# Impact of customer management systems on business process optimization: a case study at Home Link-Or

*Impacto de los sistemas de gestión de clientes en la optimización de procesos empresariales: un estudio de caso en Home Link-OR.*

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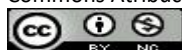
## ABSTRACT

The digital transformation of commercial processes represents a key factor in organizational competitiveness. This study analyzes the impact of a customer relationship management (CRM) system developed for the company Home Link-OR, incorporating business intelligence (BI) tools and modern technologies such as HTML, CSS, JavaScript, PHP, XAMPP, and MySQL. Through a mixed-methods approach, operational efficiency, customer perception, and internal staff experience were evaluated before and after the implementation. The results reveal a significant improvement evidenced in service efficiency, reflected in a reduction in the average service time by 65.2%, decreasing from 22.4 to 7.8 minutes. This variation represents a substantial advance in the system's response capacity, enabling the service of a greater number of users in less time. The reduction in waiting times not only optimizes the use of available resources but also contributes to improving the perception of the service by users, which is fundamental for strengthening institutional quality and continuous improvement processes. The study concludes that the implementation of a CRM with integrated BI can operationally transform an SME, enhance its strategic capacity, and increase customer and employee satisfaction. This case demonstrates that the adoption of technologies adapted to the organizational context is key to scalability and sustainability in emerging markets.

**KEYWORDS:** Customer management, business intelligence, operational efficiency, digital transformation

**RESUMEN**

La transformación digital de los procesos comerciales representa un factor clave en la competitividad organizacional. Este estudio analiza el impacto de un sistema de gestión de relaciones con clientes (CRM) desarrollado para la empresa Home Link-OR, incorporando herramientas de inteligencia de negocios (BI) y tecnologías modernas como HTML, CSS, JavaScript, PHP, XAMPP y MySQL. A través de un enfoque de métodos mixtos, se evaluó la eficiencia operativa, la percepción del cliente y la experiencia del personal interno antes y después de la implementación. Los resultados revelan una mejora significativa evidenciada en la eficiencia del servicio, reflejada en una reducción del tiempo promedio de atención en un 65.2%, pasando de 22.4 a 7.8 minutos. Esta variación representa un avance sustancial en la capacidad de respuesta del sistema, permitiendo atender a un mayor número de usuarios en menos tiempo. La reducción en los tiempos de espera no solo optimiza el uso de los recursos disponibles, sino que también contribuye a mejorar la percepción del servicio por parte de los usuarios, lo cual es fundamental para el fortalecimiento de la calidad institucional y los procesos de mejora continua. El estudio concluye que la implementación de un CRM con BI integrado puede transformar operativamente a una PyME, potenciar su capacidad estratégica y aumentar la satisfacción de clientes y empleados. Este caso demuestra que la adopción de tecnologías adaptadas al contexto organizacional es clave para la escalabilidad y sostenibilidad en los mercados emergentes.

**PALABRAS CLAVE:** Gestión de clientes, inteligencia de negocios, eficiencia operativa, transformación digital.

## INTRODUCTION

In an increasingly competitive and dynamic business environment, the effective management of customer information has become a cornerstone for the optimization of commercial processes and decision-making. Modern organizations have adopted business intelligence (BI) technologies and customer relationship management (CRM) systems to centralize and organize data, facilitating quick and accurate access to relevant information (Haro, 2023). These solutions allow for the identification of behavioral patterns, customer segmentation, and anticipation of needs, which increases operational efficiency and strengthens responsiveness to market changes (Ijomah, 2024).

Despite the proven benefits in multiple studies, many small and medium-sized enterprises (SMEs) still face significant challenges in implementing integrated management and data analysis systems (Sahoo, 2024). In the particular case of Home Link-OR, the lack of a centralized system for customer management has limited its ability to effectively handle information, affecting the optimization of its commercial processes and hindering informed decision-making. This situation highlights the need for a technological model that integrates a robust CRM, business intelligence tools, and advanced analytical capabilities to transform data into useful and actionable information.

The present study proposes the development of a customer management system for Home Link-OR, incorporating technologies such as centralized databases, interactive dashboards, and predictive analytics. The methodology employed for the system's development is based on an agile approach, which will allow flexible adaptation to the business's changes and needs, optimizing each stage of the implementation process. This approach is expected to improve operational efficiency, optimize customer service, and facilitate strategic decision-making through real-time data analysis.

In this context, the study aims to analyze how a customer management system with business intelligence tools impacts the optimization of Home Link-OR's commercial processes, enabling greater market competitiveness and improved customer loyalty. This research seeks to demonstrate that the implementation of this technological model will not only increase operational efficiency but also strengthen the company's capacity to identify opportunities and proactively respond to market demands.

