

Implementation of a Web System to Optimize the Quotation Process in the Company KSF Representaciones EIRL, 2022

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Abstract—This research seeks to demonstrate whether the implementation of a web-based system influences the optimization of activities related to the quoting process, saving time and money for KSF Representaciones EIRL. Therefore, the following question arises: To what extent does the implementation of a web-based system optimize the quoting process? This is an applied, pre-experimental design with a quantitative approach. The population consists of average daily quote records for 24 business days per month. For the convenience sample, an average of 24 quote records from May were used for the pre-test and an average of 24 quote records from June for the post-test, collected using an observation sheet. The results regarding the quoting process variable show that the application reduces the time to generate quotes. For the second dimension, the application results in a higher percentage of quote fulfillment. In conclusion, the implementation of the web-based system improved quote generation by an average of 28 minutes and increased the compliance rate of submitted quotes by an average of 89.8%.

Keywords—Web system; optimization; quotation; customer satisfaction; efficiency

I. INTRODUCTION

Nowadays, companies require a faster response to customer requests. In this sense, the generation of quotes is an activity that must be attended to more quickly, since it is essential to generate customer satisfaction [1]. Billing, purchasing and quoting activities lose agility due to the lack of automation of the related tasks [2]. Information technology and software development have had a significant impact on most fields of knowledge, and in recent decades there has been enormous development at both the industrial and academic levels [3]. In this sense, at KSF Representaciones EIRL, a problem is detected in the quotation process that, being a manual activity, causes delays in the preparation, which generates customer dissatisfaction. This produces high response times and low quality of attention. Thus, in Ecuador, the source of the digital newspaper El Telégrafo indicates that 56% of the 500 companies surveyed indicate that technological progress is the trend that brings them the greatest results [4]. The reasons are that it allows reducing errors, increasing the speed and quality of production and reducing costs. The study in [5] agrees that web systems allow automating various processes managed in an organization, providing versatility, maintaining communication digitally and instantly, obtaining better control over this data, efficiency and simplifying management. On the other hand, according to a study carried out in Peru, the level of compliance in delivery of quotes was only 54.5%, while 49.75% of those delivered quotes

were accepted by the client, because the requests for quotes were not answered in the required time [6].

II. PROBLEMATIC REALITY

In reference to previous works reviewed, both international and national, on the implementation of web-based systems for the quotation phase [7] of Colombia mentions that the implementation of a system allows to manage the quotations and the post-sale process of the projects, optimizing the search for information and managing the process flows, in addition to helping management to make decisions.

In Mexico [8], it is expressed that the local creation of a web-based quotation system helps in the management and inspection of clients and computer equipment; it also allows for generating quotations more quickly in the company Servicio de Taller “Trujillo”, optimizing internal processes and obtaining centralized data.

On the other hand, in Peru [9] it indicates that the influence of a web system on commercial management activities is favorable. According to the results, the quote effectiveness indicator improved from 57.18% (pre-test) to 80.6% (post-test), while the marketability index increased from 55.51% (pre-test) to 80.9% (post-test).

Similarly, the study in [10] states that the influence of a web system on activities related to quotation control is favorable, since the results show that the level of compliance of deliveries improved from 54.52% (pre-test) to 75.44% (post-test) and the level of accepted quotations increased from 45.75% (pre-test) to 77.26% (post-test).

Finally, the study in [11] points out that the influence of a web system on commercial management activities is favorable, since the results allowed us to increase the percentage of compliance in delivery of quotes from 61.24% (pre-test) to 71.25% (post-test), as well as to increase the number of approved quotes from 57.08% (pre-test) to 67.08% (post-test).

III. THEORETICAL FRAMEWORK

This study is justified on a practical level because currently, the quotation is a routine operational work performed manually; therefore, the implementation of the system aims to optimize the quotation process by automating the functionalities which involve carrying out this task. At a technological level because the design, development and the implementation of the web system will be implemented under the CodeIgniter framework,

which will make use of the Model View Controller (MVC) development process, Language Hypertext Preprocessor (PHP), Style Sheets (CSS), JavaScript, HyperText Markup Language (HTML), libraries for generating reports, MySQL database, domain, hosting, among others. At a methodological level, why will a registration form be used? as a research instrument, which is the document where the data is recorded obtained by monitoring company information. This form will allow consolidation and verify data to demonstrate the optimization of process.

Barzallo [12] defined a web system, also known as a web program, as a system that is created, installed and hosted on a server or intranet (local area network) on the Internet. This system can be used in any browser, such as: Chrome, Brave, Microsoft Edge, etc., regardless of the operating system. Using a web system does not require installation on each computer; it is only necessary to enter where the system is hosted. Web programs dynamically display information to the user through a database, which helps in data processing.

