

“Everything in life is a process!”: Use of the BPMN methodology and AI/IS and TO/BE analysis in a national telephone company

“Tudo na vida é um processo!”: Uso da metodologia BPMN e análise AI/IS e TO/BE em uma empresa de telefonia nacional

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Abstract: Process management is a key element for the success of organizations today. With the help of the BPM tool and the Business Process Modeling Notation, it is possible to reduce costs and eliminate unnecessary processes within a given area. This technological article aims to analyze the current process of returning devices to the end consumer of a national telephone company through the AS/IS analysis methodology and to design a proposal for improving the process to reduce freight costs through TO/BE analysis using the Bizagi Modeler software. This qualitative research uses process management tools to improve the Customer Service (SAC) sector, and the technical assistance sector of the company studied. Qualitative analysis techniques, such as coding interviews using the Atlas.ti software, Ishikawa diagram and 5W2H. The main result was the identification of bottlenecks that negatively affect the company during the processes investigated and contributions that affect the improvement of the processes in general.

Keywords: Process Management. BPMN Notation, AI/IS and TO/BE Analysis

Resumo: A gestão de processos é peça-chave para o sucesso das organizações na atualidade, com o auxílio da ferramenta BPM e da notação Business Process Modeling é possível propor a redução de custos, e eliminação de processos desnecessários dentro de uma determinada área. O objetivo deste artigo tecnológico é analisar o processo atual de retorno de aparelhos para o consumidor final de uma empresa de telefonia nacional através da metodologia de análise AS/IS, e desenhar uma proposta de melhoria do processo, para redução de custo do frete através da análise TO/BE utilizando o auxílio do software Bizagi Modeler. Esta pesquisa é de natureza qualitativa e utiliza ferramentas de gestão de processo para aprimorar o setor de Atendimento ao cliente (SAC) e o setor de assistência técnica da empresa pesquisada. Foram utilizadas também técnicas de análise qualitativa como a codificação de entrevistas através do auxílio do software Atlas.ti, aplicação do gráfico espinha de peixe e 5W2H. O principal resultado foi a identificação de gargalos que afetam negativamente a empresa durante os processos investigados além de propostas de melhorias que implicam na melhoria dos processos em geral.

Palavras-chave: Gestão de Processos. Notação BPMN, Análise AI/IS e TO/BE

Resumen: La gestión de procesos es un elemento clave para el éxito de las organizaciones en la actualidad. Con la ayuda de la herramienta BPM y la Notación de Modelado de Procesos de Negocio, es posible reducir costos y eliminar procesos innecesarios dentro de un área determinada. Este artículo tecnológico tiene como objetivo analizar el proceso actual de devolución de dispositivos al consumidor final de una empresa telefónica nacional a través de la metodología

de análisis AS/IS y diseñar una propuesta de mejora del proceso para reducir los costos de flete a través del análisis TO/BE utilizando el software Bizagi Modeler. Esta investigación cualitativa utiliza herramientas de gestión de procesos para mejorar el sector de Servicio al Cliente (SAC), y el sector de asistencia técnica de la empresa estudiada. Se utilizaron técnicas de análisis cualitativo, como entrevistas de codificación utilizando el software Atlas.ti, diagrama de Ishikawa y 5W2H. El principal resultado fue la identificación de cuellos de botella que afectan negativamente a la empresa durante los procesos investigados y aportes que inciden en la mejora de los procesos en general.

Palabras clave: Gestión de procesos. Nota BPMN, Análisis AS/IS y TO/BE

Introduction

Due to economic and technological advancements, organizations must adapt to remain competitive in today's market. Internal evaluation is one of the crucial elements influencing customer decisions (Lenira, 2024). Therefore, actions such as centralizing priorities and continuously evaluating processes are essential to a business's successful growth (Louzada & Duarte, 2017). According to Tonini (2020), process management is important for identifying the activities and functions of a given sector and for enabling the improvement and visualization of how tasks could be performed.

BPM notation (*Business Process Modeling*), also known as Business Process Management, enables organizations to create high-performance processes that can reduce operational costs by improving the speed and flexibility of activities. This way, companies can ensure their processes operate in a structured manner and evaluate whether each process meets the organization's and its customers' demands (Teixeira, 2023).

According to Magdaleno and Engiel (2020), whether in companies with experience in Business Process Management or as an opportunity to encourage the implementation of such processes, the establishment of Business Process Offices or Process Centers of Excellence in organizations is a global trend and a reality in the Brazilian context. BPMN notation is increasingly consolidating as the standard for business process modeling. Moreover, when used correctly, it is possible to achieve significant gains in the communication of flows and in process automation (Rebello, de Souza Menezes, Nelo, Santos Freitas & Marinho, 2020).

To understand the problem situation of this study, it is important to recall that managers are constantly making decisions in their organizations, and these decisions do not involve only administrative processes but all areas and processes of the company. With advances in technology and constant market changes, the quality of decisions determines organizational performance, requiring managers and employees to exercise greater precision in their processes (Oliveira, Lopes, Belchior & Wisler, 2020). In the studied company, an opportunity was identified to investigate a problem related to the return of mobile devices to end consumers.

According to Mações (2017), decision-making is not easy; it requires rationality. To assist managers, the author presents tasks that support this process, such as: beginning with problem identification, where the decision-making process starts with recognizing the existence of a problem; identification of alternatives, which consists of developing and identifying viable alternatives that can solve the problem; implementation of the chosen alternative; and finally, evaluation of the results and effectiveness of the decision, where it is necessary to verify the effectiveness of the decision — that is, to analyze whether the decision produced the desired effects and whether the problem was adequately resolved.

According to Silva et al. (2024, p. 7), “numerous studies have been conducted with the purpose of mapping and improving processes, aiming to increase operational efficiency and identify areas of improvement in various sectors.” Considering this information, the relevance of the study related to process management becomes clear for analyzing the Device Return Process to the End Consumer at Forever Mobile, conducting the current process analysis (AS/IS), and designing a future process

improvement proposal (TO/BE).

The literature on Process Management has advanced in proposing improvements for companies; however, some gaps led us to conduct this study, namely: contextual gap: an absence of studies in telephone companies in Brazil; methodological gap: few studies with real data or case studies; theoretical gap: lack of integration between BPM and consumer service; and practical gap: absence of evidence on performance improvement or customer experience.