The adoption of customer relationship management (CRM) systems is aimed at strengthening business profitability and customer loyalty. Recent studies show that the implementation of CRM in SMEs leads to significant improvements. For example, Nethanani (2024) found that it increases customer retention by 25–40% and sales by 15–30%, along with operational efficiency gains of 20–35%. Similarly, Yadhavan (2025) confirms that CRM adoption significantly enhances customer

satisfaction, which reinforces their retention. This empirical evidence supports the idea that CRMs enable personalized interactions and foster customer loyalty. Furthermore, CRM is highlighted as a key factor in driving innovation and organizational growth, as it encompasses the capture and analysis of customer data across multiple touchpoints. In short, CRM systems provide valuable information that translates into sustainable competitive advantages at the business level.

A central aspect is that many productivity gains derive from the automation and optimization of internal processes. According to Boppana (2022), CRM automation frees staff from routine tasks (such as data entry), reducing human errors and allowing more time to be devoted to strategic initiatives. This ensures more timely and personalized customer interactions, strengthening satisfaction. Additionally, automated CRMs provide real-time information and analytics that facilitate internal decision-making. As a result, workflows are streamlined, collaboration between areas improves, and resource allocation becomes more efficient, helping reduce operating costs and respond swiftly to market changes. These effects are consistent with studies highlighting the ability of CRMs to connect sales, marketing, and customer service areas, optimizing information transfer and enhancing employee performance by providing up-to-date data.

Business intelligence (BI) emerges as a strategic complement that enhances CRM systems. Baldeón (2025) points out that BI has become a critical tool in modern management, transforming strategic and operational decision-making. Thanks to the processing and visualization of large volumes of data, organizations can identify key patterns, anticipate trends, and optimize resource use. This data-driven approach increases accuracy and speed in decision-making, generating sustainable competitive advantages. Eboigbe (2023) highlights that the integration of advanced analytics and artificial intelligence into BI redefines operational efficiency: by shifting from traditional methods to AI-driven predictive analytics, predictive capabilities are strengthened, and deeper insights are obtained. Together, BI provides the analytical tools that enrich CRM data and guide more informed decisions at tactical and strategic levels. For example, in the banking sector, the integration of predictive analytics with BI has improved risk management and personalized customer service, while in education, it optimizes the management of fees and internal resources. These cases illustrate that, despite challenges such as data quality, the tangible benefits of BI fully justify its adoption.

Specifically, customer data analysis has proven to optimize commercial operations. For example, Mejía (2024) developed a framework that integrates BI techniques to model transactions in e-commerce environments. This system predicts purchase patterns using historical data, thereby improving business operations and increasing customer satisfaction. Similarly, the use of big data

technologies, machine learning, and sentiment analysis allows businesses to anticipate consumer behavior and personalize commercial interactions. Moreover, CRM predictive analytics is essential for preventing customer churn. Studies indicate that customer loss drastically reduces profits and that acquiring a new customer costs up to five times more than retaining an existing one. Therefore, companies use predictive CRM models to identify customers at risk of leaving and apply targeted retention actions, thus improving loyalty and business sustainability. In conclusion, customer data analysis lies at the heart of business intelligence, enabling more precise and effective decisions at all levels of the organization.

The literature review shows that the integrated adoption of CRM, BI, and data analytics can significa increase productivity and optimize internal processes. However, it has been noted that barriers such as a lack of financial resources or technical capabilities may limit the effective implementation of these technological solutions. These findings highlight the need for careful implementation strategies and adequate managerial support. Along these lines, Lin (2025) emphasizes that the adoption of new technologies and an organizational culture oriented towards innovation enhance the benefits of CRM, while external factors such as industry dynamics and company size moderate its impact. SMEs can innovate more rapidly based on the knowledge generated by CRM. The existing literature supports the effectiveness of CRM but points out the lack of contextual studies in SMEs in emerging markets. In this context, the present case study at Home Link-OR is relevant to generate empirical evidence on how the implementation of a CRM supported by BI influences the optimization of commercial processes, organizational productivity, and the quality of decision-making.

## METHODS AND MATERIALS

The present study aims to evaluate the impact of a customer management system on the optimization of commercial processes at Home Link-OR. To this end, a mixed methodology (quantitative and qualitative) was designed, allowing for a comprehensive analysis of the data obtained and an in-depth interpretation of the observed phenomena. The mixed approach is appropriate not only for addressing the quantifiable behavior of customers and commercial processes but also for capturing the perception and experience of employees and managers regarding the use of the implemented technology (Takona, 2024). Ortega (2023) states that this methodological approach facilitates a holistic understanding of the organizational impact by combining the analysis of structured data with the collection of qualitative information, which strengthens the validity of the findings.

For system development, an agile approach based on Scrum was adopted, allowing continuous adaptation to business changes and needs, facilitating an iterative and flexible implementation

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process. This approach has proven highly effective for technology projects, especially in dynamic business environments where evolving requirements are constant (Saiyad, 2024).