On the other hand, [13]-[10] indicate advantages of a web system, that is, the reuse of source code and modifications at any time. In that sense, [14] mentions that a web system helps improve the quotation process, given its efficiency and reliability.

The features of a web system are diverse. According to Barzallo [15], web application frameworks provide basic functionalities, such as a template system, support for user sessions, and a common interface for disk storage or databases. Generally, these frameworks encourage the reuse of components, including the reuse of source code and database access libraries.

On the other hand, the objective of using a framework, [16] - [15], is to optimize the construction activity, facilitating the reuse of already created source code and promoting best practices for development. A web framework is composed of a set of components, files in XML format and classes in Java, which speed up and help in the construction of the web system [15].

It was decided to use the framework CodeIgniter because it helps to maintain order and good practices in building the web system, as it is based on the MVC model, which stands for Model, View and Controller. In this context, CodeIgniter includes a set of useful tools to create sophisticated PHP applications, facilitating the development of web applications. In addition to its organized programming and architecture, it also offers numerous complementary tools (plugins) for the implementation of functional and secure applications.

Regarding the programming language, [15] defines that web programming languages have been emerging according to the needs of the platforms to facilitate the work of application developers. The language chosen to develop the web system was PHP. According to Arias [17], PHP is used exclusively in web environments, which means that its scope of application is limited only to web development, with the main objective of making web solutions fast, simple and effective. The choice of this language is due to greater practical knowledge, its free nature, its easy configuration and the possibility of being easily

integrated into other applications. Likewise, Bootstrap will be used to improve the visualization of the system. Villagomez [18] comments that Bootstrap is a framework that allows creating web interfaces using JavaScript and CSS, with a special feature to adapt the web page interface to the size of the display device.

In addition, a web server was used, which, according to study [19] - [23], is defined as one that attends and responds to all browser requests, providing the resources that are requested through the HTTP (Hypertext Transfer Protocol) or HTTPS protocol, the latter being the encrypted, secure and authenticated version.

To house all the information, a database was chosen. According to study [21], a database is defined as an organized series of data, which can range from a list of items to a collection of photos or a large amount of information about an organization's network. The study in [20] agree that MySQL is widely used in web applications. Its popularity is closely related to PHP, which is frequently combined with MySQL. MySQL is a very fast database management system, making it an ideal choice for applications.

Furthermore, to add, arrange and manage data stored on computers, it is necessary to have a database manager such as MySQL Server. This can process a large amount of information, which highlights the importance of database managers in computing, either as a stand-alone application or as part of other applications. According to Victor [21], MySQL is the most widely used open-source database management system. Its efficient structure contributes to its speed and its interface is intuitive. It also allows code reuse within the system, and its minimalist approach has resulted in competitiveness in terms of speed, compactness and stability, as well as being easy to implement. This database was chosen because it is easily integrated into the project, is free of charge and there is practical knowledge of it.

On the other hand, as a development methodology we will use Scrum, since it is an agile methodology that reduces the margin of error in a collaborative way, favors teamwork and allows continuous interaction with the client to build the system according to their needs. According to study [22], the main objective of having a clear development methodology and specific processes is to promote dialogue between the client and the developers. The research in [23] mentions that there are two trends in development methods: one structured and one agile, the latter being the one that helps reduce risks and has gained popularity in recent years due to favorable results in highly changing projects. Excellent software design translates into solid and reliable web applications that can be continuously improved. Therefore, Scrum is especially appropriate for projects in complex environments that require fast results, where requirements are constantly changing or not well defined, and innovation, flexibility, competitiveness and productivity are crucial [24].

The web system will be hosted on a hosting. According to study [25], hosting is based on providing services to users so that they can access from any device connected to the Internet, thus ensuring high availability. This is based on decentralized application programming, where applications are distributed across hundreds of servers located in different parts of the world,

allowing them to respond to large volumes of service requests and offering fault tolerance.

Since the application is hosted here, we considered the security that said hosting offers us and that is why we chose Blue Host, since it offers us, for example, Firewall as security in which its main objective is to prevent various attacks from external people and it also allows you to monitor HTTP traffic. SSL ensures the confidentiality of transmissions between the logical layer and the visual presentation layer, and vice versa. It offers security services by encrypting the information transmitted between the server and the client using a symmetric encryption algorithm. (usually RC4 or IDEA). Malware scanning is a tool that helps warn of the presence of malicious code and daily backup of the website, helps save the information that the hosting accumulates such as files and databases.