The objective of this technological article is to analyze the current device return process for end consumers at Forever Mobile using the AS/IS analysis methodology and to design a process improvement proposal to reduce freight costs through a TO/BE analysis. Therefore, the proposed objective of this research is qualitative in nature and uses process management tools to improve the Customer Service (CS) and Technical Assistance departments at Forever Mobile Ltda. The proposed solution to the central problem is presented in the results section, along with the identification of bottlenecks that negatively affect the company during the investigated processes, and a series of improvement proposals that contribute to overall process enhancement, thus filling the contextual, theoretical, methodological, and practical gaps presented earlier. Innovation in this context occurs by pursuing continuous improvement, digital transformation, and operational efficiency for the company. Academically, this study is scarce in the literature and serves as a foundation for other telephone companies.

This technological article is structured in five parts: following the introduction, the context and investigated reality will be presented, followed by the diagnosis and analysis of the problem situation with proposals, and finally, conclusions and technological and social contributions.

Theoretical Elements of the Research

This subsection presents the problem context and the investigated reality. For this purpose, a theoretical and situational contextualization of the area is necessary.

To produce goods or services, every organization is formed by a set of processes, most of which are informal and unrecorded. According to Cruz (2021), in the past, there were no records of the activities performed by each department, and this ended up negatively influencing the competitive performance of organizations, since even if an effort was made to achieve the best results, it is impossible to measure process quality without an outline of what is being done and what can be improved.

To build a productive system capable of competing in today's market, processes must be improved to adapt to changes in the operating environment. According to Araújo, Garcia, and Martines (2022), these processes may be classified into two categories: the first, called business or core processes, and the second, known as management or support processes.

According to Kern, Poss, Kroenung, and Schönig (2024), the explicit focus of business process management includes ethical values such as security and privacy, knowledge, and usability. At an organizational level, values such as fairness, human well-being, and responsibility are also important, shifting the focus toward the human aspect of sociotechnical systems. Process management has become one of the most modern paradigms in business management today. According to Celano and Wanderley (2021, p. 95), "it allows integrated systems and organizational structures to be understood in a more organized manner." Oliveira (2020) affirms that organizations face various bottlenecks and that improvements in process execution can often eliminate them. The author also notes that Production Administration can assist with this optimization process using tools such as flowcharts and time-and-motion analysis charts. For this study, workflows were initiated as described in the literature and subsequently developed into processes, enabling the authors to propose improvements.

With this gradual growth, information technology can help manage small and large organizations, providing various process improvements. According to Meirelles (2023), IT spending

is not easily understood by executives; however, between 2015 and 2020, growth occurred at lower rates, while in 2021 there was a 6% increase and in 2022/2023 a 4% increase. According to Brocke and Rosemann (2021, p. 186), “Information Technology played an important role in various business process management (BPM) initiatives.” Although it is difficult to measure intangible impacts, information technology, according to Lucas (2006, p. 45), “can reduce organizational costs, increase employee satisfaction levels, and improve relationships with suppliers.”

People management in technology involves technological innovations designed to streamline tasks that previously consumed significant time. This is achieved through the decentralization of information, which establishes a model that promotes information sharing within the corporate environment (Junior, Ribeiro, de Lima, de Andrade & Queiroz, 2023). Since this study is a research project in a telephone company, it is important to recognize that process management and people management must be aligned for improvement proposals to be implemented.

Furthermore, IT can be associated with an organization's efficiency and effectiveness. According to Laurindo (2008), efficiency relates to the internal aspects of the organization, while effectiveness concerns the external aspects and has greater visibility with the end consumer. Regarding the effectiveness of IT use, the author describes it as “implanting or developing the systems that best adapt to the needs of users” (Laurindo, 2008, p. 73).

From these perspectives, IT tools were developed to support process management in organizations and improve process efficiency and effectiveness. Among the tools developed, BPM (Business Process Management) and BPMN (Business Process Model Notation) can be cited; the latter will be specified in the following section.

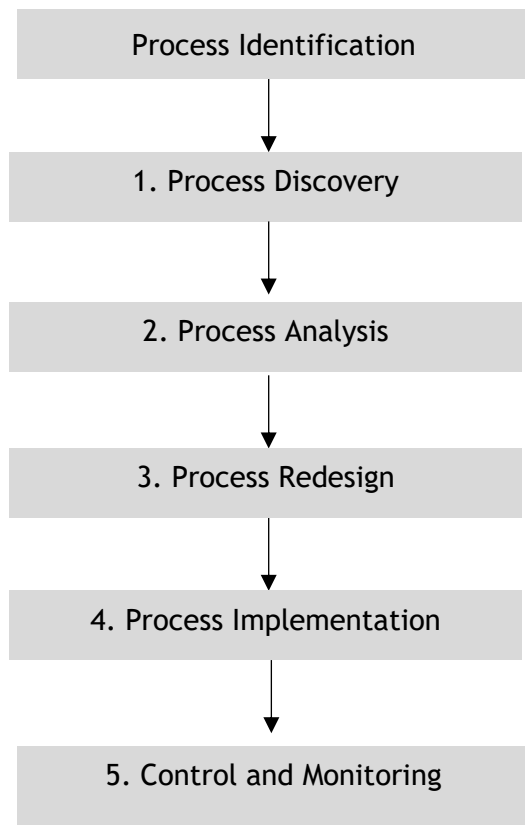
Business process management, internationally known as Business Process Management (BPM), is a set of practices focused on process modeling and highly effective for performance management, used to design, analyze, execute, and control operational processes in organizations (UBAID, 2020). Once implemented, this management model provided companies with insights for reducing operational costs.

Brocke and Rosemann (2013) characterize BPM as a customer-oriented organizational management approach. Moreover, customers care about one thing: results. As the authors further state: “an organization can create high-performance processes that operate with lower costs, greater speed, higher accuracy, better asset utilization, and greater flexibility” (Brocke & Rosemann, 2013, p. 21).

BPM is also identified by Dumas, La Rosa, Mendling, and Reijers (2013) as a continuous, gradual life cycle with interactivity among activities, as shown in Figure 1.

BPM has a notation called Business Process Modeling Notation (BPMN), which was developed by the Business Process Management Initiative (BPMI). Its objective, according to Araújo, Garcia, and Martines (2022), is to bridge the gap between process design and its implementation, being intuitive and easily understandable by all audiences: users, process analysts, technicians, clients, and other stakeholders.