The customer management system for Home Link-OR was developed using a set of modern and efficient technological tools. For frontend development, programming languages such as JS and markup languages such as HTML and CSS were used. Libraries like Bootstrap, Chart.js, and Ajax were also employed, allowing the creation of interactive and modular user interfaces that facilitate the real-time updating of data displayed to the user. Additionally, strict typing practices were applied to ensure clean and secure code, minimizing compile-time errors (Peliza, 2024). On the backend, PHP was chosen as the execution environment to manage business logic and enable efficient server communication. The database was managed using MySQL, a robust and scalable system that allows for the storage and quick querying of large volumes of information (Heath, 2021). For the development process, XAMPP was used as a local development environment, which speeds up project startup time and allows faster updates during development (Simba, 2024). The code was managed in Visual Studio Code, a development environment that offers integrated tools for debugging and organizing the project. In addition, Git and GitHub were used for version control and effective collaboration among system developers. The target population comprises the 1,100 registered customers of Home Link-OR and the 12 employees who make up its team, divided into operational and administrative areas. For the quantitative analysis, a simple random sample of 10% of the customers was taken, which allows for an adequate representation of perceptions and commercial behaviors. Regarding employees, a census sampling was used given their small number, which facilitated obtaining detailed information from each involved area.

**Tabla 1**.

*Distribution between customers and workers, and the number of employees in operational and administrative areas.*

| Group | Quantity | Percentage |
|---|---|---|
| **Customers** | 1,100 | 100% |
| **Workers** | 12 | 100% |
| **Operational Area** | 8 | 66.7% |
| **Administrative Area** | 4 | 33.3% |

**Data collection techniques**

Mixed techniques were used for data collection, allowing for a complete understanding of the phenomenon under study. In the quantitative sphere, structured surveys were applied to the selected customers, designed to measure their level of satisfaction and perception of commercial processes before and after the CRM implementation (Binbin, 2024). At the qualitative level, semi-structured interviews were conducted with key Home Link-OR employees, focusing on identifying operational improvements and challenges during system adoption. In addition, direct observation of commercial processes was carried out, facilitating the analysis of information flow and interaction with the CRM.

**Procedures for functional and experiential system validation**

System validation was carried out in two phases: functional tests and usability tests. Functional tests assessed the proper functioning of each module, including customer information registration and updating, report generation, and real-time data visualization. Meanwhile, usability tests focused on the end-user experience, collecting information on ease of use, accessibility, and navigation efficiency within the system. This data was gathered through post-interaction surveys and practical tests with internal users.

**Figura 1**

*Flowchart of the system validation process, from the development phase to production deployment.*
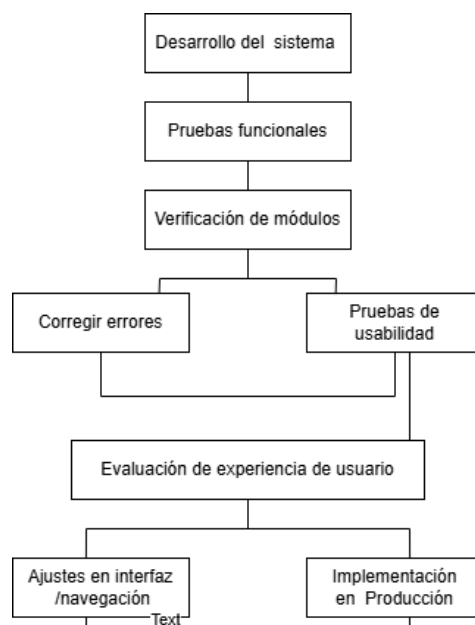


**Iterative Integration Model and Operational Deployment**

The integration of the CRM system at Home Link-OR was executed through an iterative approach based on the agile Scrum methodology, which allowed for a progressive, user-centered, and highly adaptable implementation. This strategy favored the incremental delivery of functionalities, minimizing the risk of comprehensive failures and facilitating the continuous improvement of the final product.Each development cycle or sprint lasted two weeks, within which a specific functionality was prioritized, such as customer registration, behavior analysis, or report generation. At the end of each sprint, review and retrospective meetings were held with the development team and key users to assess satisfaction and propose immediate adjustments (Velasco, 2021).

Before the final deployment of the system, a controlled internal pilot was conducted with users from the operational and administrative areas. This phase allowed for the validation of system stability under real conditions and the collection of feedback on user experience, usability, and alignment with existing commercial processes. In addition, a training plan was implemented for administrative staff, consisting of practical workshops, user manuals, simulations of real processes, and a technical help desk to resolve issues during the first weeks of use. The full deployment was staggered, starting with the customer service area and progressing to other functional areas, which reduced resistance to change and improved technological adoption.