The independent variable in the project is the web system. In that sense [26] mentions that a web system refers to a computer program or web page that works on the Internet, without the need to be installed on the local computer. To do this, only is necessary he access to a browser web, already that, HE finds programmed in HTML.

The dependent variable is the quotation process, which, according to studies [27] - [28], is defined as a standard financial process known as quotation, through which a seller can initiate a purchase/sale to provide a particular service or product. The study in [29] defines the quotation process as the activities performed for the generation of an informative document that the responsible area uses to initiate a negotiation. In addition, it mentions that the document does not generate any accounting record, but rather its purpose is to determine the price of a product or service. Often, a request for a quotation includes not only the cost of the product, but also the payment terms, the duration of the contract, and the quality level. Various product details are included in the quotation to ensure that all interested parties submit offers. In the same context, [30] - [31] mentions that a quotation is a basic financial process that instructs a supplier to start buying and selling, resulting in a specific product or service proposal.

In general, there are several aspects when requesting a quote, such as prices, various services, legal requirements. To select the quotes, according to studies [32] - [33], defines that there are three points of view for the choice of quotes: Quality analysis: Tries to analyze all the quotes, providing certain parameters that help to exclude those that do not present the minimum requirements requested. This cleaning process must be carried out very carefully, since the promotion is not always expected to be to the client's liking and some occasions are quite difficult to achieve, therefore selection or elimination must be prioritized. [33], Service: This aspect is very valuable, because it is what the client wants and therefore periodic maintenance of what you offer must be carried out. You must also make an offer so that the client has more confidence [33], Price: Among the accepted quotes, on this occasion, there are two suppliers, the most favorable price will be chosen, but with good quality compared to the product.

The first dimension is the generation of quotations. According to studies [34] - [33], it is defined as a sales promotion in which a proposal is presented that includes the

specifications and the cost of the purchase, considering a series of aspects such as the payment methods, the exchange rate, the details of the product, the quality assurance and the conditions of sale. As an indicator, there is the quotation generation time. According to studies [35] - [36], this time is defined as the average time it takes to make a quotation, starting from the entry of the request until a response is provided to the client. This time is associated with the manual task that is carried out to prepare the quotation and the different consultation sources necessary for its development.

On the other hand, the second dimension refers to the fulfillment of the quotations. According to study [37], this aspect allows measuring the fulfillment of the delivery of the offer within the deadlines agreed with the client. It also implies the end of a period in which the stipulations of both parties are fulfilled, as is the case of the process of the orders placed. As an indicator, the degree of fulfillment of the quotations delivered is considered. According to study [38] - [36] this degree is defined as the period that elapses from when the client communicates with the company until an adequate response is provided. This concept is related to the customer experience in terms of time, highlighting the importance of the consumer, who establishes a favorable association between convenience, trust and good quality.

IV. METHODOLOGY

This analysis had a quantitative approach, using measurement instruments and statistics to test the hypotheses. A pre-experimental design was used, as only one experimental group was considered for the pre-test and post-test stages.

The target population of this study is all records made from April 2004, the year in which the company began to operate, until June 2022, the month in which the system begins to operate. Since the data collection will be carried out in two stages, pretest and posttest, a convenience sample of 24 records of contributions on average of the working days of the month of May 2022 will be taken for the pretest and 24 records of contributions on average of the working days of the month of June 2022 for the post test.

The months of May and June were selected to take the samples and perform the tests solely for convenience, since at that time the system was already deployed in production and because of the availability of the person in charge of recording the quotes. In this sense, [39] states that "the convenience sample makes it possible to choose those affordable cases that agree to be included." This is based on the timely accessibility and proximity of the individuals to the researcher.

Inclusion and exclusion criteria: For the research, only the quotes received from May 1, 2022, to May 31, 2022, working days for the pre-test, and from June 1, 2022, to June 30, 2022, working days for the post-test, will be included. In the company, working days are considered from Monday to Saturday. In this sense, 24 quote records on average were taken as a sample, since the company only works from Monday to Saturday, with 24 working days per month. In addition, the month of May was chosen for convenience for the pre-test because it was the month before the implementation of the system, and the month of June was chosen for convenience for the post-test because it was the

month in which the system was already in production and the data could be measured with the implemented system.

The observation form will be used as a technique for obtaining data for the study measurements. This will allow us to collect data on the quotes made to verify how long it takes to generate a quote before and after the implementation of the system. In the same way, the percentage of compliance with the quotes delivered will be verified.

