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# Economic Efficiency and Sustainable Management in the Waste Industry: The Case of Inter Trans Jireh

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***Abstract–Economic efficiency is a critical challenge in solid waste management, a sector where companies like Inter Trans Jireh face notable deficiencies. This research details the issue of low economic efficiency, exacerbated by poor management and planning practices at Inter Trans Jireh.***

***An innovative solution is proposed through the implementation of sophisticated Enterprise Resource Planning (ERP) tools, such as advanced inventory management systems and logistics route optimization. The analysis focuses on how integrating these tools can radically transform the company's operational and economic efficiency.***

***The study is supported by a robust theoretical framework that emphasizes the critical importance of effective solid waste management and its direct impact on economic performance and environmental sustainability. Using techniques such as flowcharts and SIPOC diagrams, a comprehensive diagnosis of the operational environment at Inter Trans Jireh is conducted, tailoring the ERP solution to its specific needs.***

***A pilot phase is implemented to verify the effectiveness of this integrated strategy, using specific indicators to assess improvements in economic efficiency, including cost reduction and operational time optimization. The results demonstrate significant improvements in the economic efficiency of Inter Trans Jireh, providing a model for more sustainable and profitable management in the solid waste industry.***

***Keywords-- Economic Efficiency, Solid Waste Management, ERP, Sustainability, Operational Optimization.***

## I. Introduction

In the dynamic and challenging sector of solid waste management, effectively addressing the increasing volumes of waste is more crucial than ever. The integration of advanced Enterprise Resource Planning (ERP) systems has emerged as an essential catalyst for innovation in business models, providing fundamental tools to improve the operational and economic efficiency of involved companies [4]. This approach is particularly relevant for companies like Inter Trans Jireh, which is at a critical stage of development, facing an urgent need to overcome the limitations of inefficient traditional procedures to strengthen its competitiveness and ensure long-term sustainability.

The economic landscape in Peru, marked by a significant presence of micro, small, and medium-sized enterprises (MSMEs), presents a strategic dilemma between adopting cutting-edge technologies and continuing with traditional business models. Reference [2] highlight that, despite initial barriers related to technological adaptation, the adoption of ERP in other regions has led to substantial improvements in decision-making and operational management, with outcomes that are potentially replicable in the Peruvian business context.

The waste management sector in Peru faces unique challenges. These stem from increasing waste production and the need for sustainable disposal methods [14]. Accelerated urbanization and the rise in waste generation have put pressure on existing infrastructures, which are often insufficient to handle the volume and diversity of generated waste effectively. This situation underscores the critical importance of adopting advanced technologies and innovative management practices to ensure not only compliance with environmental regulations but also progress toward sustainability. In this context, companies like Inter Trans Jireh play a pivotal role, as the implementation of systems like ERP can significantly transform waste management efficiency, improving tracking capabilities, waste segregation, and recyclability, thereby contributing to national and international efforts for more sustainable waste management.

Inter Trans Jireh, operating in an expanding market and facing increasingly intense competition, needs to adopt these advanced technologies to maintain its relevance. The implementation of ERP systems promises not only to optimize processes and reduce operational costs but also to significantly improve the company's ability to meet growing customer expectations regarding sustainability and operational efficiency. By addressing these challenges through the integration of resource planning technology, Inter Trans Jireh could not only enhance its own operations but also set a precedent in the industry, demonstrating how technology can provide effective solutions to current and future challenges in solid waste management.

This study aims to provide a comprehensive and detailed analysis of how the implementation of ERP systems can catalyze a revolution in economic efficiency and strengthen the competitiveness of Inter Trans Jireh in a constantly evolving market. Through an evidence-based approach drawing on comparable experiences and previous studies, the study will explore how a well-integrated ERP strategy can act as a catalyst for organizational transformation. Beyond directly benefiting Inter Trans Jireh, this analysis could offer a replicable model for other companies in the sector to achieve similar results, thereby driving widespread improvements in efficiency and sustainability within the solid waste management industry.

## II. State of The Art

The ERP system, as a centralized operational core, plays a crucial role in integrating various business functions and processes within an organization. This system consolidates essential information from key departments such as finance, operations, and logistics into a single robust platform. In doing so, organizations can eliminate inefficiencies and remove redundancies in their processes. Furthermore, by providing a unified and constantly updated view of business operations, ERP empowers decision-makers, facilitating more informed and strategically focused decision-making [10][6]. This capability is critical in highly dynamic and competitive market environments where agility and precision in decision-making can determine the success or failure of a company.

In the specific field of solid waste management, the integration of ERP systems has proven to be a transformative tool, particularly in how companies perceive and manage their internal operations and environmental impact. For a company like Inter Trans Jireh, ERP not only optimizes traditional functions such as logistics and finance but also introduces advanced data analysis capabilities that provide deeper insights into operations. This includes optimizing collection routes to minimize fuel consumption, improving resource efficiency, and implementing circular economy practices. These improvements have the potential to not only enhance operational efficiency and reduce costs but also to strengthen corporate responsibility and public image by aligning with modern expectations of sustainability and environmental stewardship. The case of Inter Trans Jireh can serve as a valuable case study for other entities in the sector, providing a replicable model of how ERP technology can be applied to address environmental and economic challenges in waste management.