Figure 1
Business Process Management Cycle



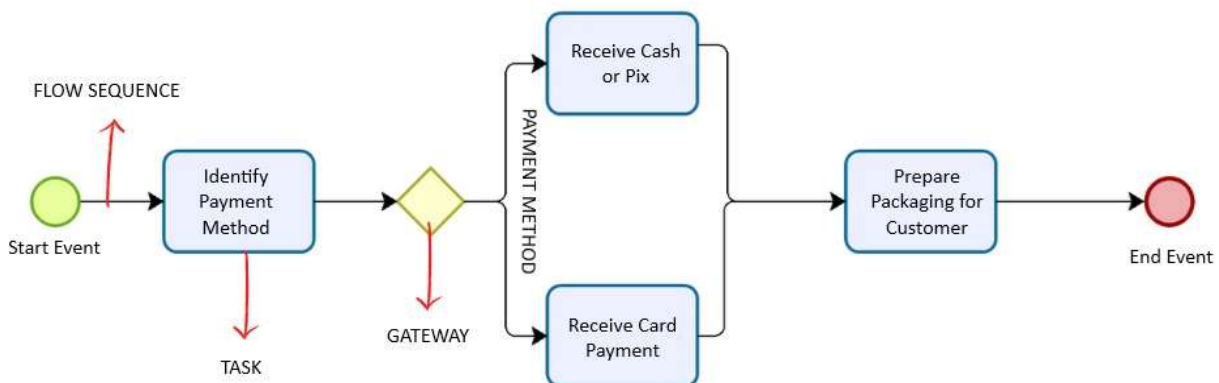
Source: Adapted from Dumas et al. (2013)

BPMN can be used for process modeling in any organizational area. One of the key points of this notation, according to Valle and Oliveira (2013), is the link between the design of business processes (DBP) and their implementation in an operational environment, enabling automation and execution by creating an integration bridge.

Thus, the BPMN technique, according to Araújo, Garcia, and Martines (2022), can be configured as a set of activities or as a single activity and may span multiple organizations.

Figure 2 exemplifies how BPMN works.

Figure 2
Process Using BPMN



Source: Adapted from Valle e Oliveira (2013)

The graphical representation of BPMN, according to Valle and Oliveira (2013), is the business process diagram, which consists of a “single workspace for process design through the drawing of graphical elements, by which we develop the business processes of the organization.” Brocke and Rosemann (2013) further add that “BPMN is grouped into four element categories: flow objects, connecting objects, swim lanes, and artifacts.”

From this knowledge, it is possible to identify how much these tools can help improve organizations. Thus, the following section will examine how this influences decision-making and delve further into the AS-IS and TO-BE technique.

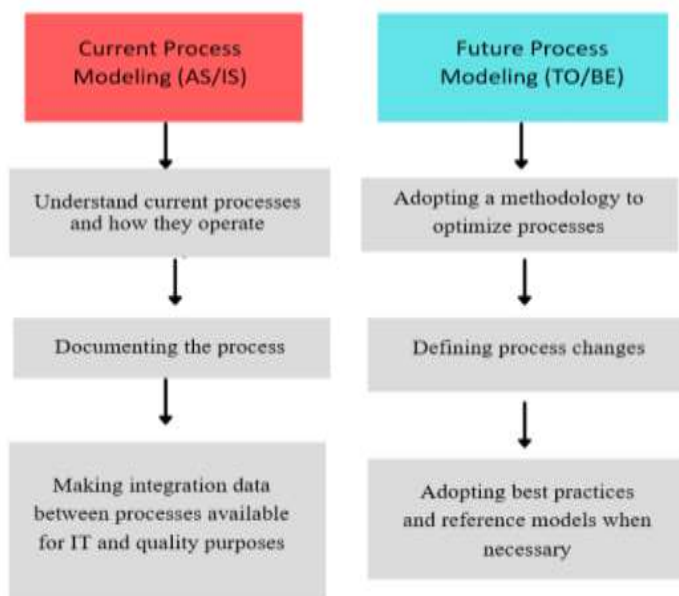
To support this process, the BPM tool uses the “AS-IS” analysis, which represents the current state of the process. After evaluating the entire scenario, an improvement is proposed that represents the idealized best-case — the “TO-BE.” According to Lobo, Conceição, and Oliveira (2018), after modeling the current state (AS-IS), organizations should use management tools to conduct a critical analysis of the collected information to identify improvements that can be implemented immediately or in the future.

In addition to modeling processes under current and future conditions, if necessary, it is possible to carry out complementary activities, such as comparing models with best practices and benchmarks, and defining and prioritizing current issues — including the continuity of solutions, specification implementation, execution and control, and BPM planning (Tolfo, Medeiros & Momabach, 2013). As shown in Figure 3.

As demonstrated in Figure 3, the TO-BE analysis helps improve and optimize processes, thereby enabling the organization to gain competitive advantage. BPMN model corrections are first applied in the AS-IS analysis. This model is then refined in the TO-BE version, where optimization standards are applied (Gonzalez-Huerta, Boubaker & Mili, 2017).

The TO-BE analysis structure defines the process flow, roles, and responsibilities of each area. The technologies needed for the process change are also specified through this analysis.

Figure 3
Model AS/IS – TO/BE



Source: Adapted from Tolfo, Medeiros, and Mombach (2013)

The main advantage of this analysis is that it provides the organization with real conditions for process transformation (Guerreiro, 2018).

Even though this is the option chosen by the authors, given the limitations of this study, it is known that, after AS/IS and TO/BE analyses, digital twins or artificial intelligence can be implemented for continuous improvement, provided the company views these alternatives as viable solutions. According to Abouzid and Saidi (2023), following the TO/BE analysis and the implementation of the digital twin, the order fulfillment process will be significantly enhanced. Monitoring, data collection, and analysis will enable better anticipation of production failures, thereby minimizing the risk of delays.

Methodological Elements of the Research

Forever Mobile Ltda. operates in the market to unite the telecommunications and communications sector's demands responsibly and with quality. With 20 years of operation, not only in the Paraíba market but with sales throughout Brazil.

The group is divided into three major areas of operation. In Brazil, the commercial structure, marketing, logistics, after-sales, trade marketing, and product development are in João Pessoa, the capital of Paraíba. In Shenzhen, China, there is an office for quality control, production inspection, supply chain, project monitoring, and shipment control. In Hong Kong, also in China, operates Forever Mobile International Ltda., the group's exporting company.

According to Oliveira (2024), the action research cycle consists of five parts: diagnosis, action planning, action implementation, evaluation, and learning. In this study, action research was applied to a critical process within a specific organization, referred to here as Forever Mobile, a telecommunications company located in João Pessoa/PB. This research involves seven Forever Mobile professionals: two from the Customer Service department (CS), two from the Technical Assistance department (TA), and three from the projects department, comprising 29% women and 71% men, aged 23 to 33 years. This information represents the entire employee population in the investigated sector. In the first phase of the research, the company permitted the use of only 2021 data for reasons of information confidentiality and to prevent the identification of the current scenario. In the second phase, which concludes the analysis process, the data are from September 2024.

