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Original Article

Design of an Enterprise Architecture Model Applying TOGAF in the Sales Management of Fast Food SMEs

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Abstract *- In this study, a design of Enterprise Architecture for an SME aimed at the fast-food sector is carried out. The purpose of this research is to design the AE so that the small business can optimize its sales, be able to carry out adequate after-sales, analyze the orders, and follow up on each customer who arrives at the store. The studio presents the architecture using the stages of TOGAF from the Preliminary Analysis, Architecture Vision, Business Architecture, Service Architecture, Technology Architecture and Opportunities and Solutions, which allow the SME to meet its strategic objectives. It is concluded that the implementation carried out can reduce the existing difficulties, improving the sales process of the organization, being that the indicator completed orders obtained an improvement of 19%, for the indicator customer complaints an improvement of 30% was obtained, for the indicator daily sales growth rate obtained an improvement of 15% and for the indicator increase of customers an improvement of 11% was obtained, noting that all the indicators presented achieved positive results with the implementation of the TOGAF Enterprise Architecture framework.*

Keywords *- Enterprise Architecture, Indicator, Sales Process, SME, TOGAF.*

1. Introduction

Currently, the rapid technological development and the growing need for technology, systems and communication processes make organizations seek to use technology that allows them to have more efficient and coordinated control of their resources [1]; this implies that organizations have many options to establish their Information Technology (IT) being that the difficulties faced by fast food companies to stay competitive in the current market are Find ways to foster their creativity and entrepreneurial spirit without compromising strict control of operations.

In the case of SMEs entering the market, the situation cannot be different. Founders focus on capturing customers and increasing sales rather than planning for the long-term future. In particular, this type of business seeks a scalable and repeatable business model. In fact, according to Mintzberg & Waters, formulating a strategy that consists of a visionary process is more common in small companies and/or new ones, in which individual control is feasible [2].

It should be noted that according to the International Labour Organization, micro and small enterprises play an important role in the economy of most OECD countries, representing more than 50% of GDP and being key drivers of innovation and competition in different markets. These companies also play a critical role in promoting environmental sustainability. However, unlike large companies, they cannot easily access technologies [3, 4]. Therefore, given the aforementioned, the problem to be addressed in this paper is that Small and Medium-sized Enterprises (SMEs) face difficulties in adopting new technologies compared to large corporations.

This situation arises because implementing such technologies entails changes in the business processes of SMEs, while owners tend to focus on customer acquisition and sales growth rather than long-term planning. Taking a fast food SME as an example, it can be observed that they also encounter challenges in maintaining their creativity and entrepreneurial spirit, which hinders their ability to remain competitive in the current market.

This highlights the importance of developing an Enterprise Architecture model that integrates different aspects, such as infrastructure, applications, data and business, to achieve a structured approach [5].

Therefore, in order to compete effectively in the market, companies must have strategic planning and that this is integrated with the Enterprise Architecture, where the EA captures the values of business, processes, and IT [6] since this technological and management practice will allocate to develop the performance of companies helping to see

themselves in the context of an integrated, holistic vision of their technological resources, Information flow, business practices and strategic direction [7]. Likewise, in the design of an EA, it is important to have a framework appropriate to the structure and needs of the organization, taking into account that in recent years, it has been observed that numerous companies have incorporated it [8].

Therefore, the TOGAF framework will be used since, according to Cameron & McMillan, TOGAF frameworks are rated as much superior compared to others. The advantages of using this framework include process completion, TOGAF ADM, flexibility in the use of elements, integration between layers, supplier neutrality, and alignment with industry standards [9]. It has a large number of applications for the rationalization of IT architecture [10], which focuses on simplifying business processes and evaluating the need for improvements [11]. TOGAF defines different stages that must be followed for architecture design, such as business vision, architecture modeling, implementation planning, and change management.

This will make it possible to identify areas for improvement and suggest proposals and new business processes that can improve the performance of companies in terms of Information Technology (IT) [12]. Considering that today, IT is essential for the efficient and effective functioning of organizations since they invest huge sums of money in the composition of their computer systems [13].

To harness the potential of an IT investment, a company needs to align its IT strategy and its business strategy [14]. All are related to the mission and vision of the company, which means that it will seek to improve the efficiency and performance of SMEs while meeting the objectives and strategic direction established.

This article aims to design enterprise architecture planning using the TOGAF 9.1 framework approach, which includes using TOGAF ADM to obtain an Information Technology (IT) plan that is aligned to the sales of fast food SMEs and thus obtain an IT plan that provides a clear idea and detailed design for the department, integrating existing and implemented data and systems in the company, to help align the technological infrastructure with the business goals and optimize it.

In contrast to other research articles exploring the use of TOGAF in various business contexts, this study represents a unique innovation by focusing on Small and Medium-sized Enterprises (SMEs) in the fast-food sector. While existing literature on TOGAF often concentrates on its application in companies across different sectors or large industrial corporations, this article stands out by specifically addressing the unique needs and challenges faced by fast-food SMEs when implementing this methodology. Furthermore, the study's originality is underscored by filling an evident gap in academic literature, addressing an issue that has received limited attention thus far. Therefore, this article significantly contributes to the field by offering a distinctive and valuable perspective on using TOGAF in a specific business context.

2. Literature Review

2.1. Enterprise Architecture (AE)

Enterprise Architecture is a methodological approach that takes a holistic view of organizations and seeks the alignment of all relevant aspects of the organization to maximize its performance and efficiency by achieving coherence between processes, data, applications, and technological infrastructure with the strategic objectives of the business [15].

EA is a management and technology discipline that is increasingly being recognized for its ability to produce holistic and agile designs for organizations. It is composed of six main components: IT strategy, information, information systems, technology services, use, and approval.

In general, enterprise architecture is used both as a management program and as a documentation method, and usually, private and public sector companies can implement it; however, there are differences in its application due to the regulations and organizational structures unique to each sector [7, 15].

A good practice of Enterprise Architecture helps a company innovate and adapt to change, providing stability and flexibility simultaneously. The information an EA provides is essential for determining change needs and priorities from a business perspective and assessing how the company can take advantage of technological innovations [16]. From these definitions, it can be deduced that enterprise architecture represents the paradigm of an operating system within the organization, ranging from the planning and design stages to implementation [17], as shown in Figure 1.

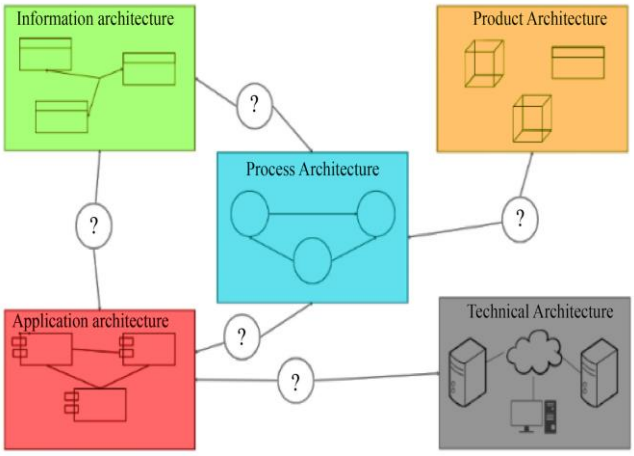


Fig. 1 Enterprise Architecture: Integrating architectural domains [16].

Enterprise Architecture is divided into four parts: process, application, information, and technology architecture. Each of them focuses on different aspects of the organization and helps improve efficiency and reduce costs. Together, these architectures provide a complete view of the organization, its goals, and how to improve it. Effective implementation of EA can make businesses more efficient and successful [16, 18].

2.1.1. Process Architecture

It focuses on how they perform activities in the organization and how they relate to each other. It provides the ability to visualize the current state of a company's business and analyze the objectives intended to be achieved through this business model [19].

2.1.2. Application Architecture

It focuses on the software and applications that are used in the organization. It defines the most important applications and their associated components to understand each application's general structure and evaluate its ability to integrate with other applications [20].

2.1.3. Information Architecture

It focuses on how data and information are handled within the organization. It focuses on ensuring that information assets are treated appropriately, maximizing their value and usefulness to drive operations and decision-making [21].