From an economic perspective, ERP is remarkably valuable for its ability to provide meticulous and detailed financial control. This system enables efficient cash flow tracking and resource allocation optimization, identifying potential areas for cost reduction and improving overall profitability. The impact of ERP on enhancing decision-making quality is significant, as it provides business leaders with accurate and timely data essential for well-founded strategic decisions [5]. Furthermore, this tool is particularly valuable in solid waste management, a sector that requires meticulous and detailed resource planning and management to optimize operations without compromising environmental responsibility or efficiency.

The effective implementation of an ERP system can be the determining factor between maintaining stable profit margins and experiencing adverse financial fluctuations. In the long term, ERP not only ensures financial stability but also equips companies to adapt and expand within highly competitive markets. It provides the necessary tools to scale operations, optimize resources, and respond agilely to changing market demands. The integration of an ERP system with a process-based approach to health, safety, and environmental (HSE) management in a specific case study demonstrated significant improvements in operational efficiency and sustainability, highlighting the versatility and transformative impact of ERPs across various operational areas [1].

The implementation process of an ERP system requires a strategic and meticulous approach that begins with accurately identifying the company's needs. Selecting ERP software that aligns with the organization’s specific objectives is a crucial initial step to ensuring that the chosen ERP system is best suited for the company's unique operations. Reference [4] discusses how ERP can function as both a driver and a barrier to business model innovation, depending on its alignment with the company's strategies and its adaptability to existing operational structures. Once the software is selected, the process continues with the configuration and customization of the ERP to ensure it aligns seamlessly with the company’s existing processes and workflows—an essential step involving both technology and human factors critical for successful implementation.

The configuration and customization of the ERP, following the selection of the appropriate software, is a critical phase in the implementation process. This step requires meticulous adjustments to ensure the system fits the company’s specific processes and workflows. Customization must be comprehensive and consider all operational aspects to ensure the ERP reflects and supports the company’s unique needs. Reference [2] highlight that ERP adoption in small and medium-sized enterprises in Jordan has shown not only improved operational and financial efficiency but also how proper system customization can facilitate a smooth transition and effective integration with existing operations. This implementation phase can be complex and requires careful planning to minimize operational disruptions and ensure all ERP components function coherently and efficiently.

Once implemented, the impact of an ERP system on solid waste management can be profoundly significant. It not only enhances operational and financial efficiency but also contributes to more sustainable and environmentally friendly management. By optimizing processes and reducing operational waste, companies can minimize their ecological footprint while improving profitability. Reference [3] analyzes how changing perceptions of sustainability influence the evaluation of waste management scenarios and how an ERP system can be crucial in implementing practices that are both economically efficient and environmentally responsible. This integrated approach helps companies not only comply with stricter environmental regulations but also adopt a leadership role in promoting sustainable operations within the industry.

In addition to direct operational and environmental improvements, ERP implementation at Inter Trans Jireh has the potential to reconfigure the value chain in the waste management industry, fostering closer collaboration among the sector’s various stakeholders. Integrating data from diverse sources and facilitating communication between suppliers, clients, and regulators, ERP creates a more cohesive and

transparent ecosystem [2]. This interconnectedness enables more effective coordination of recycling activities, from collection to final processing, ensuring that recyclable materials are handled more efficiently and sustainably. In this way, Inter Trans Jireh not only positions itself as a leader in operational efficiency but also as a catalyst for change toward more sustainable and economically viable practices in the sector, demonstrating how technology can drive not only business success but also contribute to a more responsible and forward-thinking industry.

ERP has established itself as an indispensable tool for solid waste management companies seeking not only to improve their economic efficiency but also to strategically position themselves in a competitive market. Proper implementation and effective use of an ERP system can lead to a significant transformation in a company, ensuring not only short-term profitability but also long-term sustainability and growth. This system provides a solid foundation for scaling operations, adapting to changing market demands, and responding agilely to any operational or financial challenges that may arise.

In conclusion, implementing an ERP system in the solid waste management sector offers multiple benefits that go beyond the simple automation of tasks. It facilitates a holistic and coherent view of business operations, enabling more strategic and well-founded decision-making. Furthermore, ERP's role in continuous improvement and adaptation to evolving market environments is invaluable, providing the tools necessary to maintain competitiveness and efficiency in a sector facing constant economic and environmental pressures. ERP implementation not only optimizes resource and process management for these companies but also establishes a framework for continuous innovation and improved operational sustainability.

## III. Contribution

The implementation of an Enterprise Resource Planning (ERP) system at Inter Trans Jireh addresses the critical need to close operational gaps and maximize economic efficiency identified in the current management structure. A centralized ERP will significantly strengthen operational management and planning, enabling the integration and automation of processes from logistics to finance. This not only optimizes resource utilization but also provides real-time data essential for strategic decision-making, reducing costs and eliminating redundancies [11].

Additionally, the implementation of this system enhances visibility and control over operations and finances, facilitating detailed monitoring and allowing proactive adjustments to the company's strategy. This is crucial for effective planning, enabling Inter Trans Jireh to anticipate market changes and adapt its operations to maintain competitiveness [4]. Efficient supply chain management is another direct benefit, reducing inventory costs and improving material acquisition.

The success of this adoption also depends on human factors and organizational adaptation. Reference [9] emphasize that integrating ERP with the company's culture and securing support from all organizational levels is essential for an effective and sustainable transition. This comprehensive approach not only promotes operational efficiency but also repositions Inter Trans Jireh as a leader in solid waste management, ready to tackle future challenges and opportunities in an evolving sector.