In this present investigation, the instrument that is a form of observation of Young Torres, Ariadna Magaly Nereida, in addition to this, a process of validation that measured the validation of the construct and method by half of three experts. The observation sheet will measure two times, before the implementation and after the implementation.

Regarding ethical aspects, the aim is to produce a truthful and sincere study, while being fully careful with the security of the information, since the data was acquired from a critical area of the company, which was kept completely confidential. Likewise, the authorization of the company analyzed is available and, in the opinion of the Ethics and Research Management Committee of the university, this study is subject to a review with all control systems to guarantee the originality, relevance and quality of the research. On the other hand, the personal data used in this study will be subject to compliance with the regulations of Law No. 29733 or the personal data protection law, which establishes the necessary regulations to guarantee the security and privacy of the personal information of every natural person.

When carrying out this study, limitations were observed in terms of access to collect information from the areas involved, due to the limited time available of those in charge. To carry out this activity, it was necessary to attend, observe and personally talk with the workers in the quotation process to obtain greater detail of the requirements and the problem. It was also essential to arrange virtual meetings to learn more details about the workflow and everything necessary to carry out the project. In addition, Law No. 29733 or the Personal Data Protection Law limits the development of the study because it will handle personal data of the company's clients, suppliers and workers.

V. RESULTS

A. Data Modeling

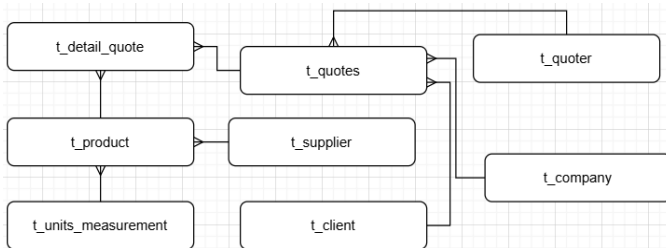


Fig. 1. Database model.

Fig. 1 shows the database model.

B. Login

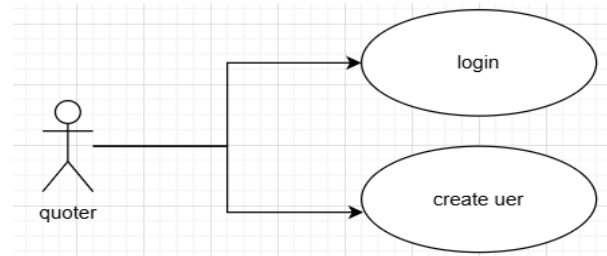


Fig. 2. Use case login.

Fig. 2 shows the use case login.

C. Register User

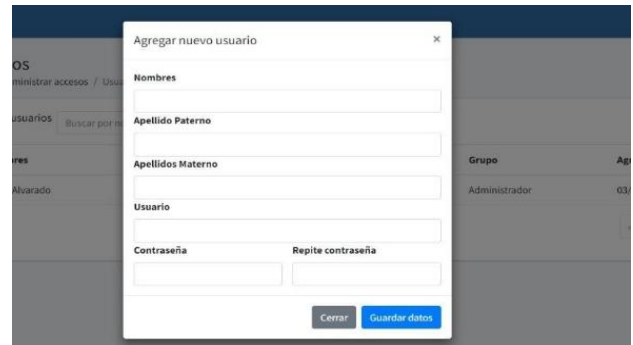


Fig. 3. Implementation register user.

Fig. 3 shows how a user registers in the system.

D. Product Module

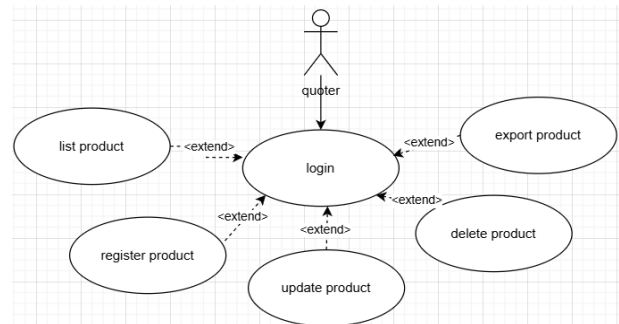


Fig. 4. Use case product.

Fig. 4 shows the use case of the product.

E. Customer Module

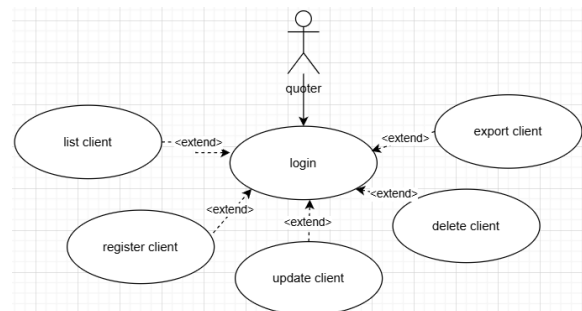


Fig. 5. Use case customer.