2.1.4. Technological Architecture

It focuses on the organization's infrastructure and technology, including hardware, software, and networking. Therefore, a technological architecture must be robust and adaptable to changes [20].

2.2. TOGAF

TOGAF is an enterprise-recognized enterprise architecture framework that offers a holistic approach to designing, planning, implementing, and managing enterprise architecture. It is used to describe, analyze, and visualize domain-to-domain relationships in enterprise organizations [22, 23]. In addition, the TOGAF framework provides methods and tools that help facilitate the acceptance, development, use, and maintenance of an Enterprise Architecture (EA). It is important to note that this framework is constantly evolving since, over time, it is modified by various people who contribute to and improve it. These modifications are based on cases of different processes that have occurred in real situations.

In this way, it seeks to keep the framework updated and adapt it to the changing needs of the environment in which it is applied [24]. This framework is based on an iterative process model supported by best practices and a set of existing reusable assets [25].

In addition, ADM is a universal methodology encompassing a set of actions used to model the progress of enterprise architecture [26]. On the other hand, TOGAF ADM is an iterative methodology that is used to develop and maintain the technical architecture of the organization. This methodology consists of several steps, and in each phase, decisions are made that affect the business scope, the level of detail and the target time to be achieved.

Both approaches work together to provide a solid framework for enterprise architecture development that always aligns with business needs and objectives [1]. Together, TOGAF and ADM provide a comprehensive set of tools and models for developing a flexible, integrated enterprise architecture that meets organizational requirements. For this reason, TOGAF ADM is an adaptive approach that can validate multiple modeling techniques employed in design since this approach has the ability to adapt to changes and needs during the design process carried out [27].According to the Open Group [12], TOGAF ADM is an iterative methodology used to develop and maintain an organization's technical architecture. This methodology consists of several phases, each with a specific purpose, as shown in Figure 2.

2.2.1. Preliminary Phase

It focuses on the preparation of the design of the enterprise architecture, where the objectives of the project are defined.

2.2.2. Phase A (Architecture Vision)

The scope and vision of the overall strategy are defined, defining objectives, identifying stakeholders, and establishing baselines.

2.2.3. Phase B (Enterprise Architecture)

It contains the primary strategy of the business, organization, and information activities.

2.2.4. Phase C (Information Systems Architecture)

An architecture that includes a detailed description of the organization's information systems is developed.

2.2.5. Phase D (Technological Architecture)

This phase focuses on creating overall architectural objectives that will be applied later.

2.2.6. Phase E (Opportunities and Solutions)

An overall strategy for the organization is developed, determining what resources should be purchased, built, or reused.

2.2.7. Phase F (Migration Planning)

It involves creating an appropriate implementation and migration plan in collaboration with portfolio and project managers.

Fig. 2 TOGAF ADM [12]

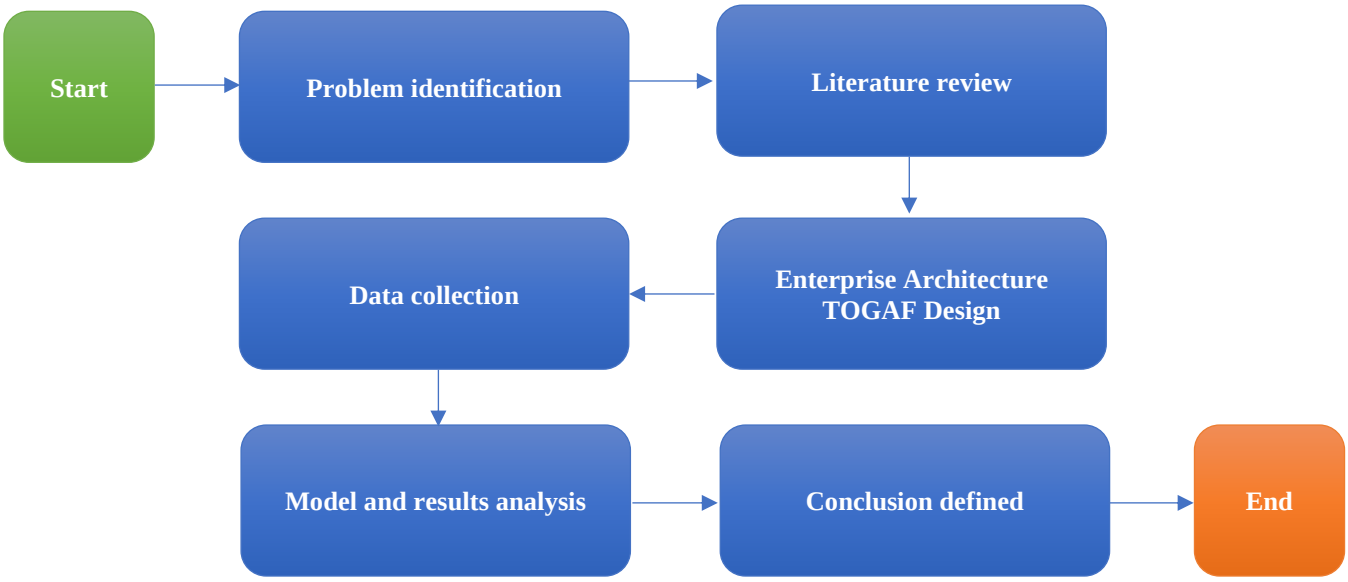


Fig. 3 Research methodology

2.2.8. Phase G (Implementation Governance)

The project is implemented as a work program and processed to achieve the desired architecture.

2.2.9. Phase H (Architecture Change Management)

Describes the drivers of change and how they must manage architectural changes from simple maintenance to complete architectural restructuring.

3. Methodology

For this study, the methodology used by the authors is an application method of studies of SMEs in the fast-food sector. To do this, it focuses on some stages of the TOGAF model, such as the initial phase, phase A (architectural vision) and phase B (enterprise architecture).

The study has a research framework, which ranges from the complete process of analysis, from the definition of the problem to making observations and interviews with the owners of these SMEs and analysing all the results obtained in each of the mentioned stages. In this specific situation, the choice of TOGAF is based on its growing popularity in the business environment [28].

Highlighting that it seeks to propose strategies to optimize the main business process, which is managing the internal work order and aligning with information technologies to increase the company's efficiency and competitiveness[29]. Figure 3 shows the entire methodology used to carry out the study. According to the research steps mentioned above, the following explanation is given:

3.1. Problem Identification

The authors understand the situation and need for progress that SMEs have in the fast food sector, as well as the problems of deficiency in the sales area, thus harming the performance and profitability of businesses.

3.2. Study of Literature

An exhaustive collection of data will be carried out in the library, where valuable references from research journals and other sources of information related to this particular study will be used. Such data collection will be very important, as it will contain a wide range of information related to enterprise architecture, the TOGAF framework and other aspects relevant to the development of this research. In addition, key elements such as the latest trends in enterprise architecture, best practices recommended by TOGAF and other related concepts that will play a fundamental role in the analysis and understanding of the subject under study will be addressed in detail.

3.3. Data Collection Technique

In this study, the following strategies have been carried out in data collection:

Table 1. Sample determination

Variable	Indicators	Sample	Period
Process sales	Completed orders	Order Registration	30 days
	Customer complaints	Registration of claims	30 days
	Daily sales growth rate	Sales Record	30 days
	Increase in customers	Customer Registration	30 days

3.3.1. Observation

Observation identifies the interconnections and patterns of meaning between the observed data. The observation attends to specific objectives, allowing one to understand the object of study.

3.3.2. Content Analysis

Examines the content of different sources of information (texts or documents) to identify analysis models. It helps to increase overall efficiency along with strategic decision-making and planning.

3.3.3. Interview

Information is obtained through a conversation with the SME under study for the collection of data to evaluate the performance of the organization.

3.4. Data Collection

Taking into account the sales process, we proceed with analysing the situation of the current portfolio of SMEs.

3.5. Design of the Enterprise Architecture TOGAF Framework

During this phase, the application design proposed in this study will be addressed based on the TOGAF framework. This stage includes:

3.5.1. Preliminary Phase

At this stage, the selection of an appropriate framework is made and the scope of the Enterprise Architecture (EA) is defined.