Among various technological alternatives considered, the ERP system was selected by Inter Trans Jireh for its exceptional ability to comprehensively integrate and optimize all business functions at a cost-effective level. While solutions such as sensors or traceability software provide specific improvements in tracking and logistics, and technologies like DEA Software and Center of Gravity involve high costs without guaranteeing a proportional increase in overall profitability, ERP provides an integral solution encompassing inventory management to human resources. It improves decision-making and profitability. Its medium-high cost is justified by a significantly higher return on investment due to its direct and broad impact on operational and economic efficiency, making it the most viable and sustainable option to enhance the company's management and competitiveness in the long term.

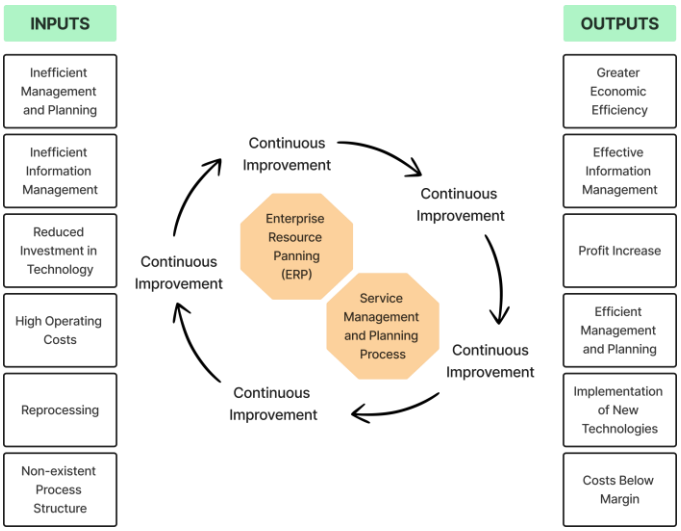



Fig. 1 Proposed Model
Source: Own elaboration.

The proposed framework aims to eliminate redundant activities and integrate key actions, focusing particularly on the digitization of operational processes and the implementation of the proposed system, centered on resource optimization and efficiency improvement.

This strategic approach seeks to ensure a durable and robust presence for companies in the waste management sector, adapting to current needs and anticipating future challenges.

The proposed model highlights the importance of ERP integration.

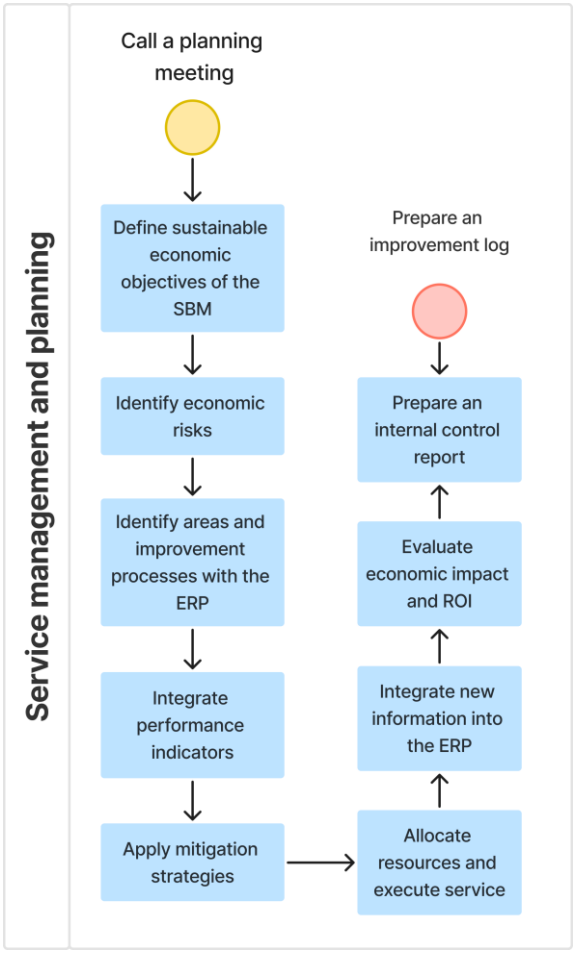



Fig. 2 Flowchart of the Intervened Process
Source: Own elaboration.

As shown in Figure 2, the Service Management and Planning process at Inter Trans Jireh, designed to guide the company towards economic efficiency in solid waste management, begins with a comprehensive audit that identifies operational strengths and weaknesses. This initial evaluation is crucial for setting goals and planning operations aligned with economic objectives, continuously adjusting to changing market conditions and regulations.

However, the company's focus has been mainly limited to short-term objectives, neglecting the strategic planning essential for long-term economic sustainability. This narrow vision, combined with a lack of alignment between siloed departments, results in duplicated efforts and incoherent decisions that diminish overall efficiency.

Moreover, Inter Trans Jireh faces rigidity in its organizational structure, which limits its ability to quickly adapt to market changes, compromising its competitiveness. Poor internal communication exacerbates the loss of vital information, and an excessive reliance on technology without proper oversight leads to system failures. Furthermore, the absence of customer feedback mechanisms and ineffective information management result in decisions based on outdated or incorrect data. These factors, combined with high operational costs and an overdependence on manual processes, not only increase the potential for errors but also slow down service delivery, negatively impacting profitability.