*Figura*                                                                                                          *2*

*Implementation of the Customer Management System using Scrum.*
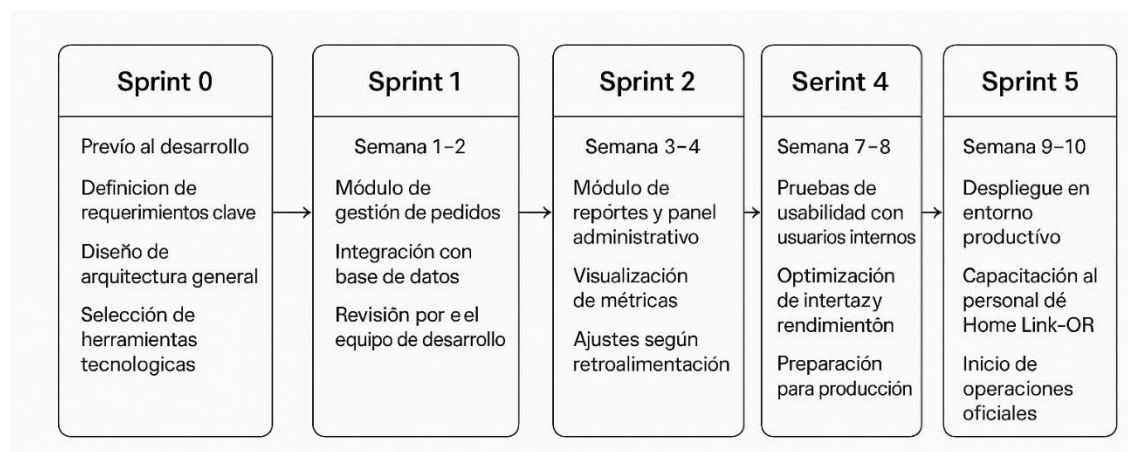


## ANÁLISIS DE RESULTADOS

**Operational transformation through the digitalization of the customer service cycle**

The implementation of the customer management system at Home Link-OR represented a structural transformation of internal commercial and administrative processes. Before technological integration, customer service workflows were managed through manual methods or unintegrated

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applications, with redundancy in data collection, delays in accessing information, and high error rates. Real-time consolidation of all commercial interactions was achieved, automating critical tasks and improving information traceability (Barragán, 2024). The direct measurement of efficiency indicators made it possible to quantify the impact of digitalization. One of the most notable results was the reduction in average service time per customer, which went from 22.4 minutes to just 7.8 minutes, representing a 65.2% operational improvement. This data was obtained through systematic time records over three consecutive weeks before and after implementation, and empirically validates the hypothesis that centralizing information reduces operational errors and increases overall efficiency (Guamán, 2024).

In addition to the impact on operational efficiency, the digitalization of the customer service cycle generated positive effects on perceived service quality. The centralization of data and process automation not only accelerated responses but also enabled personalized service according to the history and specific needs of each user. This ability to offer a more contextualized and timely service increased customer trust and strengthened the company-customer relationship. Likewise, the improvement in information traceability facilitated more precise supervision of internal performance, which contributes to data-driven decision-making and the consolidation of an organizational culture oriented towards continuous improvement. The system architecture played a decisive role in this transformation. The use of technologies such as HTML, CSS, JavaScript, XAMPP, and MySQL made it possible to build a scalable, modular system with minimal response times. The user interface (UI), adapted with Bootstrap and UX principles, reduced the learning curve for staff and facilitated rapid adoption without the need for intensive training. This was directly reflected in how smoothly employees began to use features such as customer tracking, quotation generation, and report issuance (Samitier, 2021).

**Figura 3**

*Comparison of average customer service time before and after system implementation.*
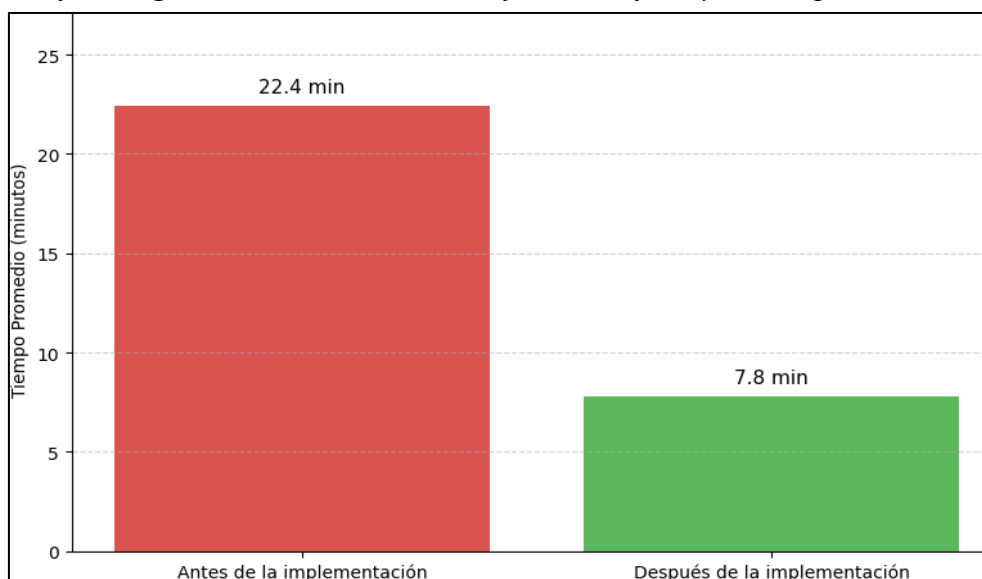


