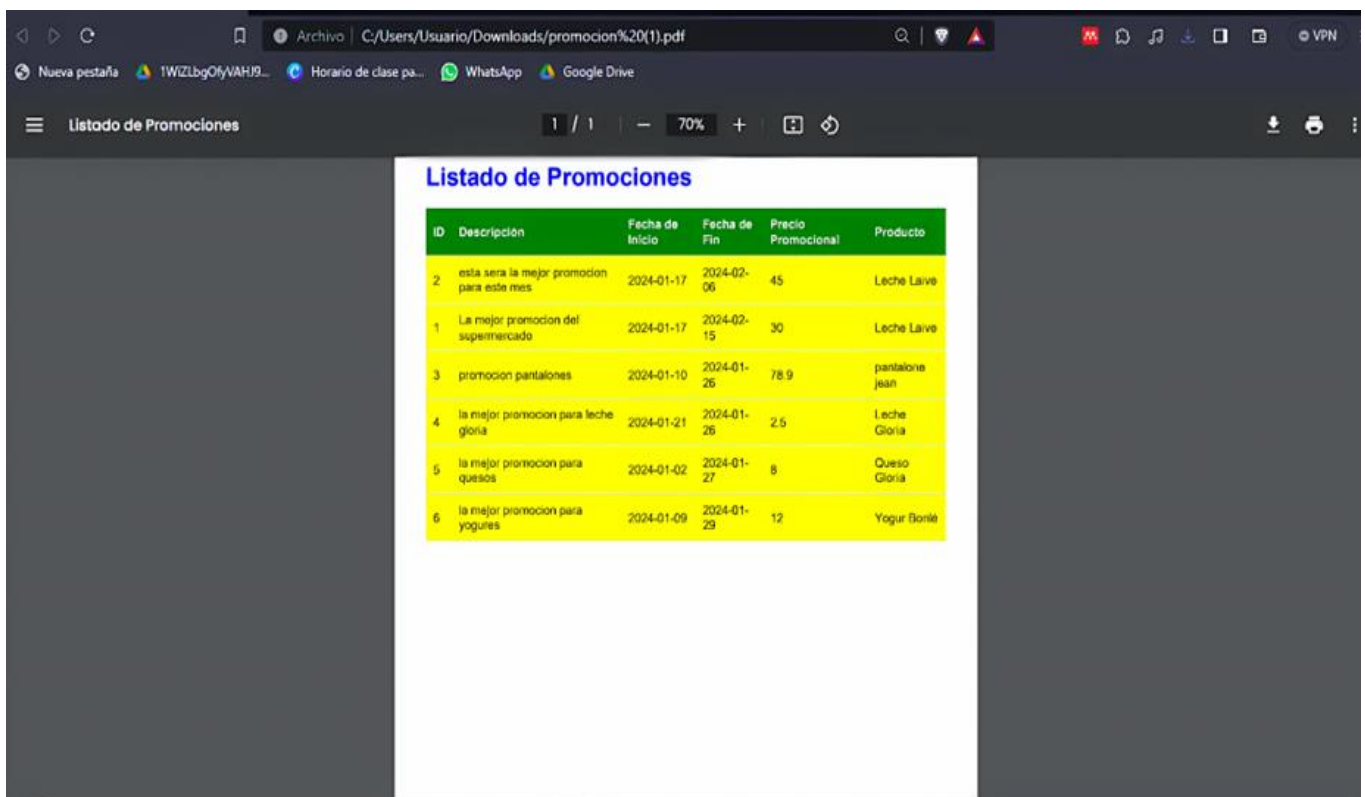


Figure 10. Report generated by the Marketing subsystem

INFORME

Empleado: Castillo Sarmiento Jose Maria Hermes

Cargo:

Fecha: 17-01-2024

Características: El presente informe tiene como objetivo proporcionar una visión general del estado actual del almacén y los productos almacenados. A continuación, se detallan los aspectos relevantes:

Almacén	Usuario	Fecha de Almacenado
:: NO HAY REGISTROS ::		

Figure 11. Report generated by the Marketing subsystem

The implementation of the web system in supermarkets has led to an increase in user satisfaction within the organization, as evidenced by Table 5. This has been achieved through the optimization of inventory management, marketing strategies, and other processes, aligning with the established purpose of streamlining processes. These results were summarized from interviews conducted with system users and direct observation of significant changes in business processes due to the use of the proposed system.