To complement and better understand the foundations of the process, the SIPOC diagram (Suppliers, Inputs, Process, Outputs, Customers) was used in the document. It provides a clear and structured view of the Service Management and Planning process at Inter Trans Jireh. This diagram efficiently identifies the suppliers, inputs, processes, outputs, and customers involved, facilitating a comprehensive understanding of how these elements interconnect. By breaking down the process into these key components, SIPOC enables the company to detect areas of inefficiency and improve coordination across different stages of the process, ensuring that each step effectively contributes to overall economic and operational objectives.

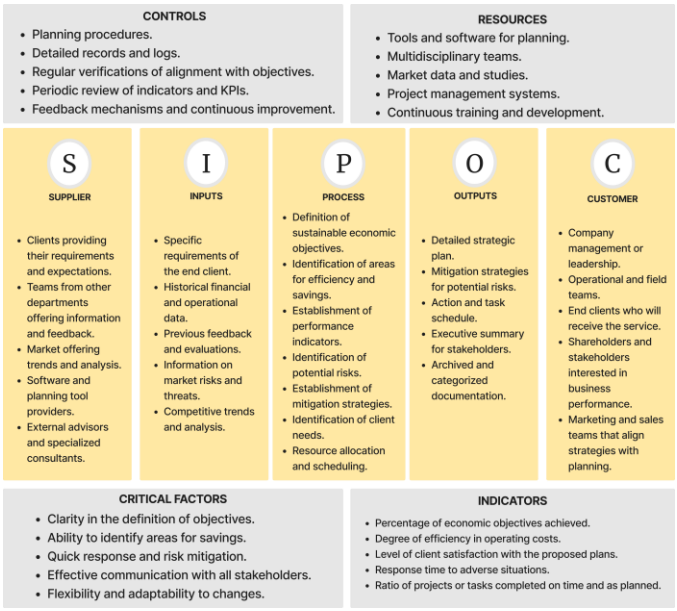
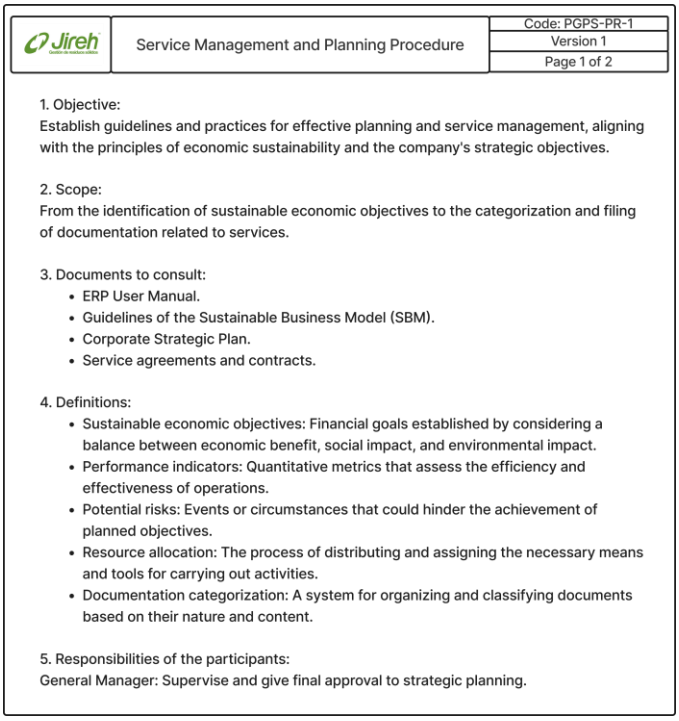



Fig. 3 SIPOC of the Management and Planning Process
Source: Own elaboration.

The inclusion of a documented procedure in this paper reflects Inter Trans Jireh's commitment to continuous improvement and detailed management of its operations. This document outlines the step-by-step process of Service Management and Planning, providing a clear framework for employees and managers. By standardizing practices and maintaining thorough documentation, the company ensures consistency and quality in its operations, minimizes errors, and facilitates the training of new staff. Additionally, these documented procedures are crucial for conducting effective internal audits and adapting strategies to change market dynamics and regulatory requirements.



Jireh | Service Management and Planning Procedure | Code: PGPS-PR-1 | Version 1 | Page 1 of 2

1. Objective:
Establish guidelines and practices for effective planning and service management, aligning with the principles of economic sustainability and the company's strategic objectives.

2. Scope:
From the identification of sustainable economic objectives to the categorization and filing of documentation related to services.

3. Documents to consult:
- ERP User Manual.
- Guidelines of the Sustainable Business Model (SBM).
- Corporate Strategic Plan.
- Service agreements and contracts.

4. Definitions:
- Sustainable economic objectives: Financial goals established by considering a balance between economic benefit, social impact, and environmental impact.
- Performance indicators: Quantitative metrics that assess the efficiency and effectiveness of operations.
- Potential risks: Events or circumstances that could hinder the achievement of planned objectives.
- Resource allocation: The process of distributing and assigning the necessary means and tools for carrying out activities.
- Documentation categorization: A system for organizing and classifying documents based on their nature and content.

5. Responsibilities of the participants:
General Manager: Supervise and give final approval to strategic planning.

Fig. 4 Procedure for the Service Management and Planning Process
Source: Own elaboration

The indicators selected for this study are designed to provide a comprehensive evaluation of the efficiency and effectiveness of the Service Management and Planning process at Inter Trans Jireh.

*1)* The Economic Efficiency Index is crucial as it directly measures profitability in relation to resources invested, offering a clear perspective on overall economic management.

