

Proposal to Improve Efficiency in the Customer Service Process Through the Use of ERP and in a Service Company

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Abstract

In this article, planning and diagnosis were carried out, in which it was evidenced from the background how the improvement tools generated impacts in the companies. In addition, the objectives of the research were established to evaluate the limitations and restrictions that the project may present. Therefore, an analysis of the KPIs was carried out in order to measure and have the standards of a company in the service sector. We proceeded to determine the problem, evidenced by reports that the company's gap is 52% efficiency. The main causes were: delays in the customer service process, incomplete documentation in the delivery of requirements, and lack of implementation of automated tools. Secondly, the issue of solution design was addressed, where the association of the causes presented above with the ERP and AI (chatbots) was performed. The proposed solution was designed to step by step as ERP and AI would greatly impact the company. In addition, a table was made on the improvement implementation budget to see the report and the accounting status. Finally, the validation and sustainability of the project was performed. Strategies were designed so that both tools work optimally with the least possible error. Therefore, optimal results were obtained after implementation.

Keywords

Enterprise Resource Planning, Artificial Intelligence, chatbots, service industry, efficiency

1. Introduction

Nowadays, companies in the service sector are going through problems that impede their correct performance at the time of managing their internal and external operations. For this reason, these companies are increasingly looking for technological tools and methods that can generate optimal solutions by evaluating the company's problems in greater depth. In general, most of the companies in this sector have problems with indicators that point to poor performance in the customer service process. The company in which the case study is developed belongs to the service sector, the company started its activities in October 2012 and today performs operations of accounting advice and management consulting, serving various organizations belonging to different areas such as industrial, financial, commercial, etc. The accounting service is part of the service sector, which is a highly demanded sector for the reason of providing financial accounting, cost accounting, auditing, and business consulting. According to the data, the development of the GDP of the service sector in Peru is 61%, which is a very significant percentage in the market, mainly due to the great advances that are being obtained in this area. (INEI 2023). In addition, according to the Current Economic Survey (2020), it can be determined that 88.8% of the companies in the service sector belong to the small business group, with estimated sales revenues ranging from 210,000 to 630,000 soles.

One of the main problems in the service sector is generated by the low efficiency in customer service, which has a negative impact on most of the companies. This is reflected in the area of customer service in an automotive company, which presented a great congestion in its processes, causing waiting times, triggering discomfort in the consumer and generating loss in the company, this was mainly due to poor process management (James et al. 2023). Therefore, measures are now being taken to improve efficiency in customer service through innovation in the use of technological tools, with the aim of providing quality service, thus meeting customer expectations and loyalty (Ayinaddis et al. 2023). Likewise, a determining factor is the reduction of time and good management of the process to achieve the short-term objective of obtaining sustainability in the customer service market (Yasuff et al. 2023). Based on the above, we define as the possible main problem the low efficiency in the company's customer service, which will be analyzed and studied in detail.

The main objective of this work is to increase the overall percentage of efficiency of the customer service process in the service sector company to 58% to reach the overall average established according to Chi Lee (2022). This will be increased with the use of the technological improvement tools Enterprise Resource Planning (ERP) and Artificial Intelligence (AI), the specific objectives established with this implementation are to reduce the percentage of errors in the documentation to 9.5%, the average time of attention to documentation and for punctual consultations to 6 hours and 8 minutes respectively, and finally to increase the number of requests attended to 200. This research is mainly focused on demonstrating how the changes mentioned below can positively impact the operation and profitability of the company

2. Literature Review

2.1 Enterprise Resource Planning

Spraakman Gary et al. (2018) argue that good ERP performance is due to good database management, business processes, and structuring of the accounting and financial process, which helps to have good customer service management. This allows having a solid accounting and financial structure with respect to data. Having everything in good parameters facilitates the task of the collaborators so that they can deliver a good quality service in an adequate range of time with an average result of 65%. According to Ling (2020), the globalized development of the economy leads to solid organizational development. This implies good integrated financial management. Therefore, making use of a new major tool such as ERP implies a breakthrough with projections to continue advancing in the company with reaching the highest levels of efficiency. Achieving an increase in the company's efficiency by 25%.

2.2 Artificial Intelligence

According to Mahalakshmi, et al. (2021) the implementation of AI (Artificial Intelligence) technology in the financial sector helps to mitigate the problem of customer service efficiency, is having good projections with respect to process management. This is possible because this automated tool facilitates data collection and serves to structure the accounting of companies, which increases efficiency by a percentage of 90%, achieving good experiences for the end customer who seeks a good performance by the company. Perdana et al. (2021) argue in an article that, by examining various audit scenarios within four accounting firms, problems of excess time in performing repetitive tasks were found. Therefore, they discussed the potential of robotic process automation (RPA) pertaining to AI technology increase the efficiency and accuracy of the corresponding tasks. Examples are given of commercial processes and prototype solutions of each, which favorably increase their efficiency percentage between 15% and 30% when using AI technology.