Fig. 5 shows the customer's use case.

F. Supplier Module

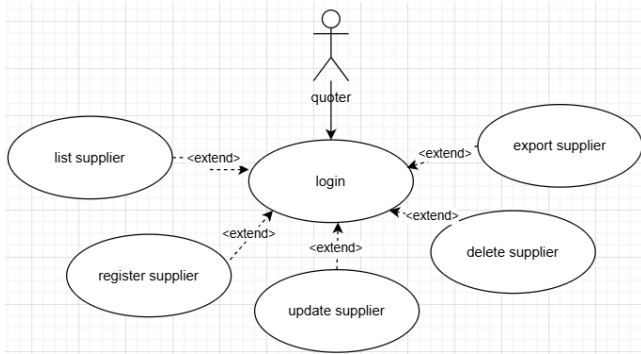


Fig. 6. Use case supplier.

Fig. 6 shows the supplier use case

G. Implementation Supplier, Customer y Product Module

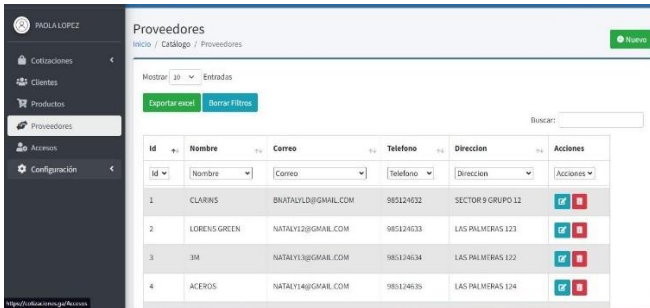


Fig. 7. Implementation list.

Fig. 7 shows the supplier module, in which you can export all the data of the view.

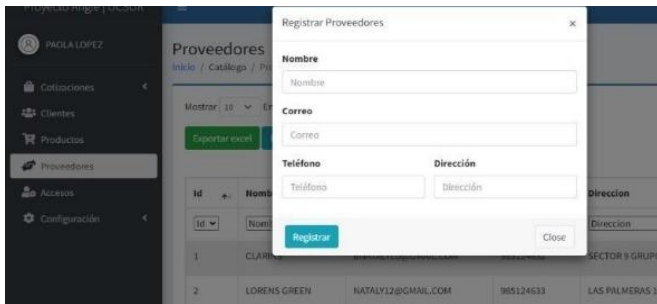


Fig. 8. Implementation register.

Fig. 8 shows the supplier registration module.

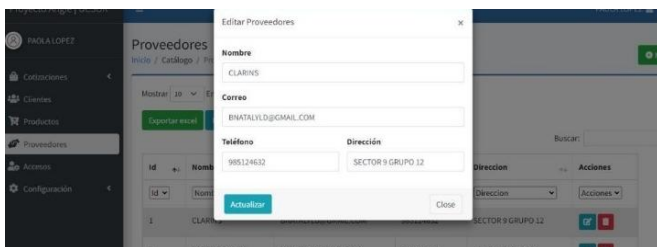


Fig. 9. Implementation update.

Fig. 9 shows the supplier's update module.

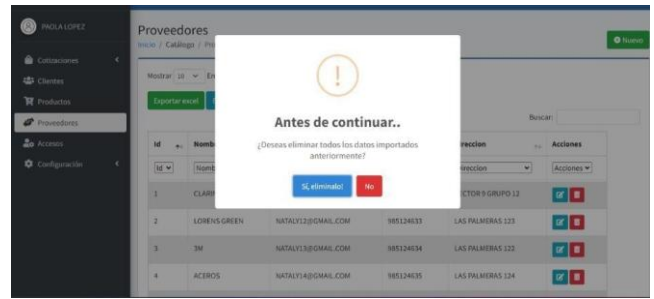


Fig. 10. Implementation delete.

Fig. 10 shows the supplier elimination module.

H. Quotes

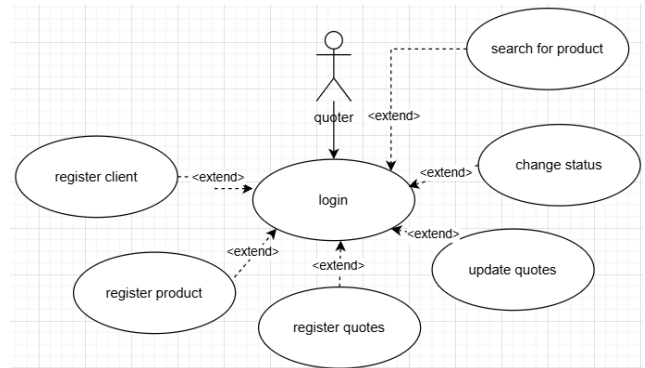


Fig. 11. Use case quotes.