Initially, to understand the processes in each sector and map and model the current process (AS/IS), semi-structured interviews were conducted. According to Gil (2019), open interviews are those in which questions are established in advance, but no answer alternatives are offered, allowing interviewees to respond freely. The questions were developed by investigating how the company was operating and drawing on the literature on BPMN and workflow. It is important to note that the questions were designed based on studies on work processes (Silva et al., 2024; Souza, 2024).

For qualitative data processing, after collection, the data were tabulated in ATLAS.TI software. This software facilitates information retrieval and data organization. With the help of Atlas.ti, it is possible to separate the analysis into categories — identified in the software as codes — which group keywords and positively support comparisons that transform data into information.

In qualitative research, the goal is to obtain as much information as possible for interpretation. Each subsequent step was necessary for more detailed research. Content analysis, according to Bardin (2016), focuses on what was said and organizes this information through text categorization. The authors decided that the interpretive technique known as hermeneutics in Atlas.ti would be most appropriate, as it brings together all interview data generated on October 15, 2021. The transcribed interviews from Forever Mobile were entered into the software. The interview was divided into two parts: the first was directed at AT technicians and consisted of 5 questions administered in person,

and, in a second stage, employees from the CS and projects departments were interviewed, with a total of 8 questions administered in person.

Table 1 describes all the questions asked of the technical assistance interviewees.

Table 1

Semi-structured Interview Questions for Technical Assistance

	Interview Questions	Research Objective
1	Tell us a little about your work sector.	Identify the work routine in relation to the device repair flow
2	How do you decide which device to repair first?	Identify the prioritization order of the technical assistance process
3	Is there pressure for fast device delivery?	Identify the prioritization order of the technical assistance process
4	Would you like to receive clear instructions to facilitate this decision? What do you suggest?	Identify improvements in the repair process at technical assistance
5	Is there any type of procedure that could improve your performance in your sector?	Identify improvements for the repair process at technical assistance

Source: The authors.

Table 2 describes all the questions asked of the CS and projects sector interviewees.

After collecting the interview information, Atlas.ti enabled the identification of graphic schemes connecting codes and quotations. These connectors aim to establish relationships between categories. Accordingly, the coding in Atlas.ti was developed from excerpts of the interviewees' statements.

After analyzing the interviews, the results analysis is divided into three stages: 1) data collection for mapping and modeling the current state (AS-IS) of the CS and AT sectors; 2) critical analysis using the quality management tool; and finally, 3) a process improvement proposal through the (TO-BE) analysis. To achieve the initial objectives of this work, the action implementation process was carried out, with two stages defined for results analysis: 1) Current process mapping (AS-IS); and finally, the use of Bizagi Modeler software for graphical representation of the adopted BPMN (Business Process Modeling Notation) technique.

The selection of questions in Table 2 was entirely driven by the need to create workflows and processes to understand better what should be described.

Table 2

Semi-structured Interview Questions for CS and Projects Sector

	Interview Questions	Research Objective
1	How is the device return procedure carried out?	Identify the device return process for end consumers
2	Is there any device repair prioritization procedure? If not, what procedure would you suggest?	Identify the problem issue in the device return process
3	Is there pressure regarding the shipment of devices for return to the end consumer?	Identify the device prioritization process for the end consumer
4	Has there been any error in device shipping delays that negatively affected the organization?	Identify the problem issue in the device return process
5	Do you believe the current shipping process flow is efficient? Would you change anything in this flow?	Identify the device prioritization process for the end consumer
6	What could bring improvements to this	Identify improvements in the device return

	process?	process for the end consumer
7	Is the organization's process management carried out using information technology tools?	Identify the use of IT in the return process for the end consumer
8	How is the choice of shipping method to the end consumer determined?	Identify the return process for the end consumer

Source: The authors.

An evaluation proposal was developed using the 5W2H framework, with improvement actions, and learning occurs through technological and social considerations and contributions.

Presentation and Discussion of Results

This subsection presents the diagnosis of the situation as it was before the actions to be carried out in the next subsection.

With mobile device sales across Brazil, Forever Mobile needed to include an authorized technical assistance service within its organizational structure to support customers who need phone repairs. According to the warranty certificate, Forever's customers have a manufacturer's warranty valid for one year. This warranty applies from the moment a manufacturing defect is detected in the device, such as a white screen, which indicates a defect in the device's motherboard and requires replacement with another part.

The supplier is responsible for remedying defects in durable goods within a maximum of thirty days, in accordance with Article 18 of Law No. 8,078 of September 11, 1990, which governs consumer protection (Brasil, 1990). Accordingly, the device must be delivered to the end consumer's address within 30 days of posting at the post office.

Given this critical situation, it was decided to analyze — through interviews with company employees responsible for the CS and Technical Assistance sectors — the possible bottlenecks in this process that could negatively affect the organization, by analyzing the current device return process to end consumers at Forever Mobile through AS/IS analysis, and designing a process improvement proposal aimed at reducing freight costs through TO/BE analysis.

To better understand the organization's return-to-consumer process, interviewees were asked how the device return procedure to end consumers is carried out. For this question, the following codes were entered in Atlas.ti: Shipping process, quotation, cost, carrier. According to Interviewee 1, the device return process is carried out as follows:

“We process the incoming invoices, check if the device is working, obtain shipping quotes, and ship using the best freight option, weighing cost-effectiveness.” 1:1 (2:2). (Process Analysis, October 16, 2021).

After understanding how the device shipping process to end consumers takes place, interviewees were asked about the device repair prioritization process and the efficiency of the current process. 80% of respondents reported that device repairs are not prioritized, while the other 20% stated that prioritization is carried out verbally. This reveals that information is lost throughout the process, as Interviewee 4 reports: “the technical assistance staff may forget, because there are many devices and it is impossible to memorize all the information.” 4:5 (15:15) (Process Analysis, October 16, 2021).

Regarding process efficiency, all interviewees reported that there is no efficiency and that “many things need to be improved.” Interviewee 5 suggests that “if the technical assistance received the devices directly, they would open the service order, and in the service order, they would check the location, and they would organize themselves to carry out the repair on time.” 5:7 (15:15) (Process Analysis, October 16, 2021). For Barros Neto, Mañas, Kuazaqui & Lisboa (2018), efficiency is an internal factor linked to process performance; for an organization to stand out in the market, it must

relentlessly seek continuous process improvement.

Given that the organization has customers from more distant locations, such as the northern and southern regions, interviewees were asked about errors in the shipping process that negatively affected the organization. Interviewee 1 reported in her interview that:

“We have the case when the postal service goes on strike, which delays 80% of product shipments, since the postal service is currently the carrier we use most.” 1:13 (20:21). (Process Analysis, October 16, 2021).