*2)* The Unbudgeted Costs Index helps identify expenses that were not anticipated in the initial planning, which is vital for improving the accuracy of future estimates and budget controls.

*3)* The Profitability Index provides a direct understanding of the economic returns generated by the services offered, reflecting the company's ability to turn operations into substantial profits.

*4)* The Operational Incidents Percentage highlights the frequency of issues or failures in daily operations, serving as a barometer for the company's operational stability.

*5)* The Percentage of Satisfactorily Completed Services evaluates the effectiveness with which services are delivered according to customer standards and expectations, which is essential for measuring customer satisfaction and service quality.

Together, these indicators provide a holistic view of operations, enabling Inter Trans Jireh to not only monitor its current performance but also plan strategic improvements based on concrete data.

| INDICATOR | INDICATORS | | | REFERENCE | MEASURE OF FREQUENCY |
|---|---|---|---|---|---|
| | Objective | Description | Form | | |
| Percentage of satisfactorily completed services. | Determine the effectiveness of the services provided. | Measures the proportion of services successfully completed without issues. | (Number of satisfactorily completed services / Total number of services offered) | >95%<br>86% - 94%<br><85% | Monthly |
| Index of Unbudgeted Costs | Determine expenses not included in the initial budget. | Measures the relationship between costs not included in the initial budget and total costs within a given period. | (Costs not included in the initial budget / Total costs) x 100 | <5%<br>6% - 10%<br>>11% | Monthly |
| Percentage of operational incidents. | Identify errors or problems in operations. | Measures the percentage of errors or problems detected in relation to total operations performed within a given period. | (Total number of detected errors or problems / Total number of operations) | <2.99%<br>3% - 4.99%<br>>5% | Monthly |
| Profit Index | Determine the company's profitability and align it with economic objectives. | This indicator measures the relationship between net profit and total sales within a given period. | (Net profit / Total sales) x 100 | >15%<br>10% - 14.99%<br><9.99% | Monthly |
| Economic Efficiency Index | Determine the relationship between net profit and total cost. | This indicator reflects the company's ability to transform its total costs into net profits. | (Net profit / Total cost) x 100 | >15%<br>10% - 14.99%<br><9.99% | Monthly |

Fig. 5 Summary of Indicators and Characterizations.

## IV. Validation

The validation of the bibliography is a fundamental pillar in academic research, as it provides the necessary structure to ensure the credibility and applicability of the study's findings. By building a solid foundation with well-established sources, the research relies on a robust theoretical framework that not only supports the arguments presented but also demonstrates the relevance and timeliness of the information.

In this study, special emphasis has been placed on selecting a bibliography composed exclusively of scientific articles published from 2020 onwards, ensuring that the content reflects contemporary trends and the most recent advancements in the field.

Each source selected for this analysis belongs to Q1 publications, indicating a high level of recognition and acceptance within the academic community. This distinction is critical, as Q1 articles are rigorously peer-reviewed and are recognized for their significant contributions to their respective fields of study. By integrating these high-quality sources, the study ensures that the data and theories utilized are validated by experts and reflect the most accurate and advanced knowledge available.

Furthermore, evaluating the research findings in contrast with the operational reality of Inter Trans Jireh not only enhances the practical applicability of the findings but also allows for a direct verification of theories against real-world experiences and data. This methodological approach ensures that the results are not only theoretically valid but also implementable and effective in a real-world context. This is essential for proposals aimed at achieving a tangible impact on the economic and operational efficiency of the company. This comprehensive validation approach underscores the study's commitment to academic excellence and practical relevance, setting a precedent for future research in the field of solid waste management.

The proposal was implemented through strategically planned steps, starting with an initial diagnosis and concluding with a final evaluation. This process aims to optimize

operations and align them with new technological capabilities to maximize economic efficiency.

*1) Comprehensive Diagnosis:*

The process began with a detailed diagnosis of current operations to identify inefficiencies and establish specific requirements for the ERP implementation. This step included an analysis to understand how processes could be optimized in parallel with the new technology.

*2) ERP Selection and Customization:*

The ERP system that best fit the needs of Inter Trans Jireh was selected, considering factors such as functionality and cost, and was customized to align with the optimized business processes.

*3) Strategic Implementation:*

The system was installed and configured, ensuring seamless integration with business processes. Test phases were conducted to guarantee full functionality before the official launch.

*4) Training and Adaptation:*

Intensive training was provided to all system users to facilitate quick and effective adaptation, accompanied by continuous support to address issues promptly.

*5) Continuous Monitoring and Adjustments:*

System and process performance were monitored and evaluated to identify opportunities for ongoing improvement and make necessary adjustments to maximize ERP efficiency and effectiveness.

*6) Post-Implementation Impact Analysis:*

Post-implementation evaluations were conducted to measure the ERP's impact on operations and overall efficiency, highlighting improvements in costs and efficiency.

Identifying and understanding stakeholders is crucial for any company seeking to adapt and thrive in a competitive environment. In the analysis of organizational impacts, the interaction of each segment—ranging from employees and customers to regulators and the local community—with Inter Trans Jireh is detailed.