Fig. 11 shows the use case of the quotations module.

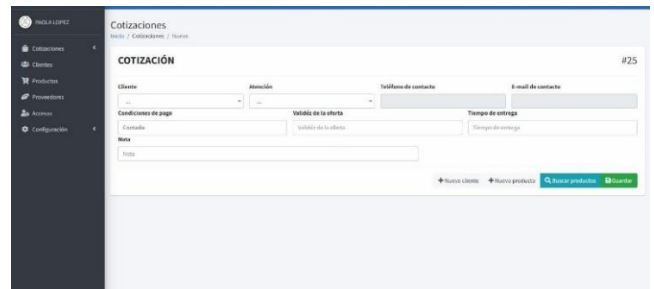


Fig. 12. Implementation new quote.

Fig. 12 shows the creation of a quote.

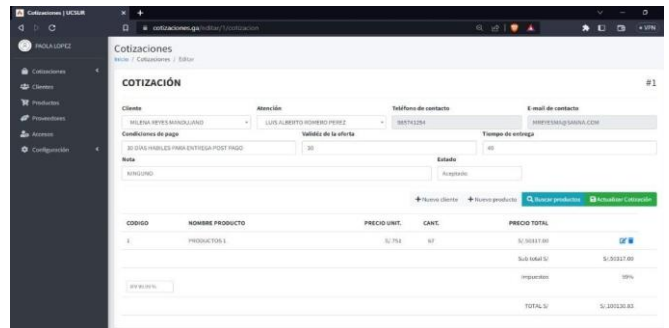


Fig. 13. Implementation update quote.

Fig. 13 shows the update of a quotation.

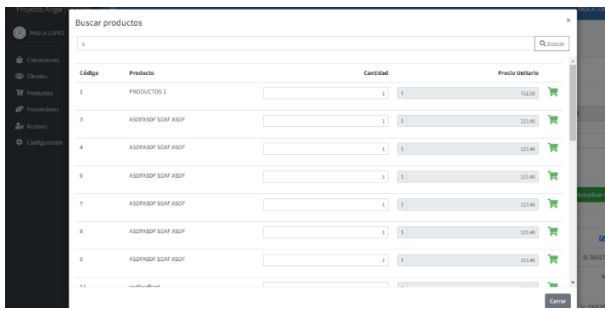


Fig. 14. Implementation search product.

Fig. 14 shows the search for a quote.

I. Generate Quote

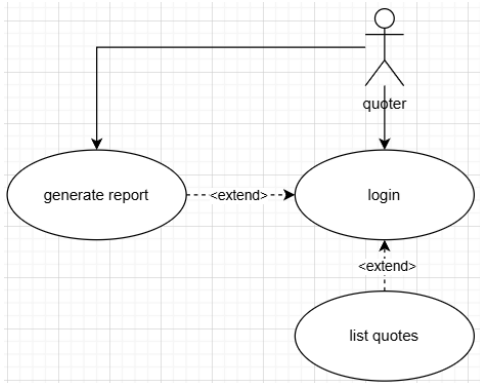


Fig. 15. Use case generate quote.

Fig. 15 shows the use case for the generation of a quotation.

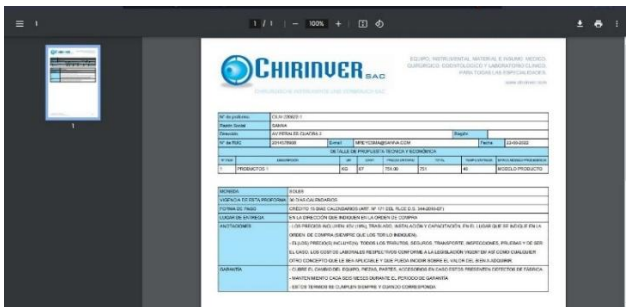


Fig. 16. Implementation generate quote.

Fig. 16 shows the module for generating a quotation.