Table 5.
How the web system dynamizes processes

Process		User Satisfaction
Inventory Optimization	Without Web	Inventory management was done manually, leading to difficulties in anticipating trends, managing perishable products, and adjusting to seasonal demand.
	With Web	Implementing our web system has allowed for more efficient inventory management. Demand forecasting algorithms analyze historical patterns and real-time data to anticipate stock needs accurately.
Dynamic Management of Marketing Strategies	Without Web	Marketing strategies were executed in a disjointed manner, with slow responses to market dynamics due to a lack of integrated tools.
	With Web	The platform provides seamless integration between inventory management and marketing strategies. Campaigns can now be planned and executed in coordination with current inventory status and market demands.
Enhanced User Experience	Without Web	The lack of visibility and coordination directly affected customer experience, leading to potential revenue and clientele losses.
	With Web	Customer experience has significantly improved with an intuitive and user-friendly interface. Users can easily check inventory, participate in promotions and special events, and receive personalized notifications.
Quick Responses to Market Changes	Without Web	Slow responses to market dynamics made it difficult to adapt to sudden changes in demand or competition.
	With Web	Real-time report generation and the agility of the Scrum methodology enable the supermarket to quickly adjust marketing strategies and inventory levels, staying competitive in the market.

DISCUSSION

The web system streamlined inventory management and marketing strategies in supermarkets, improving business processes. It provides accessible information to users, similar to what Magana et al. (2023) described as a system used for electronic or paper-based document storage, coordination, retrieval, and sharing, which generates benefits for the organization.

As Arizavi (2022), points out, the fundamental purpose of information systems is to provide data related to user activities or production processes. Selecting the web system to dynamize inventory management and marketing strategies in supermarkets is essential, considering the benefits it will bring to the organization. It must also align coherently with the information technology (IT) strategy.

The choice of the Scrum methodology is based on solid evidence provided by project management experts, as highlighted by Carrera et al. (2018), who emphasize Scrum's efficiency in task allocation and its ability to adapt to changing project requirements. This choice is supported by successful experiences documented in the literature, where Scrum has proven its value in managing inventory and marketing strategies in supermarkets.

The results of the project's economic feasibility study were favorable, providing tangible benefits for organizations. Similarly, Angulo-Noel et al. (2021), highlight the importance of conducting a diagnostic in a logistics system to assess its economic impact, emphasizing the use of economic indicators as essential tools in this process.

It is also important to note that we did not find references in the scientific literature regarding the evaluation of database efficiency and web system stability through load and stress testing. The lack of references to these tests in other studies highlights a gap in the evaluation of web systems and databases in similar environments. Using JMETER, we obtained results that support the importance of this approach for future research. We recommend that future researchers include load and stress tests in their studies, as they offer a more comprehensive evaluation of the system and database, identifying critical areas for improvement.

CONCLUSIONS

At the crossroads where market dynamics and technology converge, supermarkets face constant challenges in commerce. Efficient inventory management and marketing strategies are essential elements for a complete shopping experience and competitiveness in an informed and demanding market. This article investigates the relevance of implementing a web system supported by the agile Scrum methodology to optimize inventory management and marketing strategies in supermarkets.

Inventory management evolves into a delicate art requiring trend anticipation and adaptation to current demands, but the lack of tools leaves supermarkets vulnerable to operational challenges, directly affecting revenue and clientele. The system enables the formulation of marketing strategies by tracking customer purchases based on high-demand products. The absence of synchronization between inventory management and marketing tactics leads to uncoordinated campaigns and delayed responses to market dynamics, resulting in missed opportunities. The developed web system addresses these processes by effectively integrating both aspects.

In conclusion, implementing the web system backed by Scrum not only addresses current challenges but also represents an investment in future adaptability, providing supermarkets with the necessary tools to stand out and offer a satisfying shopping experience to their customers.

Further research should focus on continuous review and optimization of marketing strategies in supermarkets to enhance customer experience and strengthen competitiveness. For inventory management, the application of emerging technologies or updates under the Scrum methodology is

proposed for more effective and adaptable management. Additionally, future studies should include load and stress tests for a more comprehensive evaluation of system and database performance. Continuous monitoring of positive economic indicators is recommended, exploring new indicators for a more complete perspective on financial viability. In line with the results supporting investment in future adaptability, ongoing improvement of the web system is advised, incorporating new technologies and addressing market trends to maintain long-term relevance.