3. Methods

3.1. Basis

During the literature review, an exhaustive search of different researches that address the same problem of low efficiency as it occurs in this service sector company was carried out, and more emphasis was placed on finding out which tools were used to successfully overcome these problems. The following table presents a comparative matrix of the different solution tools that were identified in the articles of different authors

Table 1. Comparative Matrix

Causes and objectives	Improved customer service	Improved data centralization	Improved financial reporting	Improved process automation
Scientific article				
Alin Marius Andrieş & Julia Ungureanu (2022)	CRM		ERP	
Chia Chi Lee (2022)		ERP	Business Intelligence	RPA
M.j.a Gonçalves, a.c.f Da Silva & c.g Ferreira (2022)	IA	DMS		IA
Animesh Agrawal, Hemant Kumar Diwakar y& Suraj Kumar Mukti (2020)			ERP	
Hans van der Heijden (2022)	IA	Machine Learning		
Renato Alexandre de Lima Lemos, Thiago Cristiano Silva, Benjamin Miranda Tabak (2021)		ERP		IA
Proposal	IA	ERP	ERP	IA

3.2. Methods

In order to develop the proposed improvement model that allows to increase the percentage of efficiency in the customer service process, we have taken into account several positions that have certain scientific articles where ERP and AI are applied through a defined sequence of processes that allow to obtain the required result in an organized manner. What is sought in this model is to explain the correct management and application of the technological tools mentioned above so that a correct evaluation can be obtained and thus reach the stated objective indicated at the end of this model. In addition, by complying with the indicated connections so that the ERP and the AI can work correctly, an optimization in other resources that have been used unnecessarily and repetitively is generated. Everything explained above can be seen in Figure 1.

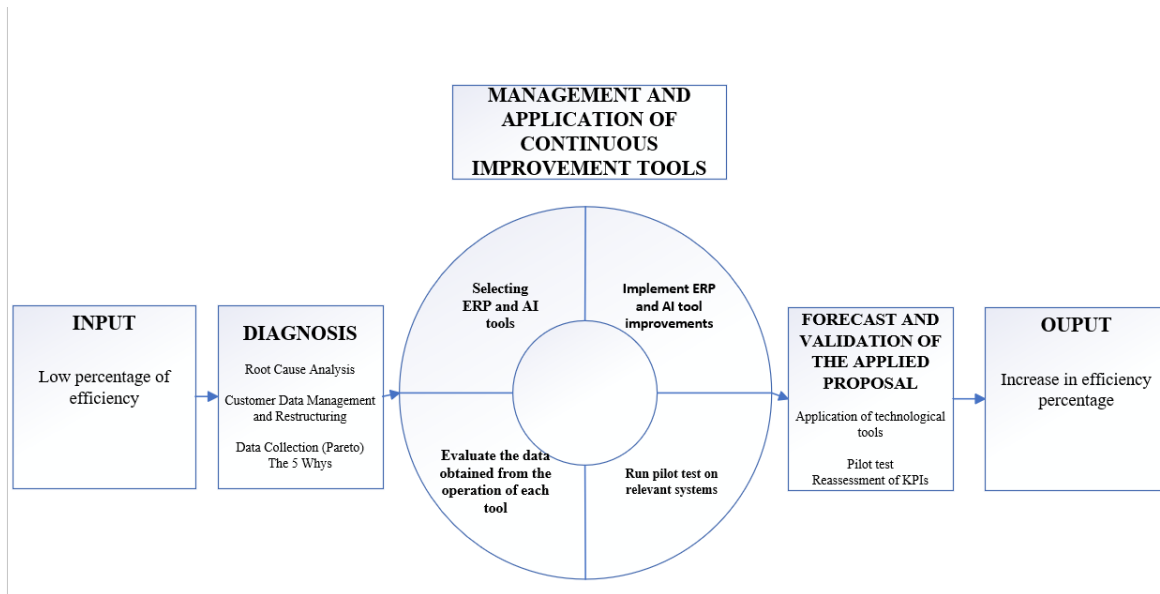


Figure 1. Propose Model

3.3 Components

The model is composed of two components, which are mentioned below.

3.3.1. Component 1: Implementación de mejora ERP

In order to carry out the improvement, the first key activity was to design the implementation process of improvement in the accounting area. Next, a migration was carried out and for this purpose a cleaning of the database was performed so that the software would have a good performance. Then we proceeded to carry out the pilot implementation where good progress was observed according to the improvement curve. Finally, the good performance of the ERP was verified in the handling of the data to carry out the management of the documentation in a concise way.