This exhaustive mapping allows the company to visualize and strategize how external and internal influences can be managed or leveraged to strengthen its operations. By highlighting the participation and level of influence of each group, the company can optimize policies and interaction strategies, which is essential to improving strategic execution and overall operational efficiency.

| ITEM | Interested Party | Location | Description | Participation | Level of Influence | Internal / External |
|---|---|---|---|---|---|---|
| 1 | Employees | Lima, Peru | Individuals working under Inter Trans Jireh. | Key to the implementation of any model. | High | Internal |
| 2 | Clients | Lima, Peru | Companies or individuals using the services of Inter Trans Jireh. | Affected by changes in efficiency or service. | High | External |
| 3 | Investors | Lima, Peru | Individuals/entities that have invested in Inter Trans Jireh. | Interested in financial health and sustainability. | Medium-High | External |
| 4 | Suppliers | Lima, Peru | Companies or individuals supplying materials or services to Inter Trans Jireh. | Affected by changes in demand or contractual terms. | Medium | External |
| 5 | Competitors | Lima, Peru | Other companies in the waste management sector. | Interested in the company's strategic moves. | Medium-Low | External |
| 6 | Regulatory Entities | Lima, Peru | Governmental bodies that regulate waste management. | Supervise and ensure compliance with regulations. | High | External |
| 7 | Local Community | Lima, Peru | Neighbors and community surrounding Inter Trans Jireh's operations. | Affected by the company's operations and decisions. | Medium | External |

Fig. 6 Organizational Impacts of the Implementation

As shown in Figure 6, seven stakeholders have been identified, ranging from employees to regulatory entities and local communities. Their descriptions and levels of participation are outlined to help determine the degree of influence they exert on both the internal and external organizational environment.

Exploring the social benefits derived from the company's operations provides a clear view of how the implemented strategies affect a variety of stakeholders. This analysis details the impacts of business interventions on profitability, employees' personal and professional growth, customer satisfaction, service quality, cost reduction, and productivity improvement. By evaluating these elements, Inter Trans Jireh's commitment to the social and economic well-being of its stakeholders is emphasized.

Additionally, by offering a quantitative assessment of the impact on these areas, the company can now effectively demonstrate how its practices not only pursue economic success but also foster a more enriching and equitable work and community environment. The following figure summarizes these social impacts.

| Beneficiary | Aspect | Element | Impact level (1-5) |
|---|---|---|---|
| Company | Economic | Higher profitability | 4 |
| Company | Economic | Establishment of alliances | 4 |
| Company | Social | Establishment of alliances | 3 |
| Workers | Formality | Establishment of alliances | 4 |
| Workers | Social | Establishment of alliances | 4 |
| Workers | Education | Establishment of alliances | 5 |
| Clients | Price | Establishment of alliances | 3 |
| Clients | Quality | Establishment of alliances | 4 |
| Clients | Service level | Establishment of alliances | 5 |
| Suppliers | Quality | Establishment of alliances | 5 |
| Suppliers | Associativity | Establishment of alliances | 3 |
| Suppliers | Economic | Establishment of alliances | 4 |
| Society | Social | Establishment of alliances | 2 |
| Society | Economic | Establishment of alliances | 5 |
| Society | Education | Establishment of alliances | 3 |

Fig. 7 Social Impacts of the Implementation

Figure 7 illustrates the relationship between the beneficiaries of these social impacts and the aspects or elements they represent, along with the level of impact assigned on a scale from 1 to 5. One of the primary beneficiaries is the customers, with service level improvements receiving a maximum impact rating of 5.

| Impact | Impact Severity | Impact Scale | Environmental Legislation | Frequency |
|---|---|---|---|---|
| Reduction of solid waste | Mild | Regional | Complied | High |
| Optimization of energy consumption | Moderate | Municipal | Complied | Medium |
| Minimization of pollutant emissions | Mild | Specific | Complied | Medium |
| Sustainable use of resources | Mild | Regional | Complied | High |
| Reduction of carbon footprint | Moderate | Municipal | Complied | Medium |
| Proper effluent management | Moderate | Specific | Complied | Low |
| Promotion of recycling and reuse | Mild | Regional | Complied | High |
| Biodiversity conservation | Mild | Municipal | Does not exist | Low |
| Reduction in the use of plastics | Mild | Regional | Complied | Medium |
| Use of clean technologies | Moderate | Specific | Complied | High |

Fig. 8 Environmental Impacts of the Implementation

Effective management of environmental impact is a cornerstone for companies committed to sustainability. This in-depth analysis covers a range of environmental effects from Inter Trans Jireh's operations, including carbon footprint reduction, proper effluent management, and the promotion of recycling. Each category is evaluated based on its severity, scale of impact, compliance with environmental legislation, and frequency of occurrence.

This approach allows the company to not only comply with regulations but also identify opportunities to improve its environmental performance. By highlighting how each practice adheres to regulations or identifying areas where legislation is absent, Inter Trans Jireh can adjust its operations to not only avoid penalties but also take the lead in adopting sustainable practices that benefit both the company and the environment.