J. Export Product, Customer, Supplier

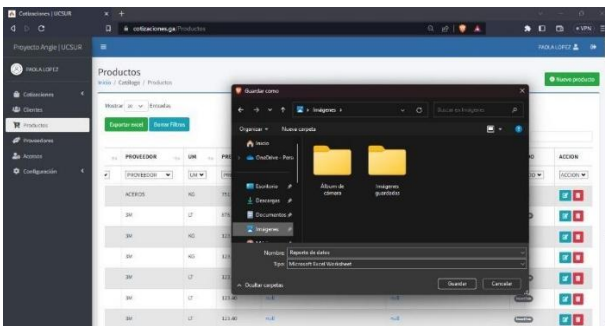


Fig. 17. Implementation export product, customer, supplier.

Fig. 17 shows the export of products, customers and quotations.

TABLE I. QUOTE GENERATION STATISTICS

Type of improvement		Statistics
Without web system (Pre-test)	Average	55,8750 min
	Deviation	38,25920 min
	Maximum	8,00 min
	Minimum	145,00 min
With web system (z<Post-test)	Average	28,0000 min
	Deviation	20,80970 min
	Maximum	4,00 min
	Minimum	72,00 min

Table I shows that the records of the observation sheet belonging to the pretest show a mean and deviation of 55.87 minutes and 38.25 minutes respectively. The range is between 8.00 minutes minimum and 145.00 minutes maximum. In the post-test a mean and deviation of 28.00 minutes and 20.80 minutes respectively can be noted. The range is between (4.00 minutes and 72.00 minutes) on the generation of quotes.

TABLE II. NORMALITY TESTS

	Shapiro-Wilk		
	Statistic	Gl.	Sig.
Quotation generation (Pre-test)	,939	24	,154
Quotation generation (Post-test)	,901	24	,022

In Table II, the analysis of the generation of quotations with and without the system, a normal distribution was observed for the pretest and a non-normal distribution for the posttest, in view of the statistical evidence of the Shapiro-Wilk test, with an estimate equal to $0.154 > 0.05$ and $0.022 < 0.05$, respectively.

TABLE III. DIFFERENCE OF THE PRE AND POST TEST DIMENSIONS

Difference between pre and post test dimensions of quotation generation			
Shapiro-Wilk			
DIFI	Statistics	Gl.	Sig.
	,905	24	,028

In Table III, the pre-test is normal since it has a value of $0.154 > 0.05$ and the post-test is non-normal because it has a value of $0.022 < 0.05$, the combination of both is non-normal since $0.028 < 0.05$ so the Mann-Whitney test is used.

Fig. 18 shows the box diagram with respect to the pre and posttest, in the comparison of the generation of quotations where the differences in time are perceived, that is, the quotation process with the system has less time to generate quotations.

Table IV shows that the records of the observation sheet belonging to the pre-test show a mean and deviation of 49.95 % and 22.57 % respectively. The range goes from 14.00 % minimum to 100.00 % maximum. In the post-test it can be noted a mean and deviation of 89.87 % and 9.63 % respectively. The range goes between 75.00 % minimum and 100.00 % maximum on the generation of quotes.

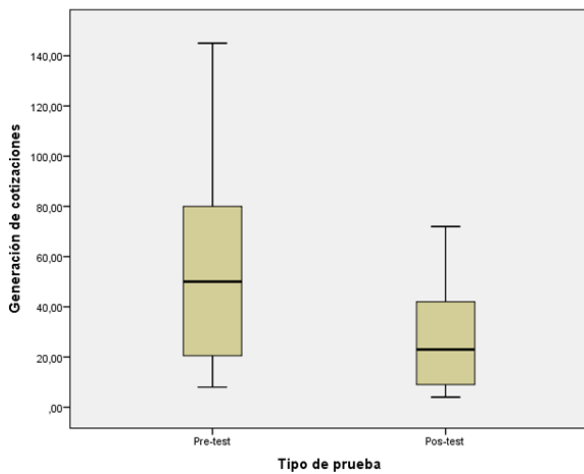


Fig. 18. Quote generation box diagram.

TABLE IV. QUOTE COMPLIANCE LEVEL STATISTICS

Type of improvement	Statistics	
Without web system (Pre-test)	Average	49,9583%
	Deviation	22,57255%
	Maximum	14,00%
	Minimum	100,00%
With web system (Post-test)	Average	89,8750%
	Deviation	9,63378%
	Maximum	75,00%
	Minimum	100,00%

TABLE V. NORMALITY TESTS

	Shapiro-Wilk		
	Statistic	Gl.	Sig.
Quotation compliance level (Pre-test)	,927	24	,085
Quotation compliance level (Post-test)	,833	24	,001

In Table V, the analysis of the generation of quotations with and without the system, a normal distribution was observed for the pretest and a non-normal distribution for the posttest, in view of the statistical evidence of the Shapiro-Wilk test, with pvalue =0.085>0.05 and 0.001<0.05, respectively.