**Impact of the system on the company–customer relationship**

The implementation of the system not only brought internal operational benefits but also radically transformed the customer experience. To validate this dimension, a structured survey was applied to a sample of customers. The sample size was determined using the statistical formula for finite population sampling, considering a 95% confidence level, 5% margin of error, and an expected proportion of 50%, resulting in a sample of 278 people from a total universe of 1,100 customers. The questions were aimed at measuring perceived service quality, response times, level of personalization, clarity in communication, and overall satisfaction. The results showed a substantial improvement. Before the system was implemented, only 14.5% of customers considered themselves "very satisfied" with the service received; this figure subsequently increased to 53.6%, while dissatisfaction levels drastically decreased from 24.6% to just 3.6%. These data reflect that the system not only resolved operational problems but also enhanced the company–customer bond, providing a closer, more professional, and solution-oriented experience (Álvarez, 2022). The improvement in service perception has a technical basis: the system enables customers to receive faster responses, obtain personalized information, and view the status of their requests in real time. This translates into a user-centered experience and the perception of a modern, efficient, and transparent company. As in recent studies, customer loyalty is a direct consequence of a company's ability to anticipate, personalize, and resolve efficiently.

**Tabla 2**

*Comparison of customer satisfaction levels before and after the system.*

| Satisfaction Level | Before the System (%) | After the System (%) |
|---|---|---|
| Very Satisfied | 14.5 | 53.6 |
| Satisfied | 31.8 | 35.5 |
| Neutral | 29.1 | 7.3 |
| Dissatisfied | 16.4 | 2.7 |
| Very Dissatisfied | 8.2 | 0.9 |

**Functional evaluation of the system from the internal staff perspective**

The perception of administrative and technical staff was collected through a structured questionnaire and semi-structured interviews with the 12 employees of Home Link-OR, including 8 technicians and 4 administrative staff. The evaluated indicators included ease of use, reduction of operational workload, improvement in decision-making, and perception of the system's overall impact. The results revealed an exceptional level of acceptance: 75% of staff rated ease of use as "very high," and 87.5% stated that the system had significantly improved their analytical capacity and decision-making. This assessment was explained by the intuitive layout of functions, the possibility of generating automatic reports, and the elimination of repetitive tasks. The interviews complemented this view, highlighting that they can now access real-time indicators that previously required hours of manual consolidation. Unlike other technological implementations that often generate resistance to change, this case showed rapid adoption. The main reason was the active participation of staff in the early phases of the project, both in defining requirements and in pilot tests. This is consistent with the approach proposed by Maghsoudi (2023), where user ownership of the system is a key success factor in technology projects.

**Figura 4**

*System evaluation by staff based on five dimensions: usability, operational load, decisions, efficiency, and training.*
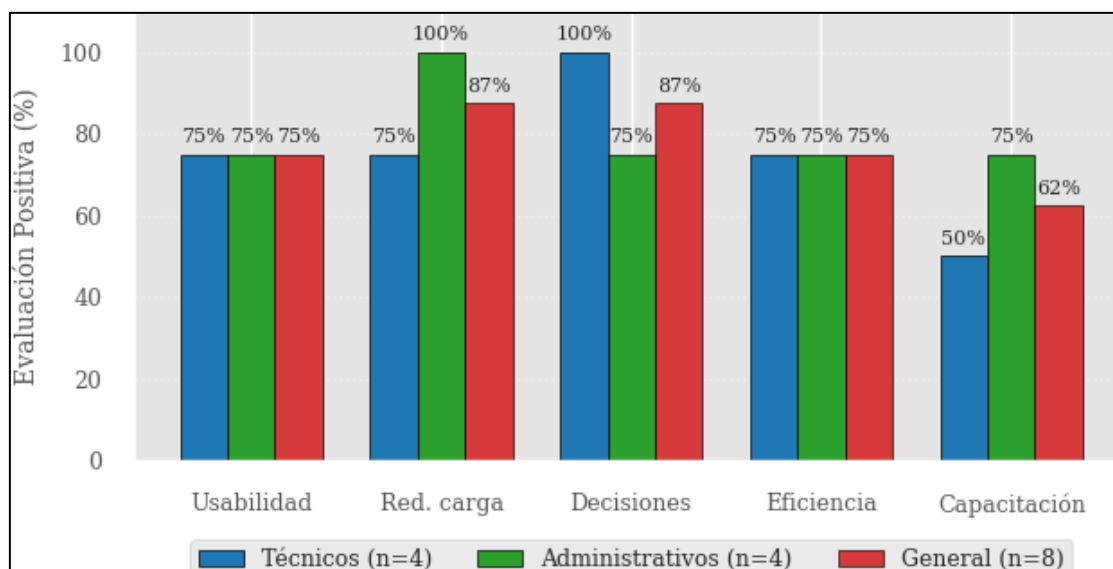