| Conceptos | Unidad | Cantidad | Costo Unitario (S/.) | Costo Total (S/.) |
|---|---|---|---|---|
| Fase 01 : Dirección del Proyecto | | | | |
| Impresión Acta de Constitución del Proyecto | Unid | 3 | S/ 3.00 | S/ 9.00 |
| Impresión Plan de Dirección del Proyecto | Unid | 3 | S/ 3.00 | S/ 9.00 |
| Impresión Acta de Cierre de Proyecto | Unid | 3 | S/ 3.00 | S/ 9.00 |
| Reuniones de inducción al proyecto con las Gerencias de la empresa | H/H | 8 | S/ 250.00 | S/ 2,000.00 |
| Reuniones de inducción al proyecto con el personal operativo de la empresa | H/H | 72 | S/ 150.00 | S/ 10,800.00 |
| Movilidad | Unid | 35 | S/ 5.00 | S/ 175.00 |
| Viáticos | Unid | 35 | S/ 15.00 | S/ 525.00 |
| Impresión Lecciones Aprendidas | Unid | 3 | S/ 3.00 | S/ 9.00 |
| Fase 02 : Implementación de la Propuesta | | | | |
| Impresión Documentación del SBM y ERP | Unid. | 3 | S/ 3.00 | S/ 9.00 |
| Impresión Capacitaciones, monitoreo y control de la implementación | Unid. | 3 | S/ 3.00 | S/ 9.00 |
| Implementación del Software del ERP | Unid. | 1 | S/ 38,990.00 | S/ 38,990.00 |
| Reuniones de implementación del proyecto con el personal de la empresa | H/H | 144 | S/ 150.00 | S/ 21,600.00 |
| Licencia Anual de Usuarios | Unid | 8 | S/ 400.00 | S/ 3,200.00 |
| Servicio de Horas de Soporte por parte de la empresa implementadora | H/H | 36 | S/ 300.00 | S/ 10,800.00 |
| Horas de Capacitación | H/H | 50 | S/ 50.00 | S/ 2,500.00 |
| Servicio de capacitación integrada en los nuevos procesos e implementaciones | Unid. | 1 | S/ 5,000.00 | S/ 5,000.00 |
| Movilidad | Unid. | 32 | S/ 5.00 | S/ 160.00 |
| Viáticos | Unid. | 32 | S/ 15.00 | S/ 480.00 |
| Impresiones de la Implementación de los procesos y subprocesos | Unid. | 5 | S/ 5.00 | S/ 25.00 |
| **TOTAL** | | | | **S/ 96,309.00** |

Fig. 9 Cost of Implementation

The table above provides a detailed breakdown of the estimated costs for implementing an Enterprise Resource Planning (ERP) project at Inter Trans Jireh, totaling S/ 96,309.00. By specifying each expense—from the planning phase to full implementation and support, including activities such as document preparation, induction meetings, software

deployment, training, and technical support services, the table offers a crucial foundation for evaluating the financial impact of the project.

This cost analysis is essential for establishing a benchmark to measure improvements in economic efficiency resulting from the ERP implementation, ensuring that the investment is justified through tangible increases in the company's operational efficiency and effectiveness.

Prior to the implementation, Inter Trans Jireh faced significant challenges in aligning actual economic efficiency with expected goals, with real efficiencies ranging from 6.74% to 12.67%, compared to a consistent target of 20%. This discrepancy underscored the critical need for improved financial and operational management. The following table presents the detailed information described.

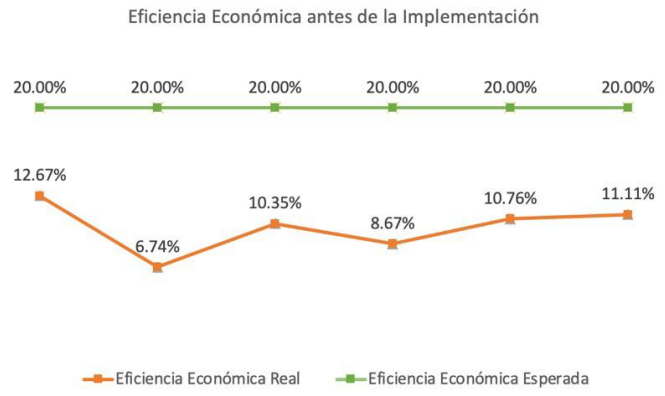



Fig. 10 Economic Situation Before Implementation

During the first four months of ERP implementation, Inter Trans Jireh has shown gradual improvements in economic efficiency, though it has yet to reach the established 20% target. Results indicate that actual economic efficiency has ranged from 13.30% to 15.08%, reflecting progressive increases that remain ongoing as the implementation process continues.

This initial period is crucial for adjusting and refining the use of the ERP system, aiming to further optimize processes and reduce variations in actual costs, which remain a challenge. Despite these advancements, the company must sustain its optimization efforts to close the gap between achieved and expected economic efficiency and to maximize the ERP's benefits within a continuous improvement framework. The following table displays the economic results and the impact of the proposal's implementation.

The chart illustrates the trajectory of Inter Trans Jireh's actual economic efficiency over several months following the ERP implementation, compared to the expected efficiency target of 20%. While initial efficiency started at a low 6.74%, it demonstrated a steady upward trend, reaching 15.08% in recent months.

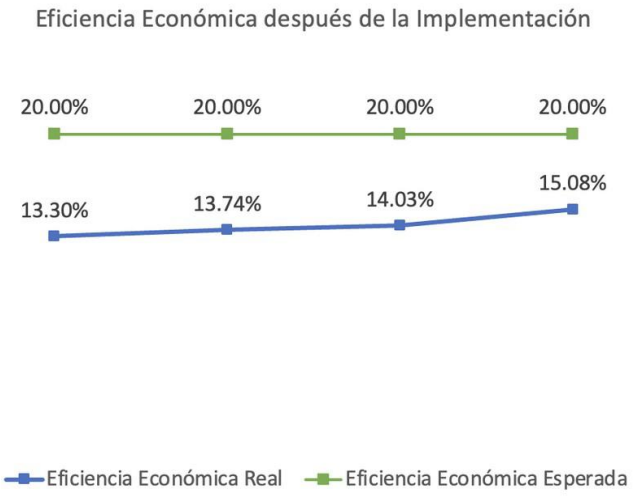



Fig. 11 Economic Situation After Implementation

This progress reflects the ERP system's capability to gradually enhance the company's operational and financial management, although it has not yet met the expected target. The ongoing implementation phase holds the expectation that actual economic efficiency will align more closely with established objectives.