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CONFLICT OF INTEREST

There is no conflict of interest related to the subject matter of the work.

AUTHORSHIP CONTRIBUTION

Conceptualization: Reyes-Riveros, A. J., Castillo-Sarmiento, J. M. H. and Santos-Fernández, J. P.

Data curation: Santos-Fernández, J. P. and Sánchez-Ticona, R. J.

Formal analysis: Reyes-Riveros, A. J., Santos-Fernández, J. P. and Sánchez-Ticona, R. J.

Research: All authors

Methodology: All authors

Software: All authors

Writing - original draft: Reyes-Riveros, A. J., Castillo-Sarmiento, J. M. H. and Santos-Fernández, J. P.

Writing - proofreading and editing: All authors

BIBLIOGRAPHIC REFERENCES

- Alatawi, M. N. (2023). Retracted: A conceptual framework for crowdsourcing requirements engineering in SCRUM-based environment. *IET Software*, 17(4), 610–619. <https://doi.org/10.1049/sfw2.12077>
- Angulo-Noel, B., Carretero-Landauro, D., Iturrino-Vilchez, D., Vásquez-Mananita, J., & Geldres-Marchena, T. (2021). Propuesta De Mejora En El Área De Logística Sobre Los Costos Operativos De Bermanlab S.A.C Trujillo, 2020. Proceedings of the 19th LACCEI International Multi-Conference for Engineering, Education, and Technology: “Prospective and Trends in Technology and Skills for Sustainable Social Development” “Leveraging Emerging Technologies to Construct the Future.” <https://doi.org/10.18687/LACCEI2021.1.1.117>
- Arizavi, S. (2022). The Interplay between Disciplinary Conventions and Research Methodologies in the Introduction Section of Research Articles: Citation Functions and Evaluations. *Applied Research on English Language*, 11(4), 47–76. <https://doi.org/10.22108/ARE.2022.133311.1889>
- Ayala, R. L., Rosas, N. V., & Andrade-Arenas, L. (2021). Implementation of a Web System to Detect Anemia in Children of Peru. *International Journal of Advanced Computer Science and Applications*, 12(12). <https://doi.org/10.14569/IJACSA.2021.0121299>
- Benmoussa, O. (2022). Improving Replenishment Flows Using Simulation Results: A Case Study. *Logistics*, 6(2), 34. <https://doi.org/10.3390/logistics6020034>
- Carrera Calderón, F. A., Baño Naranjo, F. P., & Guangasig Tubón, S. M. (2018). Aplicación Web Para La Gestión De Proyectos De Vinculación Con La Sociedad En La Universidad Regional Autónoma De Los Andes - Uniandes. *Revista Científica Multidisciplinaria*, 4(4), 213–222. <https://revista.uniandes.edu.ec/ojs/index.php/mikarimin/article/view/1201>