**Business intelligence as a strategic pillar for commercial optimization**

One of the most innovative modules of the system was the one that incorporates business intelligence (BI) tools. Thanks to this component, information was transformed into actionable knowledge, generating automated reports with indicators such as cumulative sales, frequent customers, best-selling products, and distribution of interactions by day. Data analysis in the first month revealed that Tuesdays, Wednesdays, and Thursdays concentrated 62.5% of commercial requests. This metric motivated a redistribution of human resources and work shifts, improving coverage without increasing costs. In addition, it was observed that certain products generated 80% of total revenue, which allowed for the application of targeted commercial strategies (Barragán, 2024).

The system also enabled segmented campaigns based on purchase history, resulting in a 22% increase in response rate during the second month post-implementation. This behavior validates the claims of Maghsoudi (2023), who indicates that CRM systems with integrated BI enhance organizations' predictive capabilities.

**Figura 5**

*Projection of historical customer data from 2018.*
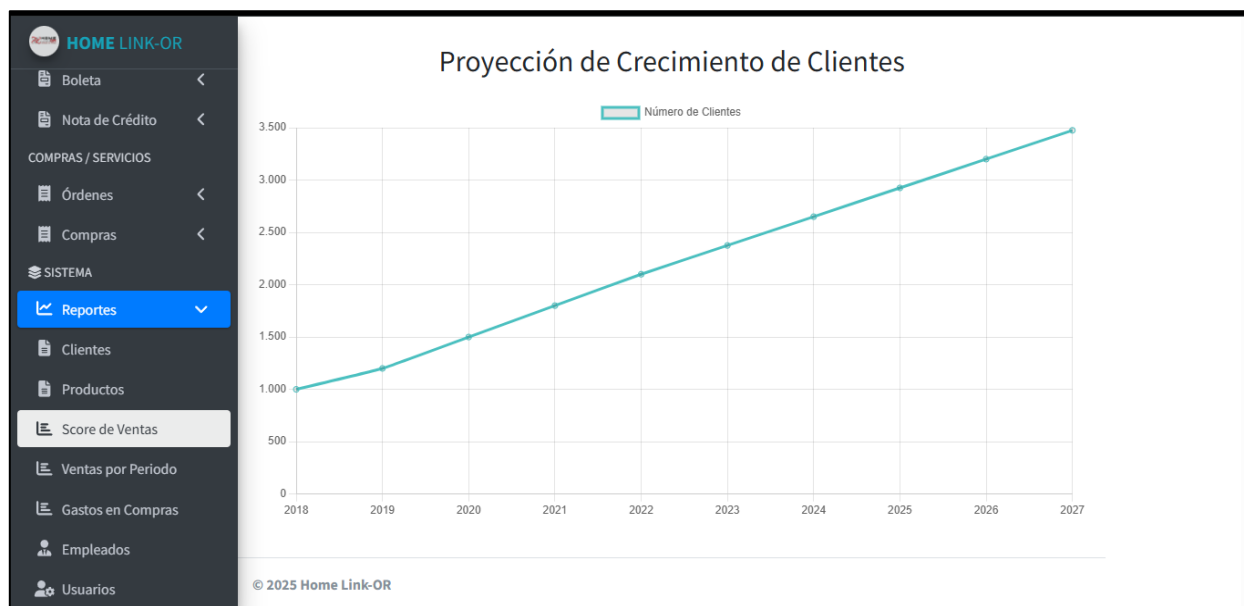


**Validation of usability, technical robustness, and operational security**

The system underwent unit, integration, and user acceptance tests (UAT). The results were positive: 100% of critical functionalities such as customer registration, quotation issuance, report generation, and inventory control met functional requirements without generating errors or conflicts.

To validate user perception of ease of use, the international System Usability Scale (SUS) was applied, obtaining an average score of 88.5/100, which is interpreted as an "excellent" level. This value is especially noteworthy considering that some staff had no previous experience with similar systems. The high usability was attributed to the modern visual design and fluid interaction with graphic elements such as buttons, filters, and adaptive forms. Technically, the system was deployed with version control through Git and hosting in a secure environment with automated backup. Likewise, the client-server architecture guarantees availability and scalability, preparing the company for future modules such as warranty management or integration with digital sales channels.