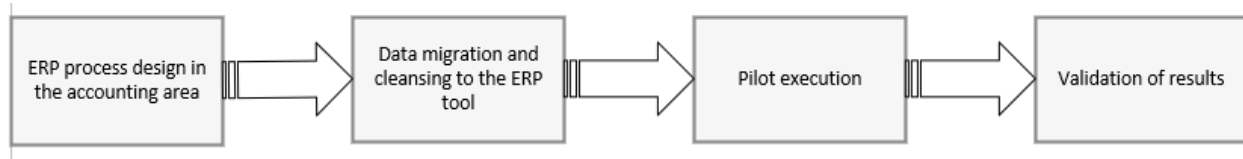


Figure 2. ERP

3.3.2. Component 2: Implementación de mejora chatbots (IA)

In order to implement the improvement, a series of steps must be taken. The first activity to be carried out is the configuration of the AI in the accounting area, where the aim is to have a better response in the attention of queries. The next step is to integrate the database in order to have a good support in the communication channel. In addition, training has to be carried out in order to minimize errors and achieve the expected objectives of the tool. Finally, the validation was carried out, where a good performance was obtained, achieving an escalation in the process of attention to queries.

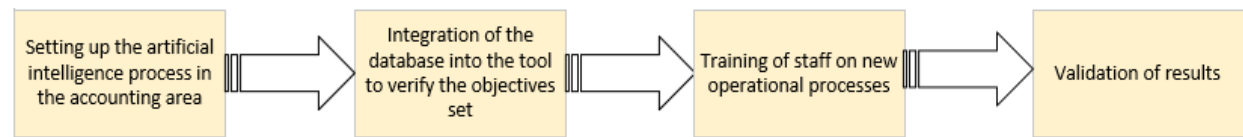


Figure 3. IA

3.4 Indicators

The indicators of the proposed model are those represented in the following image and with which it is possible to calculate the differences that exist between the initial scenario and the improved scenario based on the improvement of the selected tools.

Improvement tool	Selected Indicator	Unit	Formula	As Is	To Be	Improvement
ERP	Percentage of errors in documentation	%	$\frac{\text{Number of documents with errors}}{\text{Documentation number}} \times 100\%$	33%	25%	Decreases in 8%
	Percentage of completed documents	%	$\frac{\text{Number of requirements fulfilled}}{\text{Total number of requirements}} \times 100\%$	68,42%	80%	Increase 11,58 %
ERP e IA (chatbots)	Average customer service processing time	Hours	$\frac{\text{Attention time}}{\text{Number of customers}}$	10 Hours	6 Hours	Decreases in 4 Hours
Inteligencia Artificial (chatbots)	Average time for one-off queries	Minutes	$\frac{\text{Consultation time}}{\text{Total number of queries}}$	27 Minutes	8 Minutes	Decreases in 11 Minutes

Figure 4. Indicators

4. Validation

As indicated in the previous section, this functional model, which is based on continuous improvement together with the implementation of ERP and IA tools, is explained in detail and in detail, which allows to generate a greater emphasis on the field work carried out in the company and what changes were presented in this new scenario, comparing it with the one that existed before this project was carried out. To validate the new indicators obtained, the Minitab software version 2022 was used, which allows verifying that there were increases or decreases in each indicator when obtaining a p-value of less than 0.05. Therefore, the null hypothesis is rejected, affirming that there are significant differences between each of the scenarios compared. The formula and numerical values needed to perform the Student's t-test are shown below.

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

μ = Population average

\bar{x} = Mean of data distribution

n = Sample size

s = Standard error of the sample

This formula is applied automatically by the software, which in a few seconds indicates through a tab the complete procedure with the values of each variable; therefore, it was possible to verify the results obtained by using the technological tools by attaching the data of the initial scenario and the improved scenario. An example shown is the one that was made to verify that the time of attention to documentation decreased on average to about 6.75 hours as it could be observed in the tests made during the time taking that was given. Therefore, the data of the first initial scenario were inserted together with those of each test in order to verify that the average decreases and the p-value is less than 0.05. This process can be seen in the following figure.

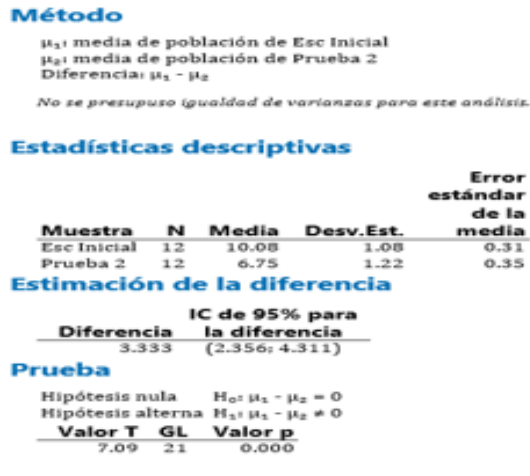


Figure 5. Proposed model validation software

The validation certifies a result with a downward trend and to verify this movement in a more dynamic way, a graph was obtained showing the downward movement that has been generated when starting to make improvements to each of the required tools.