3.5.2. Architectural Vision

This stage marks the beginning of the process. It highlights the importance of enterprise architecture to achieve the organizational objectives formulated as part of a strategy that establishes the scope of the architecture to be developed.

3.5.3. Enterprise Architecture

This stage is used to expand the objectives and description of the company's enterprise architecture at this time and then to develop the existing architecture based on the results of the analysis of current conditions.

Table 2. SWOT analysis of the old sales process of fast-food SMEs

SWOT	Sales process (old)
Strengths	It is simple and direct, facilitating the execution and understanding through the collaborators.
Opportunities	It allows a high focus on personalizing customer interactions. Collaborators adapt and customize their vision to meet the needs of each user.
Weaknesses	Limited efficiency and productivity by requiring more time and manual effort to develop lead tracking, customer management and generating reports, which affects the monitoring of sales generated.
Threats	Difficulties with the collection, storage and effective management of sales data, causing limitations with the analysis of metrics and the monitoring of sales performance.

Table 3. SWOT analysis of the new sales process of fast-food SMEs

SWOT	Sales process (proposed)
Strengths	It reduces risks and helps ensure a good, effective adaptation to any change in your process, resulting in improved consistency and efficiency.
Opportunities	Eliminate redundancies and optimize user interaction. Integrates with other systems and applications to extend data quality throughout the sales cycle.
Weaknesses	Not having adequate management of the difficulties encountered leads to an obsolescence of the framework and limits its impact on the process.
Threats	Disconnect between the practices and concepts of the framework and the reality of the market in which fast food SMEs operate. Taking into account that it is necessary to adapt and customize the framework to operate according to the established demand.

Table 4. Owner's needs and proposed solutions

Needs	Proposed Solutions
Obtain positioning in social media	Create ads on social media
Increase clientele	Provide a good customer experience
Make more sales in the store	Streamline the sales process
Optimize the order process	Implement an Order Entry System
Adopt new technologies	Implement a CRM

3.5.4. Information and Technology Systems Architecture

This stage focuses on prioritizing activities related to the architecture of information systems and the construction of technological architecture, respectively.

3.5.6. Opportunities and Solutions

In this stage, the gaps identified in the previous architectures are addressed (Phase B-C-D), and the proposed architecture will be implemented, thus improving the sales of SMEs.

3.6. Model and Analysis of Results

At this stage, a thorough analysis will be performed by joining and examining the results obtained from TOGAF modeling. This analysis will make it possible to determine the development process that will be carried out accurately. The data and findings obtained from the modeling will be evaluated in order to make informed and informed decisions about the most appropriate approach to the development process.

3.7. Definite Conclusion

During this stage, we proceed to carry out an exhaustive discussion of the results obtained from the development proposals that have been previously analyzed. The main objective is to reach an optimal and informed conclusion in relation to these results.

4. Result and Analysis

4.1. Preliminary Analysis

At this stage, we will discuss the role of enterprise architecture in fast food SMEs where the TOGAF application will be analyzed through a SWOT analysis in relation to its advantages and disadvantages, taking into account the old sales process and the one that was proposed, all this explained in table 2 and 3.

4.2. Phase A: Architecture Vision

At this stage, information was gathered from the owner regarding the desired objectives to be implemented in the SME, who focused mainly on increasing his business sales since this area was causing him to lose money. Therefore, concrete proposals were presented to address the problem, detailed in Table 4.

Once the exhaustive analysis of the problem has been carried out and the needs of the stakeholders have been understood, the needs have been identified and prioritized with the objective of obtaining beneficial results for the organization.

In this sense, it has been determined that the first areas to be addressed are the incorporation of new technologies and the optimization of the ordering process since solving these issues will contribute positively to achieving the other needs.

Also, by solving these needs, the company will be in a better position to establish its presence in social networks, allowing for greater visibility and, therefore, a significant increase in the SME's sales.

To achieve this, the company's current sales data was requested, which showed ambiguity with respect to sales control and planning, resulting in a late process and causing the indicators to show low results. Subsequently, a detailed analysis of the requirements necessary for implementing the proposed systems was carried out. This included a precise definition of the data and information that would be managed by the CRM, as well as the determination of how staff would access the information, considering the time needed for training. Similarly, the implementation of the Order Entry System included integrating new modules for sales and inventory management and incorporating devices such as printers and displays for order transmission. In this way, the most critical needs were identified and prioritized in a timely manner, and the necessary resources were managed to achieve the established objectives.

4.3. Phase A: Architecture Vision

At this stage, relevant stakeholders, such as the owners, store managers, administrators, and store collaborators, have been identified. Each of them plays a fundamental role in the functioning and success of the organization. In addition, the necessary drivers for the optimization of sales in the business have been analyzed. These drivers can cover aspects such as marketing strategies, quality of products or services, and customer service, among others. It should be borne in mind that, to achieve the business objectives of SMEs, that is, to increase the products offered, it is important to manage supplier data [30].

Likewise, clear and defined goals that the organization seeks to achieve in relation to the process in question have been established. These goals can be related to increasing sales, improving customer satisfaction, market expansion, and optimizing internal processes, among other relevant aspects for business success, thus giving our business architecture model, shown in Figure 4.

4.4. Phase B: Enterprise Architecture

At this stage, an exhaustive analysis of the AS-IS and TO-BE process diagrams was carried out. These diagrams are fundamental tools that allow us to understand and improve current and future business processes respectively. The main objective of this analysis was to achieve the goals set in relation to the specific organizational objectives of our fast food Small and Medium Enterprises (SMEs).

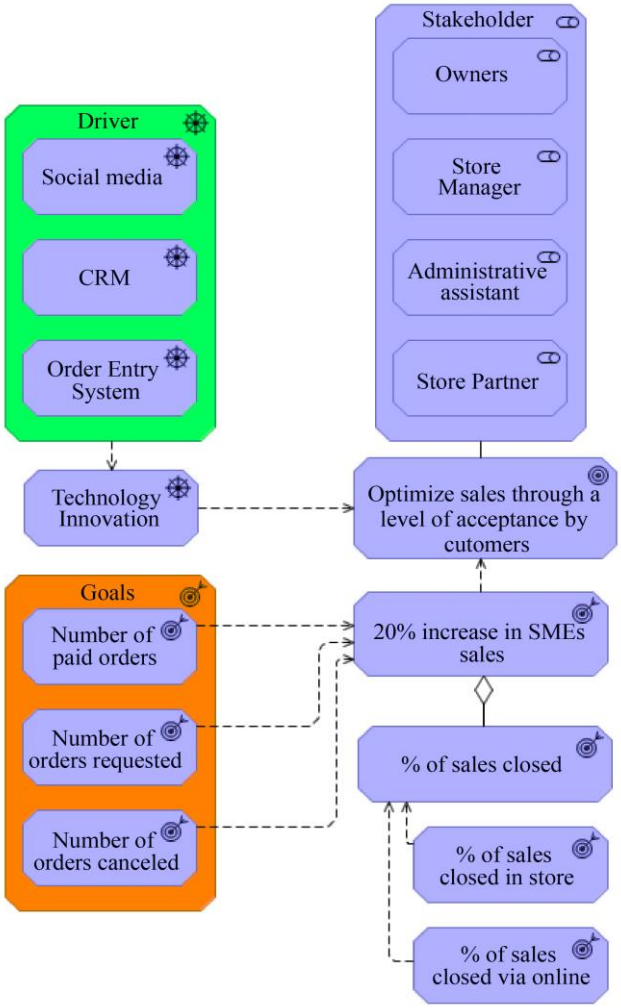


Fig. 4 Requirements for the Enterprise Architecture model of the sales process

4.4.1. Sales Process (AS-IS)

During this analysis process, a primary focus was placed on the sales area, a vital part of the business. Through a detailed evaluation of the AS-IS model, a thorough review of how sales are currently being conducted within the fast food company was conducted. This analysis allowed us to identify both strengths and areas that require improvement throughout the process.