**Figura 6**

*Validation of Usability, Technical Robustness and Operational Safety.*
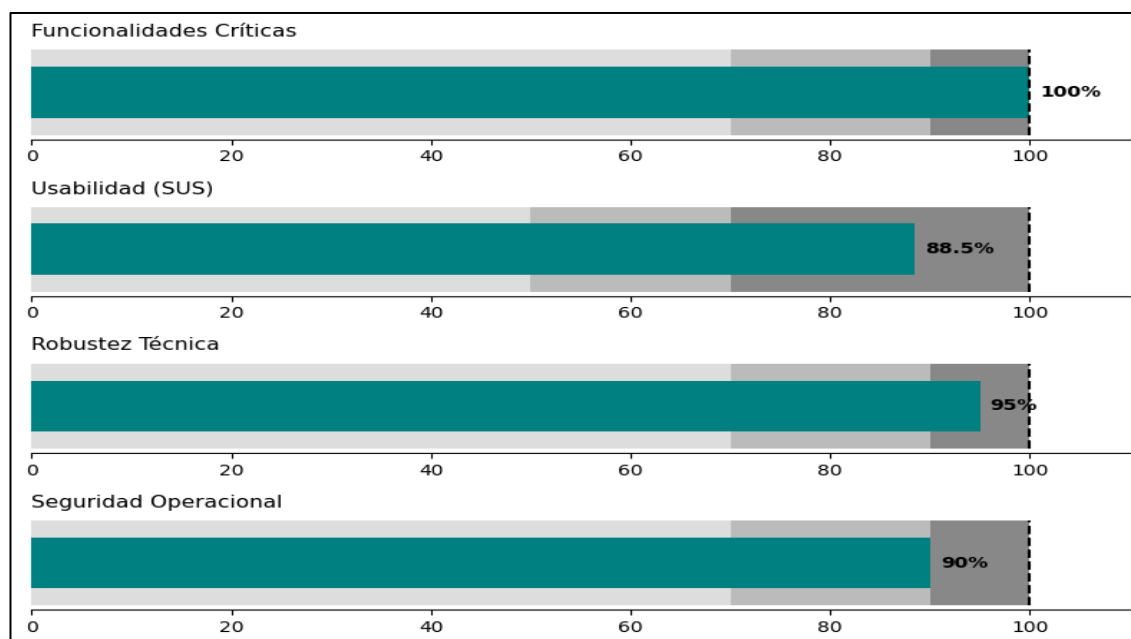


**Multilevel systemic scope and cross-organizational impact**

The impact of the technological solution was not limited to operational areas but permeated the entire organization. At the management level, a shift was seen in managerial culture, moving from a reactive to a proactive, data-driven approach. In addition, weekly planning meetings now incorporate real-time dashboards, enabling decisions to be made with validated, visually interpretable information.

Suppliers also benefited from this ecosystem with the automation of purchase orders and access to stock reports. The 10 suppliers (7 men and 3 women) can anticipate deliveries and improve their logistics. This has generated an indirect improvement in supply chain efficiency and strengthened commercial relationships. Finally, the system has strengthened the Home Link-OR brand as an innovative company, enhancing its positioning compared to local competitors. This perception has begun to be reflected on social media and rating platforms, with an 18% increase in positive reviews (Álvarez, 2022).

**Figura 7**

*Participation of indirect beneficiaries and perception of the system's impact by group.*
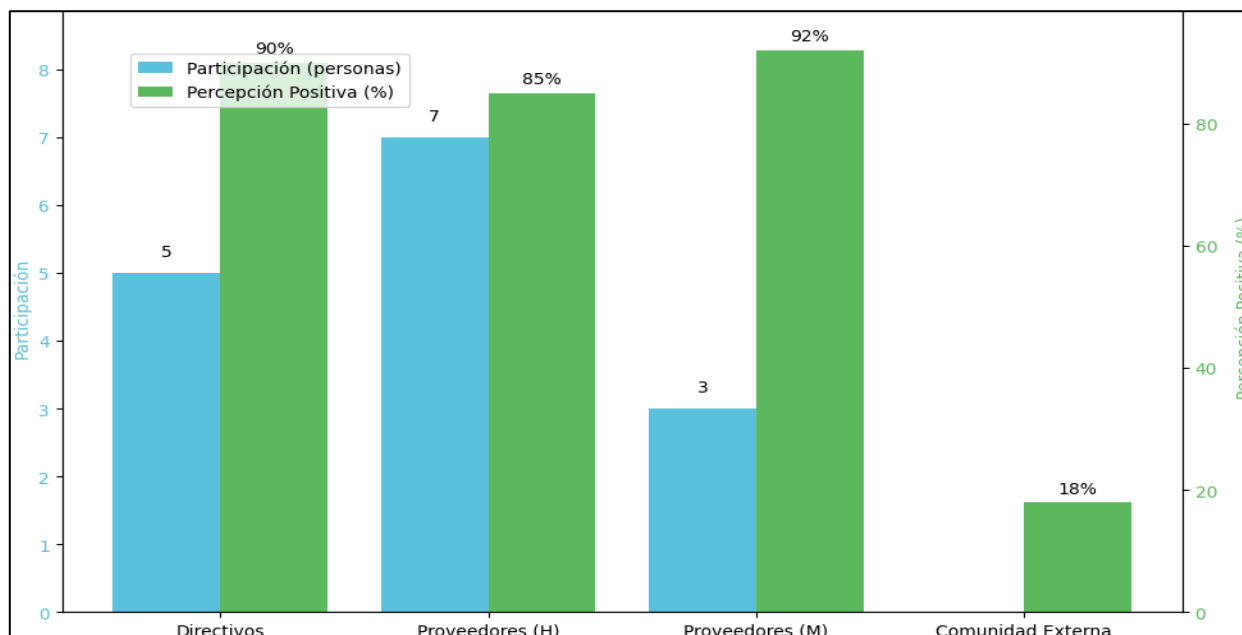