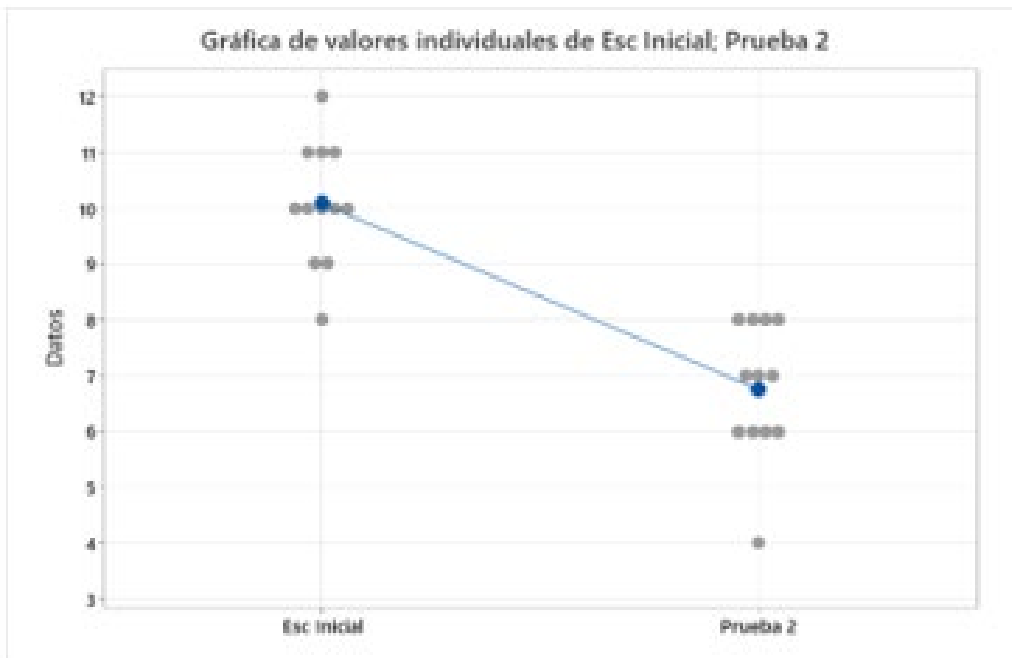


Figure 6. Trend line Initial scenario vs Test (ERP)

5. Results and Discussion

5.1 Numerical Results

In order to have the true data of the implementation, a follow-up was carried out based on KPIs where the causes were addressed in order to measure the before and verify if the initial objective was reached. The following table shows the performance of the tools.

Problem	Current	Aim	Improved	Tool	Indicator	Current	Aim	Improved
Low % of efficiency in the customer service process	52%	58%	56.60%	ERP	% of errors in the documentation	33,7%	9,5%	4,83%
				ERP, IA	Average time for documentation attention	10,08 H	6 H	6,38 H
				IA	Time for answering queries	27 MIN	8 MIN	9,3 MIN
				ERP	Number of requests attended to	8	200	189

Figure 7. Model results

From the table it can be contrasted that in the four indicators there was a significant improvement where the desired margins were reached. It covers an optimal scenario in the implementation since there are expected margins in the % of errors in the documentation, average time of attention to documentation, consultation time and number of requests attended. All this was obtained from the pilot tests where we have the service time indicator where the ERP tool is the facilitator to be able to manage the process in a faster way. The following table shows the good performance of the tool.

Table 2. Results Documentation service times: Scenario vs. test (ERP)

	Time Attention by Documentation First test (Hours)	Time Attention by Documentation Second test (Hours)	Time Attention by Documentation Third test (Hours)	Time Attention by Documentation Fourth test (Hours)
TOTAL AVERAGE TIME	7,3	6,8	6,4	5

Likewise, a pilot test was performed with the AI tool in order to parameterize the performance to be achieved. Below is a table detailing the behavior of the AI where the data were optimal.

Table 3. Comparison table before vs. after implementation (IA)

ID Consulta	Duration of consultations (Minutes)	First test (Minutes)	Second test (Minutes)	Third test (Minutes)
PROMEDIO	27	10,85	9,05	8

6. Conclusions

With respect to the percentage of errors in the documentation, it can be seen that the previous performance was 33.7% and we were able to reduce the margin to 4.83%. This is a great step forward to expedite all the procedures in a fast way and to have a correct response to the client. The average time of attention to documentation was the best performance after the use of the ERP in the company, reaching an average of 6.38 hours in the indicator. The time of attention to queries was made using the AI to achieve a performance according to an adequate time that can speed up

this indicator in order to meet a greater demand. As a result, an average of 9.3 minutes was achieved, with a positive impact.

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