In this evaluation, the activities involved in each of the stages of the sales process were thoroughly examined. This included how products are presented to customers, how they receive purchase requests, how to generate proof of payment, and how to manage the payments themselves. Each aspect was analyzed in detail to identify potential inefficiencies and areas where we can optimize our resources and improve our overall customer experience.In order to have a clear visualization of this process and understand the activities involved in each stage, detailed modeling was carried out, as shown in Figure 5.

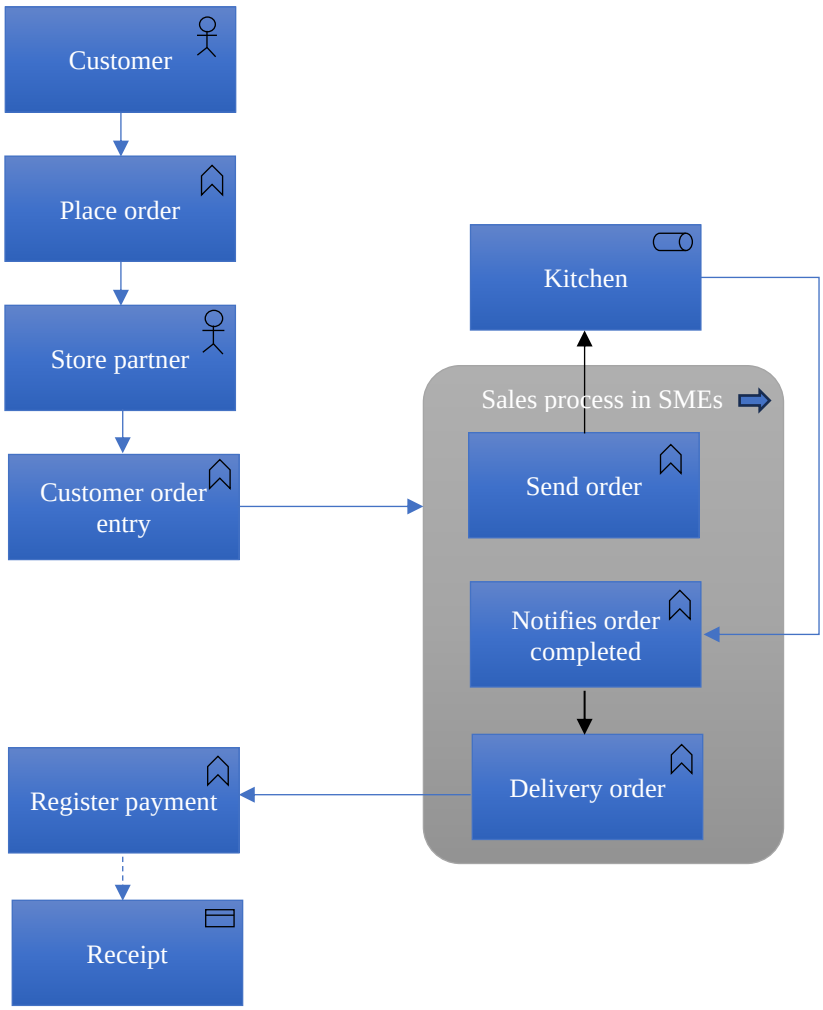


Fig. 5 Current fast-food sales process

4.4.2. Sales Process (TO-BE)

Making use of the valuable findings gained during the Current State of the Processes (AS-IS) assessment, we proceeded to develop the TO-BE process diagram, which represents a clear view of how we expect sales to take place in the near future. This model aims to optimize both the efficiency and effectiveness of our sales process, placing greater emphasis on critical areas of the organization such as interaction with our customers, coordination and internal communication between different departments and time management. This approach will allow us to visualize a process automation-oriented perspective presented in the BPMN business process notation model. With this integrative perspective, we seek to improve productivity, reduce potential errors and streamline our business operations to deliver an exceptional customer experience. The above is shown in Figure 6.

4.4.3. GAP Analysis (AS IS – TO BE)

Also, a GAP analysis is developed as a fundamental part of an enterprise architecture model, which plays an extremely important role in this task. In this process, the activities that will be replaced, added or deleted are identified by comparing the process's current state (AS-IS) with the desired state (TO-BE). This thorough evaluation will allow to present and support in a technical and concise way all the changes that will be generated when moving from one state to another, justifying and solidly substantiating these changes since it is used by the ADM to verify the validity of the architecture under development [31], as well as the desired state of the process in a systematic and detailed manner. This involves thoroughly reviewing each activity involved, examining the AS-IS model's possible shortcomings, inefficiencies, or limitations, and determining how they will be improved and optimized in the TO-BE model. By presenting the findings and recommendations obtained from the GAP analysis, informed decision-making is facilitated, and the necessary support is obtained to implement the required modifications in the process. For example, as shown in Figure 7, it is necessary to automate certain activities through an application, which will therefore automate the process in general.

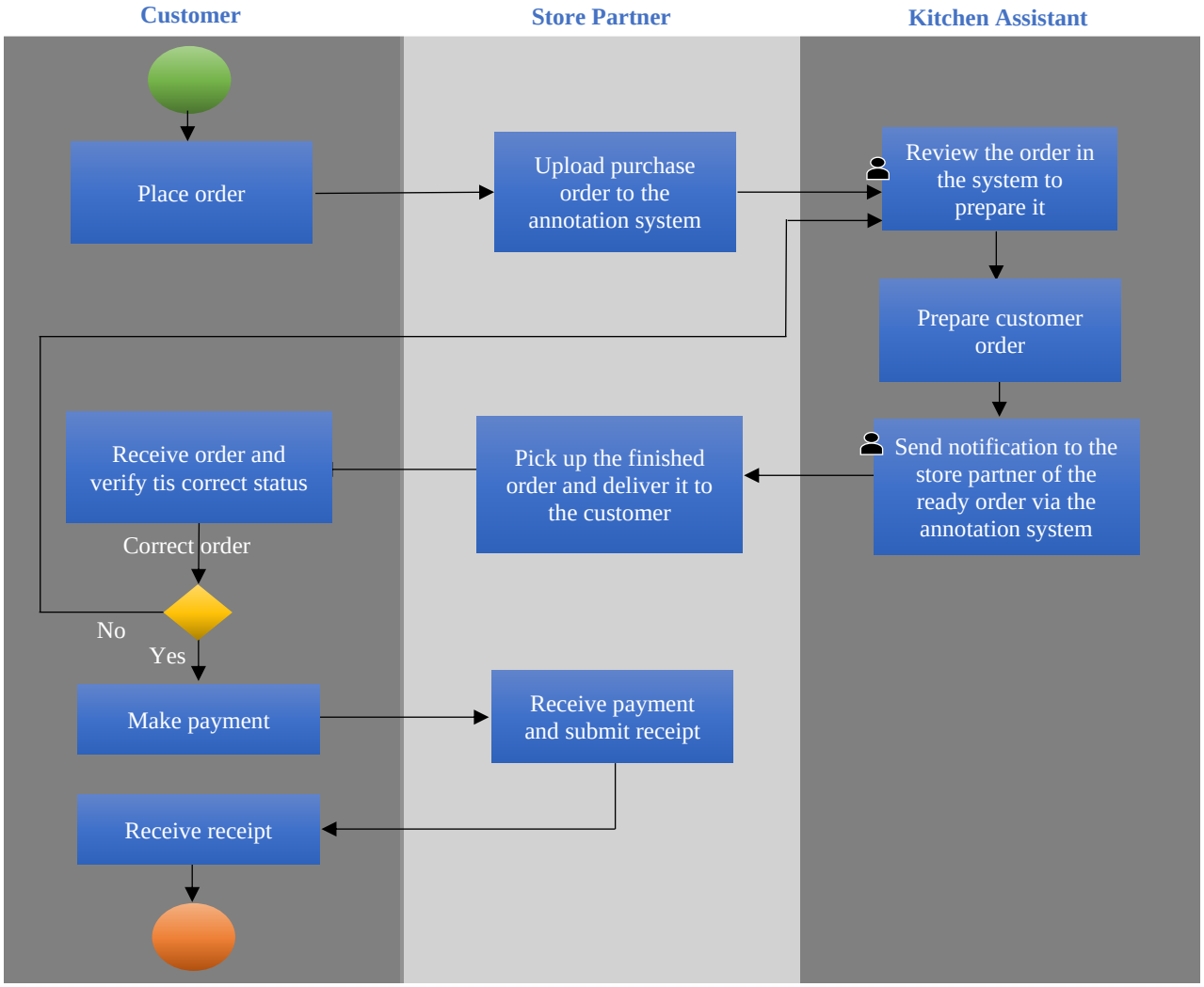


Fig. 6 BPMN sales process for automation purposes

	Enter order in the annotation system	Check system order	Send notification to waiter	Pick up and deliver the order	Eliminated
Customer order entry	**Application is installed**				
Communicat e order to kitchen		**Application automates process**			
Inform the waiter of completed			**Application automates process**		
Hand over order to waiter				**Modified (automated)**	
Deliver order to customer				**Modified (automated)**	
New	**Enter order in the annotation system**	**Check system order**	**Send notification to waiter**		