Interviewee 4 further supplements the errors that negatively affect the organization by noting that loss cases are the most burdensome and occur very frequently:

“The losses we experience from carriers are a burden both for the customers and for us, and this is routine — it happens every month.” 4:9 (23:23) (Process Analysis, October 16, 2021).

Due to the pandemic and rising fuel prices, the factors that go into total freight costs have increased dramatically, causing organizations to spend even more on transportation. In addition, cargo losses negatively impact this area. According to data released by the National Association of Cargo Transportation and Logistics - NTC & Logistics (2020), Brazil recorded 14,159 cargo theft cases, resulting in a loss of R\$ 1.2 billion.

Regarding information technology tools, interviewees reported that the organization uses PROTHEUS, a software by Totvs, and the freight platform integrated with PROTHEUS (Frete Rápido), which manages all freight quotations and delivery deadlines. However, Interviewee 2 emphasizes that many things remain manual and that many changes are still needed:

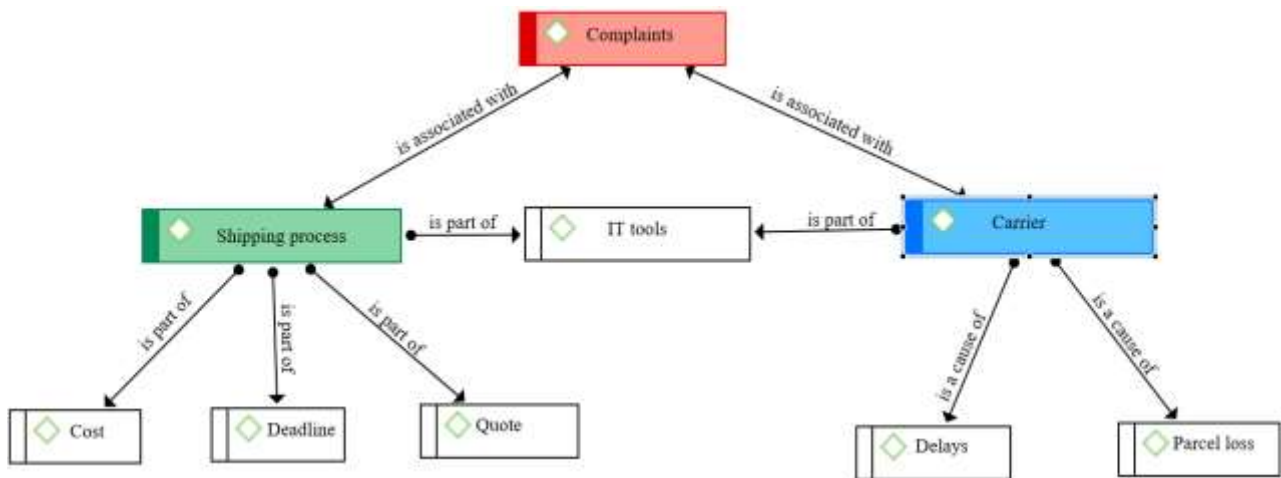
“Many things depend on the CS attendants, which can lead to many human errors. For example, the very process of going through the assistants before reaching the technicians. This significantly delays the repair process.” 2:10 (23:23) (Process Analysis, October 16, 2021).

In Figure 4, created in Atlas.ti software, a network graph was generated to model all information reported in the interviews. In this graph, topics such as quotation, deadline, and cost can be visually identified as activities within the shipping process. In contrast, issues of cargo loss and delivery delays are caused by the carriers responsible for delivering goods to end consumers.

From the team responsible for the return of goods to the end consumer's perspective, an interview was also conducted with technical assistance technicians to better understand the device repair prioritization process and identify possible issues contributing to increased complaint levels and end consumer dissatisfaction. As described in the introduction, the gaps this study fills position the company as an innovation hub in the telephone sector — primarily because it prioritizes both internal and external customers and, secondarily, because it initiates a model that will be adopted in other contexts within the organization. Studies like this one are hard to find. In a study conducted at a Peruvian company, implementing BPM using the AS/IS and TO/BE methodologies reduced call-handling time, thereby improving organizational efficiency (Paja, 2024). Therefore, there is both originality and relevance for the telephone sector.

When asked whether there is any prioritization order for device repairs, interviewees reported that it follows the order of device arrival in their sector.

Figure 4
Atlas.ti Network Graph



Source: The authors.

Problem Situation Analysis and Proposal

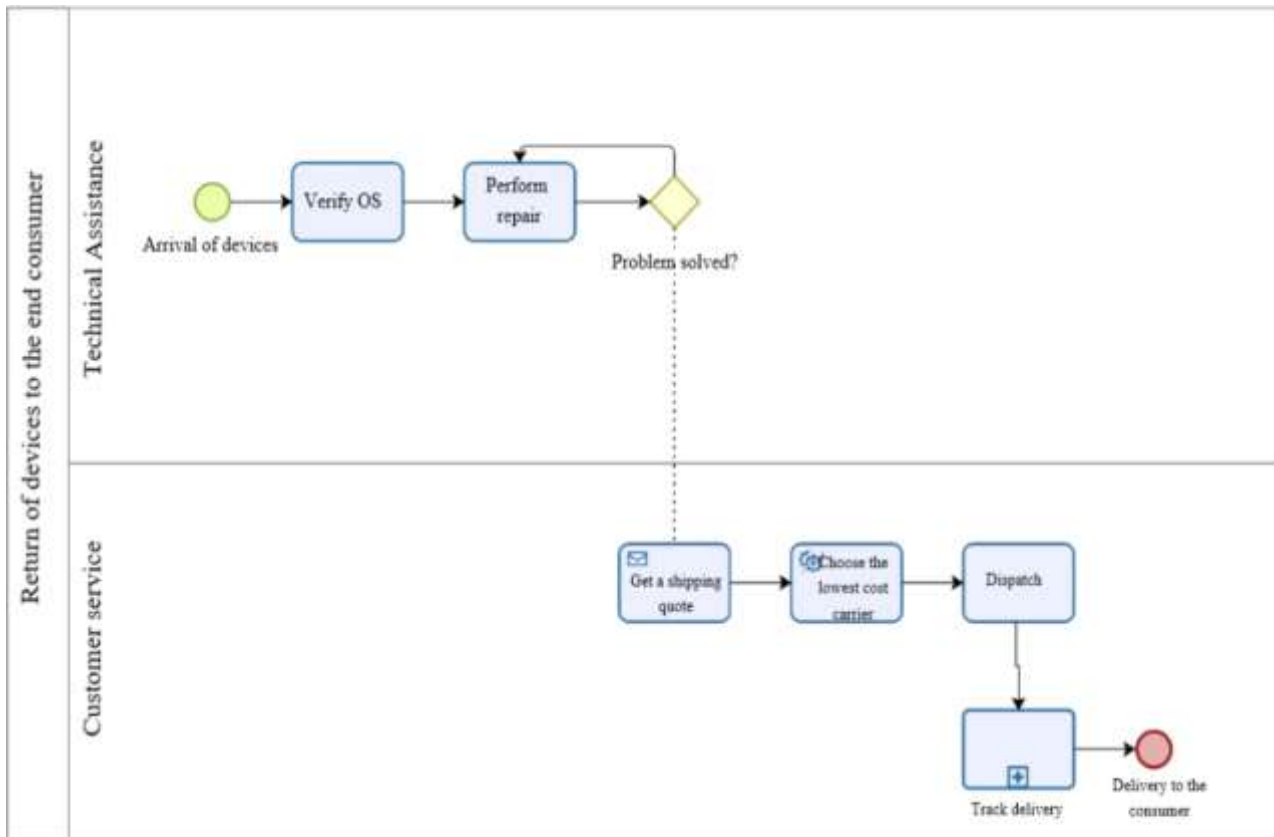
Regarding a process improvement proposal, interviewees stated they would like clear instructions on the prioritization order for device repairs. Interviewee 3 also suggested as an improvement:

“It would also be helpful to have the state abbreviation on a label, so we could identify that the device comes from a distant state and needs to be prioritized for repair.” 3:9 (19:21) (Process Analysis, October 16, 2021).

From this, it can be concluded that various factors currently influence the goods return process for end consumers, and it is up to the involved departments to seek improvements.

The process studied in this work is the return of warranty-covered devices to Forever Mobile's end consumers. This process involves the Customer Service (CS) and Technical Assistance (TA) departments. In this flowchart, the bottleneck identified was the prioritization routine for repairing damaged devices, which is one of the possible causes of delivery delays and an increase in end-consumer complaints. For better analysis, the device return process for end consumers in its current state (AS/IS) was modeled using BPMN in Figure 5.

Figure 5
AS/IS Method



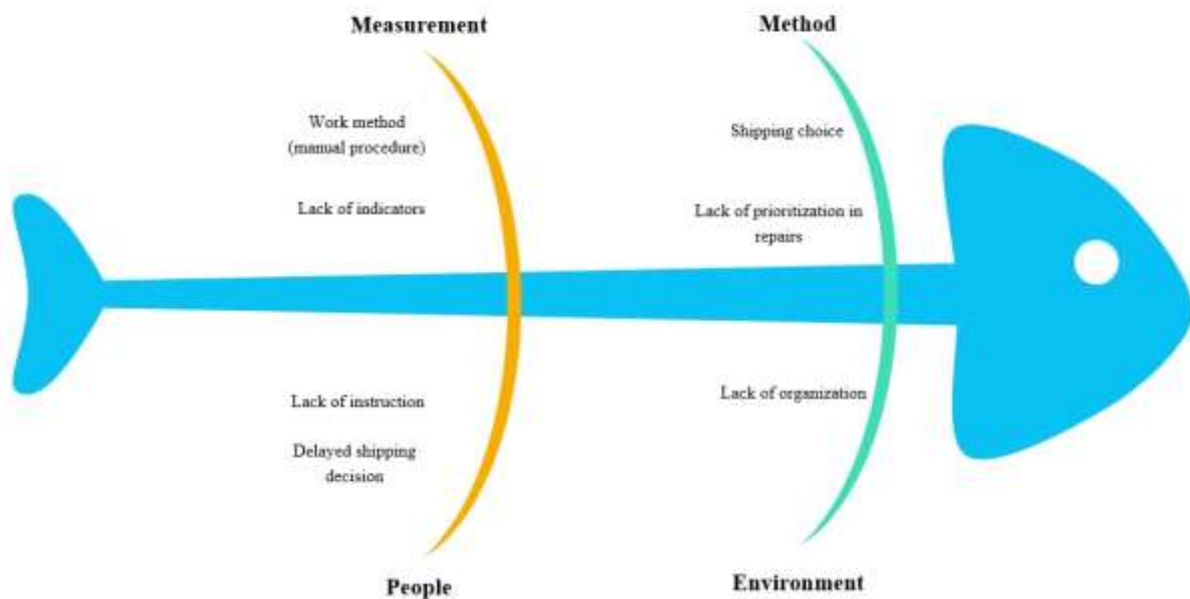
Source: The authors.

The current process is configured as follows: after devices are delivered to the TA (Technical Assistance), technicians check the SO (Service Order) in which the devices are registered and carry out the repair; if the problem is resolved, the device is delivered to the CS to proceed with shipment, obtaining quotations and selecting the carrier with the lowest cost; if the problem is not resolved, the device returns to the technicians for better visualization of the critical points in the device return process, the quality management tool — the Ishikawa diagram — was used, which is employed to identify the causes of a specific bottleneck. The Ishikawa diagram is an excellent tool for identifying potential variables that negatively influence organizational outcomes (Souza & Azevedo, 2019). The diagram is elaborated by classifying causes under the following categories: labor, method, measurement, and environment. The diagram is shown in Figure 6.

As shown in Figure 6, the problem has been identified: the descriptive Atlas.ti analysis revealed a delay in shipping devices to end consumers, thereby causing losses for the company. This process is related to the “Technical Assistance Process.”

The causes of this bottleneck were explored across four different dimensions.

Figure 6
Fishbone Diagram



Source: The authors.

In the methods dimension, the lack of prioritization during repair was a significant issue. As reported in the descriptive analysis, there is no prioritization for repairing the devices; technicians use methods based on the order of arrival. In Brazil, the most common type of transport for product shipments is road transport, suited for short- and medium-distance shipments, and one of its main drawbacks is higher freight costs (Goulart & Campos, 2018). This is identified as the second critical factor in the methods dimension: freight hiring, where carriers have a “fixed” delivery schedule, making the hiring process inflexible and often unable to ensure timely delivery to end consumers before the 30-day deadline. In the environment dimension, a lack of organization within the work environment itself was identified, hindering on-time, efficient returns to the team responsible for product shipment. Burmester (2018) observes that to achieve an organization's strategic objectives, it is necessary to understand the basic principles of organizational design, aligning the structure with the organization's strategies and ensuring that both design and strategy are adapted to the company's environment. In the measurement dimension, the absence of indicators makes the process difficult, as there is no parameter to help employees prevent errors that negatively affect the organization. Indicators are designed to track progress over time within a given process (Santos & Santos, 2018). Ambrozewicz (2015) adds that the results-oriented management model requires indicators to evaluate proposed goals. It was also identified that the way work is conducted — with communication mostly conducted verbally — results in significant information loss throughout the process. Finally, in the labor dimension, the lack of instructions means technicians have no guidance on the bottleneck of returning goods to locations in other regions, creating a late-delivery decision problem in which one

issue influences another. Through training, it is possible to qualify the service, ensure managers' profit, and keep employees skilled and motivated. Thus, we can visualize the root causes of the delivery delay and what can be corrected to resolve this bottleneck through BPMN modeling via TO/BE analysis.