Fig. 12 Impact of Implementation on Economic Efficiency

## V. DISCUSSION

In the context of ERP system implementation at Inter Trans Jireh, several hypothetical scenarios have been outlined to understand how different conditions could affect the company's economic efficiency. Each scenario includes a description of how the improvements were implemented:

### *A. Current Scenario*

Inter Trans Jireh has currently achieved an economic efficiency of 15.08%. The ERP implementation has been conducted gradually, addressing emerging operational challenges. Significant progress has been made, but the company remains below the optimal target of 20%.

The ERP system has been implemented with a focus on continuous improvement and real-time problem-solving,

enabling more agile adaptation to market demands and improved coordination between departments.

### B. *Pessimistic Scenario*

In a pessimistic scenario, economic efficiency reaches only 10%. This scenario assumes that the ERP implementation faced significant resistance from personnel and technical issues that limited its functionality.

In this scenario, the implementation was more reactive, addressing problems as they arose without a clear strategy. This approach resulted in lower performance and incomplete integration of business processes.

### C. *Moderate Scenario*

This scenario represents an improvement over the current state, achieving an economic efficiency of 15.08%, the same as in the current scenario. The ERP implementation was planned and executed with a conservative approach, ensuring that all systems functioned correctly before proceeding to the next phase. Improvements were incremental and focused primarily on areas of greatest need, avoiding drastic changes that could disrupt existing operations.

### D. *Optimal Scenario*

The optimal scenario reflects an ideal economic efficiency of 20%. In this case, the ERP implementation was carried out strategically and effectively, with active and enthusiastic participation across all organizational levels. Comprehensive training was conducted before implementation, and clear communication and feedback channels were established. The integration of the ERP system into business processes was smooth and well-coordinated, resulting in significant improvements in operational efficiency and cost reductions.

### E. *Scenario Comparison*

To visualize the results of each scenario, a comparative table has been prepared summarizing the economic efficiency achieved in each case. This table clearly demonstrates how different approaches to change management, and technological implementation can have a significant impact on the company's financial outcomes.

| Scenario | Economic Efficiency (%) |
|---|---|
| Current | 15 |
| Pessimistic | 10 |
| Moderate | 15 |
| Moderate | 20 |

Fig. 13 Scenario Comparison

## VI. Acknowledgments

We would like to express our sincere gratitude to Inter Trans Jireh for their invaluable collaboration in the proposed study. Their generous support and provision of resources were essential to the realization of this research. Thanks to Inter Trans Jireh, significant advances were made in the study, achieving results that would not have been possible without their valuable participation.

Similarly, we extend our heartfelt thanks to Cynthia Elías Giordano for her valuable guidance and expert advice throughout this research. Her knowledge and wisdom were fundamental to the success of our project.

## VII. Success Cases

**Lutfi et al. (2022):**

Investigated the effects of adopting Enterprise Resource Planning (ERP) systems in small and medium-sized enterprises (SMEs) in Jordan. The research highlighted that companies implementing ERP experienced an average 20% increase in operational efficiency and a 15% improvement in customer satisfaction. The adoption of ERP facilitated better data and process integration, enabling more informed and faster decision-making.

**Tomic, Kremer, and Schneider (2021):**

Analyzed the economic efficiency of different waste management scenarios with a focus on resource recovery. The results showed that the implementation of advanced recycling and recovery technologies increased the profitability of waste management companies by 25%, while public perception of their sustainability improved significantly. This case illustrates how innovations in waste management can be both economically viable and environmentally beneficial.

**Molina-Castillo et al. (2022):**

Explored how ERP systems can act as catalysts for business model innovation. Their study found that companies aligning their processes with their ERP system capabilities reported an 18% increase in business agility and a 22% improvement in product and service innovation. This study underscores the importance of careful ERP integration to ensure it serves as a driver rather than a hindrance to innovation.

These success cases demonstrate that adopting advanced management systems and innovative technologies is effective and adaptable across diverse sectors and companies. They reflect that implementing sustainable business models and efficient planning systems can significantly enhance competitiveness and sustainability in different environments, encouraging other organizations to follow these examples to optimize their operations.

## VIII. Conclusions

The implementation of the Enterprise Resource Planning (ERP) system in the company has fundamentally transformed the way information and resources are managed. By providing real-time access to critical data, the ERP has significantly improved efficiency and decision-making, enabling more effective management and a substantial reduction in costs. As a result, profitability reached an impressive 15.08%, demonstrating a significant improvement in the company's financial performance.

Additionally, the ERP implementation has driven notable improvements in the processes analyzed. Since its inception, the proposed model has proven effective, optimizing resource management and streamlining internal operations. This has contributed to more agile execution and better responsiveness to market demands. These process improvements have been instrumental in strengthening the company's competitive position.

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