Fig. 7 GAP analysis to reach the desired state of the TO-BE model in the sales process

4.5. Phase C and D: Information Systems and Technology Architecture

At this crucial stage, the application, data, and technology layer architecture development takes place. In particular, the need to implement an annotation system within the overall sales process has been identified. The integration of a robust Customer Relationship Management (CRM) that supports and optimizes this functionality has been proposed to achieve this. Implementing this system will streamline the sales process, providing greater operational efficiency and significantly improving customer service. With this solution in place, an optimization of commercial interactions and an increase in the quality of service is expected, which in turn will contribute to boosting the growth and sales of Small and Medium-sized Enterprises (SMEs), especially those in the fast-food sector. For a better understanding of this proposal, the attached TO-BE diagram in Figure 8 is presented, which visually represents the configuration and interaction of the key components of this architecture.

4.6. Phase E: Opportunities and Solutions

In this stage, the consolidation of gaps identified in the previous architectures is carried out (Phase B-C-D). Likewise, the implementation and migration of the proposed architecture are carried out, which will facilitate its transition and contribute to the improvement of SME sales, as shown in Table 5 below.

The restrictions that arise in the implementation are the little understanding on the part of the workers towards the web applications or, failing that, with the advanced technologies. However, the development of EA is not restricted by any circumstance because the monetary resources necessary to carry it out are affordable for SMEs, not posing any problems with respect to its implementation. Referring to the dangers posed by the implementation include the misuse of technological devices and different problems related to the use of the internet (network failure).

Table 5. Gap analysis consolidation matrix

AS-IS	TO-BE	PROFITS
Sales Process		Implementing an EA allows
Handwrite the customer's order. Absence of post-closing follow-up.	Manually compose proof of payment. Delay in generating the payment receipt. Delay in calculating the amount to be paid for the expense.	Automate the sales process to streamline payment registration and improve sales tracking. The generation of the receipt will no longer require it to be done manually, butcan be printed or sent digitally to the user's email. Transfer the system to a cloud computing infrastructure for services from any location.

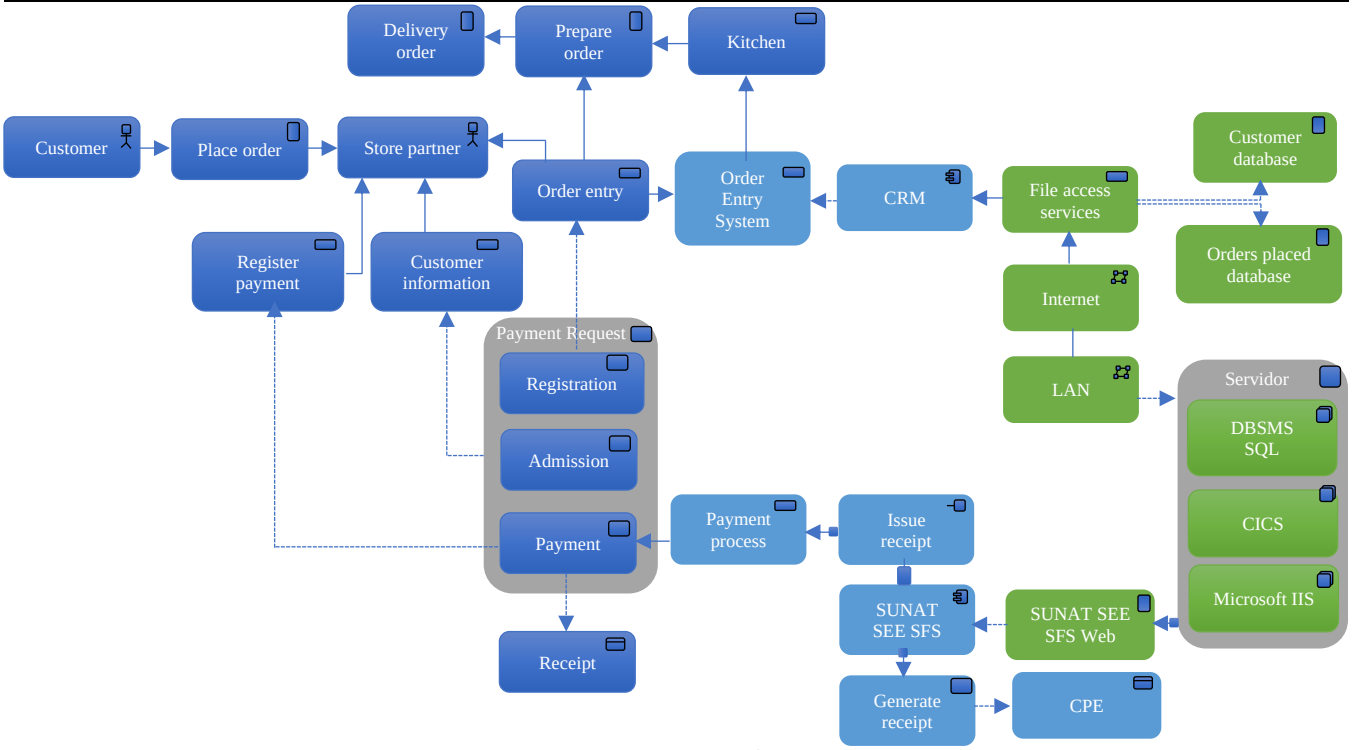


Fig. 8 Expected Architecture Model for automation purposes

Table 6. Descriptive statistics completed orders

	Median	N	Standard Deviation	Standard error median
Indicador 1 PreTest	77.4981%	30	23.64136%	4.31630%
Indicador 1 PostTest	95.8368%	30	7.76683%	1.41802%

4.7. Descriptive Results

4.7.1. Descriptive Results of Completed Orders

According to the exploratory data analysis, the mean statistic is considered as a result of comparing the Pre-Test and Post-Test data developed to evaluate the implementation of the AE, where in the Pre-Test phase, an average of 77% of completed orders was reached, while in the Post-Test stage, there was an increase to 96% on average of completed orders, which reflects an improvement of 19% after applying the proposal as can be seen in Table 6. In the same way, Figure 9 shows the data collected from the indicator of orders completed during the Pre-Test and Post-Test phase. A higher percentage can be seen after implementing the AE, which shows that the SME can more efficiently complete the orders required by customers due to the automation of order registration.

4.7.2. Descriptive Results of Customer Complaints

According to the exploratory data analysis, the mean statistic is considered as a result of comparing the Pre-Test and Post-Test data developed to evaluate the implementation of the AE, where in the Pre-Test phase, an average of 35% of complaints were obtained by customers, while in the Post-Test stage, there was a reduction up to 5% on average of customer complaints, which reflects an improvement of 30% after applying the proposal as can be seen in Table 7. In the same way, Figure 10 shows the data collected from the customer complaints indicator during the Pre-Test and Post-Test phase. A lower percentage can be seen after implementing the AE, which shows that the SME, together with the new technological tool, has achieved an improvement in the management and monitoring of orders, reducing claims by meeting the customers' needs.