### Critical analysis of technical limitations and scalability opportunities

Although the system has met its primary objectives, there are limitations that should be addressed in future versions. The main one is the absence of an automated payment gateway. Currently, payments are recorded manually, which introduces a margin of error and dependence on accounting staff. The inclusion of a banking API with secure SSL connection would be a natural advancement (Maghsoudi, 2023).

Another improvement opportunity lies in integration with external logistics services, which would enable a fully automated system from sale to delivery. From a technical standpoint, the current modular architecture allows these changes to be implemented without the need to restructure the system's core.

In the long term, it is recommended to implement machine learning tools to predict customer behavior and automate product recommendations, which would turn the system into a true decision-making engine (Oscco, 2021).

### Comparison with the state of the art and differential value of the proposed solution

In contrast with CRM solutions that require high investments and perpetual licenses, this system represents a customized alternative with reduced costs and total adaptability to Home Link-OR's operational model. Its local development enabled culturally contextualized implementation, with

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direct validation by end users. Home Link-OR not only adopted a technical solution but also embraced a new management paradigm based on information.

The differential contribution of this study lies in its comprehensive approach: adaptive design, BI integration, empirical validation, low implementation cost, and high satisfaction among all beneficiary groups. This case demonstrates that SMEs in emerging contexts can incorporate business intelligence without relying on external platforms, boosting their competitiveness sustainably (Barragán, 2024).

## CONCLUSION

The study conducted at Home Link-OR empirically demonstrates that the implementation of a customer management system (CRM) with business intelligence (BI) tools can generate a significant positive impact on operational efficiency, customer experience, and organizational culture. Throughout the analysis, a structural transformation of internal commercial processes was evident, facilitated by a modular, scalable, and highly usable technological architecture developed with modern tools such as HTML, PHP, and MySQL. One of the most compelling results was the reduction of average customer service time by 65.2%, decreasing from 22.4 minutes before the system to just 7.8 minutes after its implementation. This improvement reflects clear optimization in operational efficiency, reducing errors, eliminating redundancies in information flow, and automating critical tasks. These benefits, in addition to being verified in internal operations, were directly perceived by end users: the proportion of customers who declared themselves "very satisfied" with the service received increased from 14.5% to 53.6%, while dissatisfaction levels drastically decreased from 24.6% to 3.6%.

From the internal staff's perspective, the perception of the system was also notably positive. 75% rated ease of use as "very high," and 87.5% stated that the system significantly improved their analytical and decision-making capacity. This outcome is directly related to the automation of reports, real-time access to information, and the intuitive layout of system functions—key elements for successful technological adoption. The BI module, in particular, proved to be a catalyst for strategic decision-making. Through the visualization of real-time indicators, it was identified that 62.5% of commercial requests were concentrated on Tuesdays, Wednesdays, and Thursdays, which enabled a redesign of work shift distribution without increasing the operational workload. Similarly, the analysis of the most profitable products revealed that 80% of revenue came from a small subset of the catalog, which enabled more effective segmentation and targeted commercial strategies. In addition, the use of automated campaigns increased the customer response rate by 22% in just two months.

At the organizational level, the system's integration generated cross-cutting effects. Management meetings began incorporating dashboards as a central analysis tool, promoting a proactive, data-driven management approach. The relationship with suppliers was also strengthened thanks to the automation of purchase orders and shared access to inventory reports, improving supply chain efficiency.

In summary, the experience of Home Link-OR confirms that a CRM-BI implementation adapted to the local context, with active user participation and an agile development methodology, can substantially transform commercial operations and strengthen the competitiveness of SMEs. This case provides solid evidence that digital transformation is not exclusive to large corporations, but can also be successfully achieved by small organizations when there is a clear strategic vision and appropriate technical execution.

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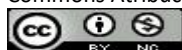
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