- Chuanpeng, Z., & Yi, Z. (2021). Study on Inventory Management Optimization of Small and Medium-sized Retail Companies in the Context of New Retail. *Asian Journal of Business and Management*, 9(5). <https://doi.org/10.24203/ajbm.v9i5.6814>
- Ginantra, N. L. W. S. R., Asana, I. M. D. P., Parwita, W. G. S., & Eriana, I. W. E. (2022). Mobile-Based Customers Management System in Ayunadi Supermarket. *ADI Journal on Recent Innovation (AJRI)*, 4(1), 86–101. <https://doi.org/10.34306/ajri.v4i1.767>
- Jaime, F. M., & Andrade-Arenas, L. (2021). Implementation of a Web System to Improve the Evaluation System of an Institute in Lima. *International Journal of Advanced Computer Science and Applications*, 12(12). <https://doi.org/10.14569/IJACSA.2021.01212101>
- Jones, A., Shahid, M., Morelli, G., Howes, K., Riesenber, D., Sievert, K., Pettigrew, S., & Sacks, G. (2023). Chocolate unicorns and smiling teddy biscuits: analysis of the use of child-directed marketing on the packages of Australian foods. *Public Health Nutrition*, 26(12), 3291–3302. <https://doi.org/10.1017/S136898002300215X>
- Kuz, A., Falco, M., & Giandini, R. S. (2018). Comprendiendo la Aplicabilidad de Scrum en el Aula: Herramientas y Ejemplos. *Revista Iberoamericana de Tecnología En Educación y Educación En Tecnología*, 21, e07. <https://doi.org/10.24215/18509959.21.e07>
- Leung, K. H., Choy, K. L., Siu, P. K. Y., Ho, G. T. S., Lam, H. Y., & Lee, C. K. M. (2018). A B2C e-commerce intelligent system for re-engineering the e-order fulfilment process. *Expert Systems with Applications*, 91, 386–401. <https://doi.org/10.1016/j.eswa.2017.09.026>
- Liu, J., & Liu, B. (2023). Commodity Pricing and Replenishment Decision Strategy Based on the Seasonal ARIMA Model. *Mathematics*, 11(24), 4921. <https://doi.org/10.3390/math11244921>
- Magana, A. J., Amuah, T., Aggrawal, S., & Patel, D. A. (2023). Teamwork dynamics in the context of large-size software development courses. *International Journal of STEM Education*, 10(1), 57. <https://doi.org/10.1186/s40594-023-00451-6>
- Martin, E. A., Kim, S. B., & Beckham, G. K. (2023). Calibration and Multiple Reliability Assessments of a Scrum Machine Instrumented to Measure Force. *Applied Sciences*, 13(13), 7581. <https://doi.org/10.3390/app13137581>
- Montororing, Y. D. R., & Widyantoro, M. (2022). Model of Inventory Planning Using Monte Carlo Simulation in Retail Supermarket with Consider To Competitors and Stimulus Strategies. *Journal of Applied Engineering and Technological Science (JAETS)*, 4(1), 342–350. <https://doi.org/10.37385/jaets.v4i1.1093>
- Neyra Gonzales, J. A., Cieza Mostacero, S. E., Pacheco Torres, J. F., & Anticona Rubio, K. Y. (2020). Sistema Multiplataforma para mejorar los Servicios Turísticos en la ciudad de Trujillo. *Proceedings of the 18th LACCEI International Multi-Conference for Engineering, Education, and Technology: Engineering, Integration, And Alliances for A Sustainable Development* “Hemispheric Cooperation for Competitiveness and Prosperity on A Knowledge-Bas. <https://doi.org/10.18687/LACCEI2020.1.1.536>
- Parada, C. J., Gómez, C., & Diaz, N. (2020). Mobile and web technology to display notifications of academic events of the Universidad Francisco de Paula Santander by using the agile methodology for mobile development. *Journal of Physics: Conference Series*, 1513(1), 012005. <https://doi.org/10.1088/1742-6596/1513/1/012005>
- Ponce, E. K., Sanchez, K. E., & Andrade-Arenas, L. (2022). Implementation of a Web System: Prevent Fraud Cases in Electronic Transactions. *International Journal of Advanced Computer Science and Applications*, 13(6). <https://doi.org/10.14569/IJACSA.2022.01306102>

- Rosin, M., Young, L., Jiang, Y., Vandevijvere, S., Waterlander, W., Mackay, S., & Ni Mhurchu, C. (2023). Product promotional strategies in supermarkets and their effects on sales: A case study of breakfast cereals and drinks in New Zealand. *Nutrition & Dietetics*, 80(5), 463–471. <https://doi.org/10.1111/1747-0080.12800>
- Samoggia, A., Rossi, G., & Beccati, F. (2023). Consumers' Attitude towards Supermarket and Proximity Stores as Purchasing Outlets of Italian Potato Consumers. *Foods*, 12(15), 2877. <https://doi.org/10.3390/foods12152877>
- Toledo González, N., Ríos Gomez, M. S., Requena Hernandez, L. E., & Leal Vazquez, N. L. (2023). Desarrollo de un software de inventarios utilizando la metodología SCRUM. TECTZAPIC. *Revista Académico-Científica*, 9–20. <https://doi.org/10.51896/tectzapic/RUCS4253>
- Ventocilla Gomeró, F., Aguila-Ruiz, B., & Andrade-Arenas, L. (2021). Prototype of Web System for Organizations Dedicated to e-Commerce under the SCRUM Methodology. *International Journal of Advanced Computer Science and Applications*, 12(1), 437–444. https://thesai.org/Downloads/Volume12No1/Paper_52-Prototype_of_Web_System_for_Organizations.pdf
- Yücenur, G. N. (2023). MCDM approach to investigate the effectiveness of SCRUM events in minimizing risk factors in project management. *Journal of Project Management*, 8(4), 227–238. <https://doi.org/10.5267/j.jp.m.2023.7.001>