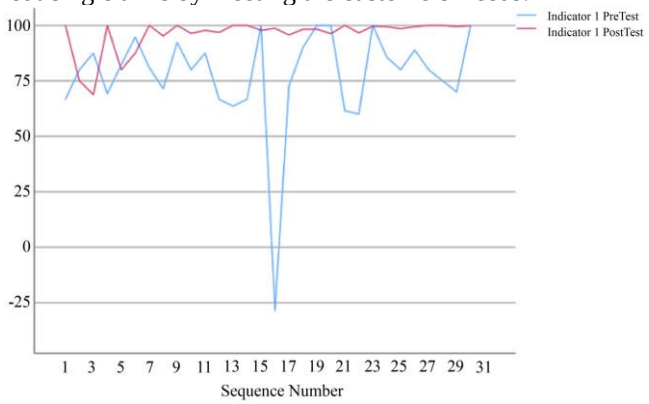


Fig. 9 Graphs of descriptive results Completed orders

Table 7. Descriptive statistics Customer complaints

	Median	N	Standard Deviation	Standard error median
Indicador 3 PreTest	5.6764%	29	46.70992%	8.67381%
Indicador 3 PostTest	19.8945%	29	22.04260%	4.09321%

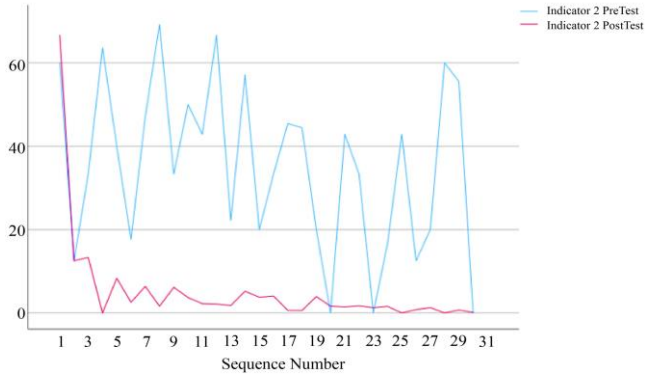


Fig. 10 Graphs of descriptive results customer complaints

Table 8. Descriptive statistics daily sales growth rate

	Median	N	Standard Deviation	Standard error median
Indicador 3 PreTest	5.6764%	29	46.70992%	8.67381%
Indicador 3 PostTest	19.8945%	29	22.04260%	4.09321%

4.7.3. Descriptive Results of the Daily Sales Growth Rate

According to the exploratory analysis of data, the mean statistic is considered as a result of comparing the Pre-Test and Post-Test data developed to evaluate the implementation of the AE, where in the Pre-Test phase, an average of 5% daily growth in sales was obtained, while in the Post-Test stage there was an increase to 20% on average in the daily sales growth rate, which reflects an improvement of 15% after applying the proposal as can be seen in Table 8.

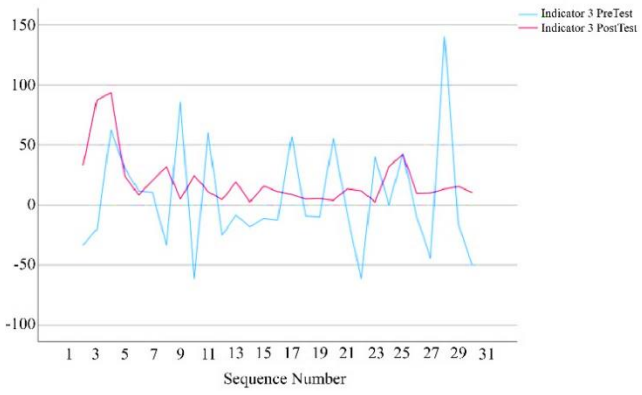


Fig. 11 Graphs of descriptive results Daily sales growth rate

In the same way, Figure 11 shows the data collected from the daily sales growth rate indicator during the Pre-Test and Post-Test phases. A higher percentage can be seen after implementing the AE, which shows that the SME, together with the new technological tool, has achieved an improvement in the control of sales and the generation of proof of payment, demonstrating security in customers.

4.7.4. Descriptive Results of the Daily Sales Growth Rate
Descriptive Results of Customer Increment

According to the exploratory data analysis, the mean statistic is considered as a result of comparing the Pre-Test and Post-Test data developed to evaluate the implementation of the AE, where in the Pre-Test phase, an average of 9% increase was obtained. At the same time, in the Post-Test stage, there was an increase of 20% on average of the increase in customers, which reflects an improvement of 11% after applying the proposal, as seen in Table 9.

In the same way, Figure 12 shows the data collected from the customer growth indicator during the Pre-Test and Post-Test phases. A higher percentage can be seen after implementing the AE, which shows that the SME, together with the new technological tool, has achieved an improvement in monitoring and communication with its customers, motivating them to return because they are pleased with the service offered.

4.8. Inferential Results

4.8.1. Setting the Normality Hypothesis

H_0: There is a normal distribution of the data source.

H_α: There is no normal distribution of the data source.

Table 9. Descriptive statistics customer growth

Median		N	Standard Deviation	Standard error median
Indicador 4 PreTest	9.0852%	29	58.45170%	10.85421%
Indicador 4 PostTest	19.8945%	29	22.04260%	4.09321%

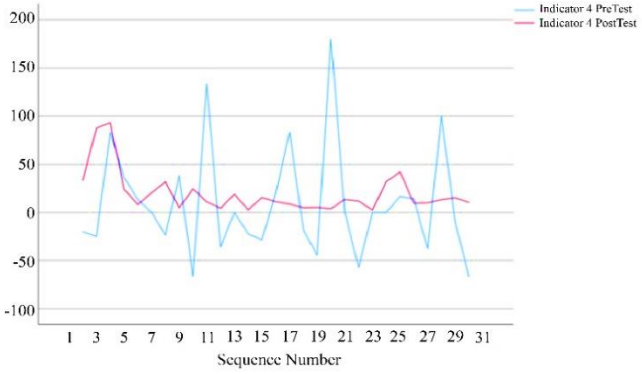


Fig. 12 Graphs of descriptive results customer growth

You have a confidence level of $\alpha = 0.05$

Likewise, the decision rule is given as follows:
Reject the H_0 when $sig < \alpha$
Accept the H_0 when $sig > \alpha$

4.8.2. Data Normality Test for Independent Groups
Pre-Test and Post-Test Data Normality Test

The normality assumption was validated for the samples of each indicator in the Pre-Test and Post-Test stages, considering that the samples belong to independent groups. The Shapiro-Wilk statistical test was used to evaluate the distribution of the data. Table 10 shows the results of the Shapiro-Wilk test applied to the data of the Pre-Test group.

Also, in Table 11, the results of the Shapiro-Wilk test from the data of the Post-Test group are displayed.

Table 10. Data normality test of the Pre-Test group

	Shapiro-Wilk		
	Statistical	gl	Sig.
Completed Orders PreTest	.678	29	<.001
Customer Complaint PreTest	.959	29	.318
Daily sales growth rate PreTest	.927	29	.047
Customer Growth PreTest	.887	29	.005

Table 11. Data normality test of the Post-Test group

	Shapiro-Wilk		
	Statistical	gl	Sig.
Completed Orders PostTest	.584	29	<.001
Customer Complaint PostTest	.781	29	<.001
Daily sales growth rate PostTest	.685	29	<.001
Customer Growth PostTest	.685	29	<.001

Table 12. Comparison of Data normality test of the Pre-Test and Post-Test group

Indicators	Pre-Test (sig)	Post-Test (sig)	Used test
Completed Orders	<.001	<.001	No parametric
Customer Complaint	.318	<.001	No parametric
Daily sales growth rate	.047	<.001	No parametric
Customer's growth indicator	.005	<.001	No parametric

Normality Test Results

In Table 12, a comparison of the Shapiro-Wilk "sig" results of the Pre-Test and Post-Test groups is carried out to evaluate whether or not they comply with the assumption of normality.For the Completed Orders indicator, when analyzing the values of the independent groups and when using the decision rule, different values were acquired ($sig =< .001\ and\ sig =< .001$) and no result meets the normal ($sig > 0.05$), so it is decided to reject the null hypothesis, that is, there is no normal distribution of the origin of the data, and before this, it is necessary to use a nonparametric test (Mann-Whitney U test). $sig =< .001\ and\ sig =< .001$

For the Customer complaints indicator, when analyzing the values of the independent groups and using the decision rule, different values were acquired ($sig = 0.318\ and\ sig =< .001$) and only one result meets the normal ($sig > 0.05$), and the other does not, so it is decided to reject the null hypothesis, that is, there is no normal distribution of the origin of the data, and before this, it is necessary to use a nonparametric test (Mann-Whitney U test). For the indicator Daily sales growth rate, when analyzing the values of the independent groups and using the decision rule, different values were acquired ($sig = 0.047\ and\ sig =< .001$) and no result meets the normal ($sig > 0.05$), so it is decided to reject the null hypothesis, that is, there is no normal distribution of the origin of the data and before this, it is necessary to use a nonparametric test (Mann-Whitney U test. For the Customer Increment indicator, when analyzing the values of the independent groups and using the decision rule, different values were acquired ($sig = 0.005\ and\ sig =< .001$) and no result meets the normal ($sig > 0.05$), so it is decided to reject the null hypothesis, that is, there is no normal distribution of the origin of the data and before this, it is necessary to use a nonparametric test (Mann-Whitney U test).