Results Obtained and Analysis

This subsection presents the analyses and process improvement suggestions. Based on the information gathered from the interviews and the elaboration of the organization's process model (AS/IS), it was observed that the device return process to end consumers is quite critical, given the short return timeframe.

To better visualize the critical points in the device, the return process, and delays in shipping devices to end consumers, the company identified these issues, resulting in losses. This process is related to the "Technical Assistance Process." The following were identified:

- Lack of prioritization at the time of repair: as reported in the descriptive analysis, there is no prioritization for device repairs — technicians use only a first-come, first-served approach.
- Freight hiring carriers have a "fixed" delivery schedule, making the hiring process inflexible and often unable to ensure timely delivery to end consumers before the 30-day deadline.
- Lack of organization in the work environment is hindering efficient, on-time returns to the team responsible for product shipment.
- Absence of indicators, which makes the process difficult, as there is no parameter to help employees prevent errors that negatively affect the organization.
- Lack of instructions: technicians have no guidance on the bottleneck of returning goods to locations in other regions, creating a late-delivery decision problem in which one problem influences another.

This way, we can visualize the root causes of the delivery delay and what can be corrected to resolve this bottleneck through BPMN modeling via TO/BE analysis. Below is a table of device delivery delays for the device return operation to end consumers from September 2024. Normally, the company seeks to comply with the timeframe established by the Consumer Defense Code. Table 3 presents a summary of the original table taken from the Frete Rápido platform used at Forever Mobile for contracting device return freight.

It was observed that all 16 shipments were delayed, totaling 100% of deliveries, with an average delay of 13 days in September; the shortest delay was 9 days, and the longest was 17 days.

Based on this brief analysis, it can be observed that Forever Mobile has a significant delay rate. Accordingly, the next section proposes a future process model (TO/BE) whose main objective is to reduce these delay levels, thereby reducing transportation costs and increasing the organization's competitive advantage.

Table 3
Delays Recorded in the System in September 2024

Freight	Carrier	Service	Clients	FU	Delivery	Delays (days)
09/18/2024 10:12	Correios	PAC	Feira de Santana	BA	09/27/2024	9 days
09/18/2024 10:10	Correios	PAC	Recife	PE	09/30/2024	12 days
09/18/2024 10:07	Correios	PAC	Natal	RN	09/30/2024	12 days
09/18/2024 10:03	Correios	PAC	Fortaleza	CE	09/27/2024	9 days
09/18/2024 09:23	Correios	PAC	Recife	PE	09/30/2024	12 days
09/27/2024 10:30	Correios	PAC	Cabo de Santo Agostinho	PE	09/25/2024	13 days
09/10/2024 17:29	Correios	PAC	Recife	PE	09/27/2024	10 days
09/04/2024 13:41	Correios	PAC	Caxias	RJ	09/16/2024	12 days
09/03/2024 12:43	Correios	PAC	São Lourenço da Matra	PE	09/20/2024	17 days
09/02/2024 17:51	Correios	PAC	Minas Gerais	BA	09/19/2024	17 days
08/27/2024 17:24	Correios	PAC	Praia Grande	SP	09/10/2024	14 days
08/27/2024 11:13	Correios	PAC	Delmiro Gouveia	AL	09/09/2024	13 days
08/26/2024 11:41	Correios	PAC	Caicó	RN	09/06/2024	11 days
08/21/2024 15:11	Correios	PAC	Rio de Janeiro	RJ	09/09/2024	19 days
08/21/2024 14:36	Correios	PAC	Puxinanã	PB	09/03/2024	13 days
08/15/2024 11:14	Correios	PAC	São Paulo	SP	09/03/2024	19 days

Source: The authors.

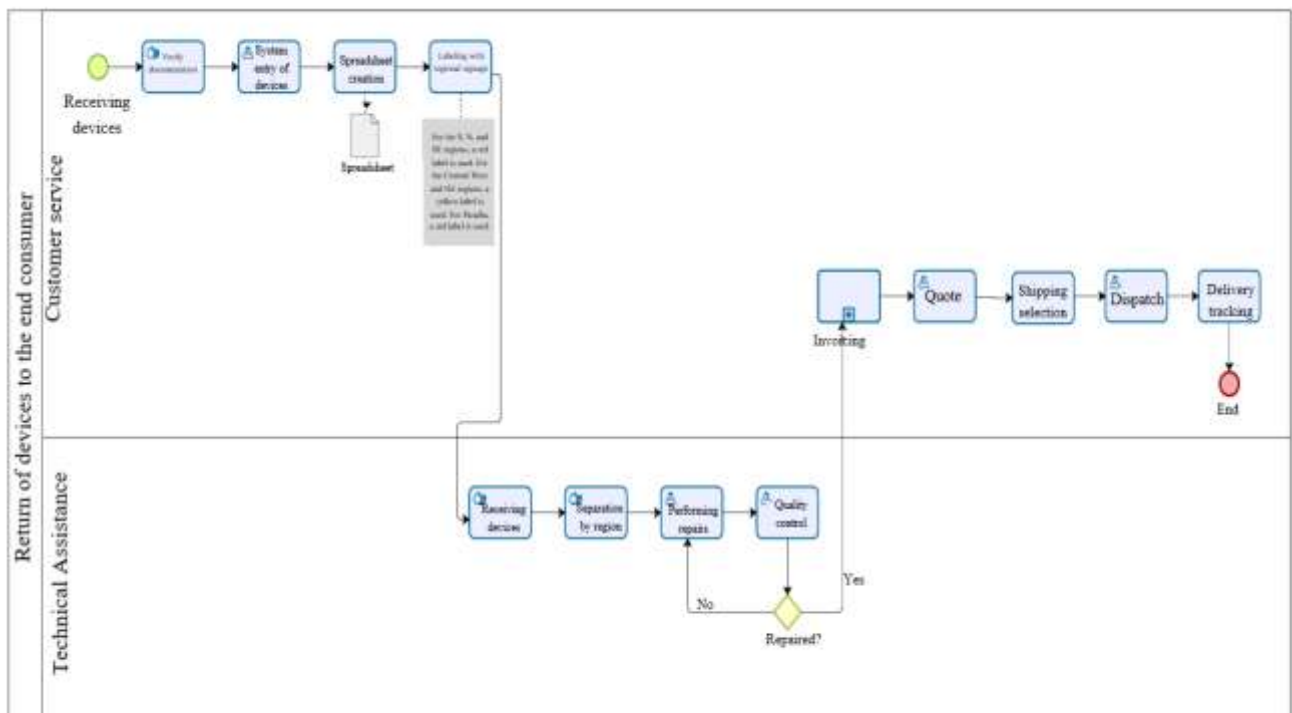
Future Process Modeling (TO/BE)

By analyzing the process, it is possible to identify the bottlenecks that negatively affect Forever Mobile. A process-mapping flow was proposed to streamline activities.

Thus, in Figure 7, the improvement process is shown, which was designed using the Bizagi process mapping tool. The process improvement suggestion is that, upon receiving devices at the CS, attendants check the customer-provided documentation and verify whether it complies with the warranty parameters.

After this stage, the received devices are entered into the system. As an improvement suggestion, a spreadsheet is prepared containing the customer's ticket number (service order), device model, color, unique identifier (IMEI), system invoice entry, and the end consumer's state (UF). Following this task, the attendants have a new task of labeling the devices with color-coded signaling red for devices sent from the SOUTH, NORTH, and SOUTHEAST regions; yellow for devices from the MIDWEST and NORTHEAST regions; and finally, green for devices sent from within the state of Paraíba, where delivery is faster and carried out via SEDEX.

Figure 7
Future Process TO/BE



Source: The authors.

The labeling task is identified as the Kanban method, a word derived from Japanese meaning “label.” According to Lobo (2010), Kanban functions as an internal order placed at a workstation and as a shipping guide when it accompanies the product resulting from that order. The Kanban is attached to pre-processed products and is removed when the required products are delivered (Shima, Yamaguchi, Yoshida, & Otsuka, 2021).

Immediately after the signaling task, the devices are sent to technical assistance, where, upon receipt, they are manually sorted and organized on a rack that identifies the critical regions — marked by the red flag, intermediate by the yellow flag, and within the state of Paraíba by the green flag. After sorting, the repair is carried out, which then passes through the quality control task. If the reported defect is repaired, the device is returned to the CS, which proceeds with the invoicing task and then obtains quotations from carriers, negotiating deadlines and delivery costs.

In the next task, freight will be contracted with the carrier that offered the lowest cost and the best delivery deadline. Before finalizing the process, delivery tracking will be conducted to monitor potential carrier losses. The process only concludes once the goods arrive at the customer's registered address.

Table 4 presents these improvement suggestions through the 5W2H representation. According to Lobo (2010), 5W2H is essentially a task execution and control form in which responsibilities are assigned, and the work to be carried out is specified, including the department, the reason, the deadline for completion, and the costs involved.

The improvement proposal, presented in the 5W2H format, outlines in a didactic manner the activities of the return process that need improvement, the people responsible for performing these tasks, the objectives, and how they should be carried out. Therefore, through this study, it was possible to identify the bottlenecks, present the modifications and improvements, and suggest how they should

be executed, which is fundamental for the conclusion of the process.

Table 4

Execution of Improvement Suggestions

What (What?)	Where (Onde?)	Why (Why?)	Who (Quem?)	When (Quando?)	How (How?)	How Much (How Much?)
Verification of consumer documentation	CS Department	Verify warranty compliance	CS attendants	Starting in November 2024	Purchase invoice analysis	No cost
Device System Entry	Protheus Systems	Fiscal control	CS attendants	Starting in November 2024	Through customer registration in the system.	No cost
Prepare Entry Control Spreadsheet	Excel	Controlling the number of devices in technical support	CS attendants	Starting in the second half of November 2024	Create columns with the main product information	No cost
Label the devices with color-coded labels.	In the device's box	To reduce the delays in shipping the device to the end consumer	CS attendants	Starting in the second half of November 2024	Label the devices in the five regions	No cost

Source: The authors.

According to the action research cycle stages of Oliveira (2024), it can be said that there was an initial diagnosis of the problem, involving complaints, delays, and costs; action planning, taking into account the understanding of the origins of the problems; action implementation, through the design of flows and processes after interview analysis; evaluation carried out by the AS/IS and TO/BE methodologies; and learning, following the improvement proposals. The scarcity of prior studies within the company makes this work relevant for encouraging the organization to adopt such practices.

Final Considerations and Technological and Social Contributions

Organizations are like a human body: they need all their organs functioning properly to keep them standing. The same applies to an organization, which needs its processes to function adequately to remain competitive in the market. This topic, therefore, has great relevance for managers and business administration students who aspire to manage a business one day.

According to Frago (2024), once the structure of processes is understood, company management can evaluate the impact of its actions on customers and the extent to which a given process affects the business.

Through process management, it is possible to analyze, identify, and propose improvement suggestions in any area within a company. To do so, it is first necessary to evaluate the bottlenecks within the organization that directly or indirectly harm its results.

Thus, according to Ferreira (2019), Business Process Management (BPM) is a tool that links business management and information technology with other areas of the company, thereby improving the company's relationships with both its customers and suppliers.

In the study in question, the objective was to analyze Forever Mobile's current device return process for end consumers using an AS/IS analysis and to propose a process improvement to reduce freight costs through a TO/BE analysis. The bottleneck in the device return process to end consumers

was therefore identified. This bottleneck primarily harmed the organization financially, as freight costs exceeded the invoice value paid by the end consumer at the time of purchase. Using BPMN notation, the process was visually presented, and how it could be improved to reduce transportation costs was identified, providing an improvement proposal directly from the root of the problem.

The practical and academic implications of this study aim to support business process implementation and management, as well as business decision-making. From an academic standpoint, this study describes the stages of implementing process management through the AS/IS and TO/BE methodologies, which propose process improvements after comparisons.

This study satisfactorily aggregates research knowledge, assisting future research on process management using BPMN notation. As a future research suggestion, we recommend that this company implement the approach in other areas, such as the financial and sales sectors, so that other processes with pending issues can be observed, analyzed, and implemented in ways that contribute to the organization. The second future research suggestion would be a comparative study to observe and analyze these flows in the implementation of automation and artificial intelligence.

The limitations of this research are related to the company's permission to provide new data and expand the implementation of the flows. The second limitation concerns the company's investment conditions for this to occur.

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