4.8.3. Mann-Whitney U Statistical Test

After analysing the assumptions, this study's most appropriate statistical test is the Mann-Whitney U test for two groups of independent samples. To carry out this test, $\boldsymbol{U_1}$ and $\boldsymbol{U_2}$ must be calculated and developed, taking into account the indicator information in relation to the Pre-Test and Post-Test data groups. The necessary formulation is presented below:

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1;$$
$$U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2;$$
$$U = min(U_1, U_2)$$

The letter Z is the representation of the Mann-Whitney U test statistic, and its formula is given by:

$$Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}}} \sim N(0,1)$$

4.8.4. Hypothesis Testing of Completed Orders

1. Formulation of Hypotheses

To perform hypothesis testing, the hypothesis for the Completed Orders indicator is first formulated:

H_0: Designing an enterprise architecture model using TOGAF does not improve completed Orders.

H_α: Designing an enterprise architecture model applying TOGAF improves Completed Orders.

You have a value of sig $\alpha = 0.05$

Likewise, the decision rule is given as follows:

Reject the H_0 when $sig < \alpha$

Accept the H_0 when $sig < \alpha$.

2. Results of the Statistical Test

The comparative results of the ranges analyzed in the Pre-Test and Post-Test groups are reflected in Table 13, where it is evident that the average range is higher in the Post-Test group; in addition, the sum of ranges is also higher in the Post-Test group with a value of 1190 points, unlike the Pre-Test that has 640 points, this increase in Post-Test results evidences an improvement in completed orders, during the time of the respective tests and evaluations.

On the other hand, the contrast of the statistical test shown in Table 14 reflects significant differences between the Pre-Test and post-test groups with results of the value of $Z = -4.093$ favorable to improving the completed Orders, also evidenced by the value of the $sig =< .001$ being $sig =< 0.05$, implying that the groups analyzed present different and favorable results for the study.

3. Distribution of the Statistical Test

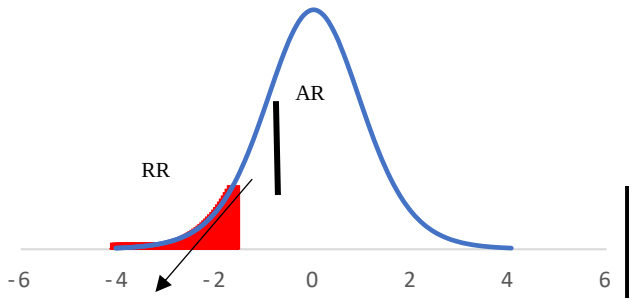
To achieve the decision of the hypothesis test, the use of the normal distribution was required, represented as $Z_{tab} = (1 - \alpha)$, where replacing the values $Z_{tab} = (0.95) = -1.645$, this result served as a limit to compare the value of $Z_{cal} = -4.093$, which was compared graphically using the Gauss bell displayed in Figure 13.

Table 13. Comparative ranges of completed orders

	Group	N	Average Rate	Rate Total
Completed Orders	PreTest	30	21.33	640.00
	PostTest	30	39.67	1190.00
	Total	60		

Table 14. Test statistics of completed orders

	Completed Orders
U de Mann-Whitney	175.000
W de Wilcoxon	640.000
Z	-4.093
Sig. asin. (bilateral)	<.001



$Z_{tab(0.95)} = -1{,}645$ *RR: Rejected Region*
AR: Acceptation Region

$Z_{cal} = -4.093$

Fig. 13 Gauss bell completed orders

Where, $Z_{cal} < Z_{tab}$ y is in the rejection region, so it is decided to reject the null hypothesis, concluding that there is statistical evidence that proves that the groups analyzed show different and favorable results for the study, that is, that after applying a business architecture model applying TOGAF improves Completed Orders with 95% confidence.

4.8.5. Hypothesis Testing of Customer Complaints

1. Formulation of Hypotheses

To perform the hypothesis test, the hypothesis for the Customer Complaints indicator is first formulated:

$\boldsymbol{H_0}$: Designing an enterprise architecture model by applying TOGAF does not improve Customer Complaints.

$\boldsymbol{H_\alpha}$: Designing an enterprise architecture model by applying TOGAF improves customer complaints.

You have a value of sig $\boldsymbol{\alpha = 0.05}$

Likewise, the decision rule is given as follows:

Reject the $\boldsymbol{H_0}$ when $\boldsymbol{sig} < \alpha$

Accept the $\boldsymbol{H_0}$ when $\boldsymbol{sig} < \alpha$

2. Results of the Statistical Test

The comparative results of the ranges analyzed in the Pre-Test and Post-Test groups are reflected in Table 15, where it is evident that the average range is smaller in the Post-Test group; in addition, the sum of ranges is also lower in the Post-Test group with a value of 579 points unlike the Pre-Test that has 1251 points, this decrease in Post-Test results shows a reduction in customer complaints during the time of the respective tests and evaluations.

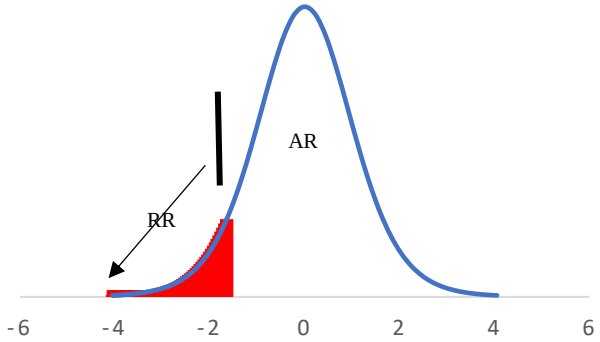
On the other hand, the contrast of the statistical test shown in Table 16 reflects significant differences of the Pre-Test and Post-Test groups with results of the value of $Z = -4.972$ favorable to improving customer complaints, also evidenced by the value of the $sig =< .001$ being $sig =< 0.05$, implying that the groups analyzed present different and favorable results for the study.

Table 15. Comparative Customer Complaint Ranges

Group		N	Average Rate	Rate Total
Customers Complaint	PreTest	30	41.70	1251.00
	PostTest	30	19.30	579.00
	Total	60		

Table 16. Customer Complaint Testing Statistics

Customers Complaint	
U de Mann-Whitney	114.000
W de Wilcoxon	579.000
Z	-4.972
Sig. asin. (bilateral)	<.001



$Z_{tab(0.95)} = -1{,}645$ *RR: Rejected Region*
AR: Acceptation Region

$Z_{cal} = -4.972$

Fig. 14 Gauss bell customer complaints

Distribution of the Statistical Test

To achieve the decision of the hypothesis test, the use of the normal distribution was required, represented as $Z_{tab} = (1 - \alpha)$, where replacing the values $Z_{tab} = (0.95) = -1.645$, this result served as a limit to compare the value of $Z_{cal} = -4.972$, which was compared graphically using the Gauss bell shown in Figure 14. Where, $Z_{cal} < Z_{tab}$ and is in the rejection region, so it is decided to reject the null hypothesis, concluding that there is statistical evidence that proves that the analyzed groups show different and favorable results for the study, that is, that after applying a business architecture model applying TOGAF improves Customer Complaints with 95% confidence.

4.8.6. Hypothesis Testing Daily Sales Growth Rate

Formulation of Hypotheses

To carry out the hypothesis test, the hypothesis for the indicator Daily Sales Growth Rate is first formulated:

H_0: Designing an enterprise architecture model by applying TOGAF does not improve the Daily Sales Growth Rate.

H_α: Designing an enterprise architecture model applying TOGAF improves the daily sales growth rate.

You have a value of sig $\alpha = 0.05$

Likewise, the decision rule is given as follows:
Reject the H_0 when $sig < \alpha$
Accept the H_0 when $sig < \alpha$

1. Results of the Statistical Test

The comparative results of the ranges analyzed in the Pre-Test and Post-Test groups are reflected in Table 17, where it is evident that the average range is higher in the Post-Test group; in addition, the sum of ranges is also higher in the Post-Test group with a value of 705 points, unlike the Pre-Test that has 1006 points, this increase in Post-Test results evidences an improvement in the daily sales growth rate, during the time of the respective tests and evaluations.

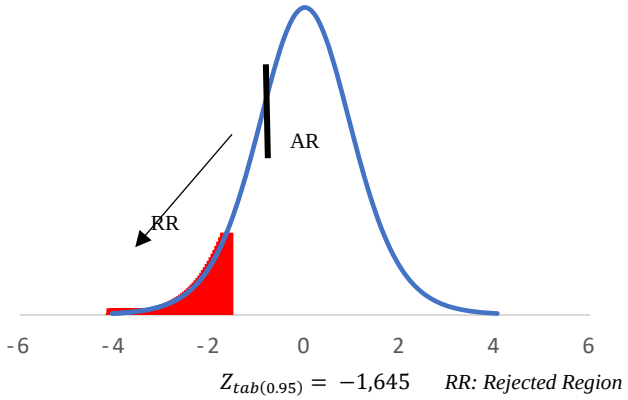
On the other hand, the contrast of the statistical test shown in Table 18 reflects significant differences of the Pre-Test and Post-Test groups with results of the value of $ZZ = -2.341$ favorable to improving the daily sales growth rate, also evidenced by the value of the $sig = .019$ being $sig =< 0.05$, implying that the groups analyzed present different and favorable results for the study.

Table 17. Comparative ranges of daily sales growth rate

	Group	N	Average Rate	Rate Total
Daily sales growth rate	PreTest	29	24.31	705.00
	PostTest	29	34.69	1006.00
	Total	58		

Table 18. Daily sales growth rate test statistics

	Daily sales growth rate
U de Mann-Whitney	270.000
W de Wilcoxon	705.000
Z	-2.341
Sig. asin. (bilateral)	.019



$Z_{tab(0.95)} = -1{,}645$ *RR: Rejected Region*
AR: Acceptation Region
$Z_{cal} = -2.341$

Fig. 15 Gauss's Bell Daily sales growth rate

Distribution of the Statistical Test

To achieve the decision of the hypothesis test, the use of the normal distribution was required, represented as $Z_{tab} = (1 - \alpha)$, where replacing the values $Z_{tab} = (0.95) = -1.645$, this result served as a limit to compare the value of $Z_{cal} = -2.341$, which was compared graphically using the Gauss bell shown in Figure 15.

Where, $Z_{cal} < Z_{tab}$ and is in the rejection region, so it is decided to reject the null hypothesis, concluding that there is statistical evidence that proves that the groups analyzed show different and favorable results for the study, that is, that after applying a business architecture model applying TOGAF improves the daily sales growth rate with 95% confidence.

4.8.7. Testing the Assumptions of Customer Growth
Formulation of Hypotheses

To carry out the hypothesis test, the hypothesis for the Customer Growth indicator is first formulated:

H_0: Designing an enterprise architecture model using TOGAF does not improve customer growth.

H_α: The design of an enterprise architecture model applying TOGAF improves customer growth.

You have a value of sig $\alpha = 0.05$

Likewise, the decision rule is given as follows:
Reject the H_0 when $sig < \alpha$
Accept the H_0 when $sig < \alpha$

1. Results of the Statistical Test

The comparative results of the ranges analyzed in the Pre-Test and Post-Test groups are reflected in Table 19, where it is evident that the average range is higher in the Post-Test group.

In addition, the sum of ranges is also higher in the Post-Test group with a value of 1012 points, unlike the Pre-Test that has 699 points; this increase in Post-Test results shows an improvement in the increase of customers during the time of the respective tests and evaluations.On the other hand, the contrast of the statistical test shown in Table 20 reflects significant differences of the Pre-Test and Post-Test groups with results of the value of $Z = -2.435$ favorable to the improvement of the increase of clients, also evidenced by the value of the $sig = 0.15$ being $sig =< 0.05$, implying that the groups analyzed present different and favorable results for the study.

Table 19. Comparative customer increment ranges

Group		N	Average Rate	Rate Total
Customers Growth	PreTest	29	24.10	699.00
	PostTest	29	34.90	1012.00
	Total	58		

Table 20. Customer increment test statistics

Customer Growth	
U de Mann-Whitney	264.000
W de Wilcoxon	699.000
Z	-2.435
Sig. asin. (bilateral)	.015

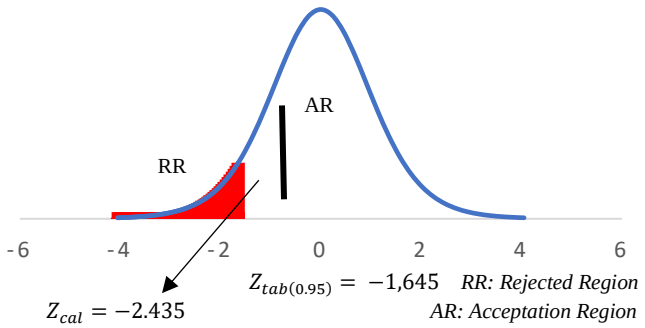


Fig. 16 Gauss's bell Increase in customers

2. Distribution of the Statistical Test

To achieve the decision of the hypothesis test, the use of the normal distribution was required, represented as $Z_{tab} = (1 - \alpha)$, where replacing the values $Z_{tab} = (0.95) = -1.645$, this result served as a limit to compare the value of $Z_{cal} = -2.435$, which was compared graphically using the Gauss bell displayed in Figure 16. Where, , $Z_{cal} < Z_{tab}$ and is in the rejection region, so it is decided to reject the null hypothesis, concluding that there is statistical evidence that proves that the groups analyzed show different and favorable results for the study, that is after applying a model of enterprise architecture applying TOGAF improves the increase of customers with 95% confidence.

5. Discussion

In this section, the results obtained in this article, which implements an enterprise architecture model based on TOGAF within a fast food SME, are compared with those of other research studies to increase understanding regarding its effectiveness and limitations.

The results of other studies confirm the efficiency of applying TOGAF to improve key processes in SMEs. Key highlights include alignment between technological and business objectives, process standardization, and identification of areas for improvement [5]. Therefore, this article adds to the evidence by focusing on the fast food sector, where efficiency and standardization are crucial, thus demonstrating the usefulness of TOGAF.

Furthermore, this article aligns with other findings regarding the importance of visualization for communicating enterprise architecture [32]. Hence, this study exemplifies visualization through AS-IS/TO-BE, facilitating communication among stakeholders in the sales process. This study also aligns with the results of other articles, demonstrating that using enterprise architecture helps generate a better understanding of growing SMEs, thereby facilitating implementation using frameworks like TOGAF [33].

6. Conclusion

Once this research is completed, it can be concluded that the implementation of TOGAF in a fast food SME demonstrated improvements in key sales process indicators such as completed orders, customer complaints, daily sales growth rate, and customer increase. This was evidenced in automated records, order management, and customer tracking. Visualization through AS-IS and TO-BE diagrams was also an advantage of TOGAF in facilitating stakeholder communication.

All of this highlights the potential of TOGAF to standardize processes, prepare for scalability, and identify improvements based on gap analysis. The efficiency of Enterprise Architecture based on TOGAF in fast food SMEs was determined through indicators, the results of which show a favorable improvement of 19% in completed orders, a 30% reduction in customer complaints, a 15% increase in the daily sales growth rate, and an 11% increase in the number of customers.

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