TABLE VI. DIFFERENCE OF THE PRE AND POST TEST DIMENSIONS

Difference between pre and post test dimensions of quotation generation			
Shapiro-Wilk			
DIFI	Statistics	Gl.	Sig.
	,957	24	,381

In Table VI, the pre-test is normal since it has a value of 0.085>0.05 and the post-test is non-normal because it has a value of 0.001<0.05, the combination of both is normal since 0.381>0.05 so the T-test is used.

Fig. 19 shows the box plot for the pre- and post-test with respect to the comparison of the level of compliance with

quotations, where the differences in percentage can be seen, i.e., the process with the system has a higher percentage of compliance with quotations.

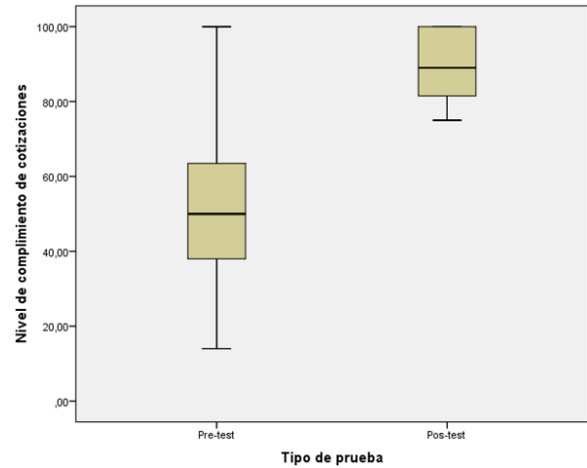


Fig. 19. Compliance level box diagram.

The Shapiro-Wilk normality test was performed, since our sample is smaller than 50 observations for the pretest and posttest. In addition, it is necessary to know whether the samples collected follow a normal or non-normal distribution and thus determine which statistical tool to use to statistically test the hypotheses raised. For example, the sample for the first dimension of quote generation follows a non-normal distribution, so we used the Mann-Whitney test. On the other hand, the second dimension, which is the fulfillment of quotations delivered, follows a normal distribution, so we use parametric tests, such as Student's t-test, which require that the data follows a normal distribution.

K. Hypothesis Test Contrast

1) Hypothesis test for dimension 1: Generation of quotations.

a) Ho: The implementation of a web system does not significantly improve the generation of quotations in the quotation process of the company KSF Representaciones EIRL, 2022.

b) H1: The implementation of a web system significantly improves the generation of quotations in the quotation process of the company KSF Representaciones EIRL, 2022.

Level of Significance $\alpha= 0.05$ has been considered.

Decision rule: If the sig. ≥ 0.05 , the null hypothesis is rejected, otherwise the alternate hypothesis is accepted.

TABLE VII. QUOTE GENERATION (MINUTES)

Dimension 1: Quotation generation (min) Mann-Whitney test	
	Quote generation
U Mann-Whitney	156,000
W de Wilcoxon	456,000
Z	-2,724
Sig. asintót. (bilateral)	,006

From Table VII, the Mann Whitney U. test was relevant with a Sig. < 0.05, so that the null hypothesis is denied, and the alternative hypothesis is approved. It is concluded that the implementation of a web system significantly improves the generation of quotations in the quotation phase of the company KSF Representaciones EIRL, 2022.

2) Hypothesis test for dimension 2: Fulfillment of quotations delivered.

a) Ho: The implementation of a web system does not significantly improve the compliance of quotations delivered in

the quotation process of the company KSF Representaciones EIRL, 2022.

b) H1: The implementation of a web system significantly improves the compliance of quotations delivered in the quotation process of the company KSF Representaciones EIRL, 2022.

Level of Significance $\alpha = 0.05$ has been considered.

Decision rule: If the sig. ≥ 0.05 , the null hypothesis is rejected, otherwise the alternate hypothesis is accepted.

TABLE VIII. COMPLIANCE WITH QUOTATIONS DELIVERED (%)

Dimension 2: Compliance with quotations delivered (%)									
	Levene's test for equality of variances		T-test for equality of means						
	F	Sig.	T	Gl.	Sig.(bilateral)	Mean difference	Standard error of difference	95% confidence interval for the difference	
								lower	upper
Equal variances have been assumed	4,407	,041	-7,968	46	,000	-39,91667	5,00970	-50,00067	-29,83267
Equal variances have not been assumed			-7,968	31,110	,000	-39,91667	5,00970	-50,13255	-29,70078

From Table VIII, the t-test was significant with a Sig. < 0.05, so that the null hypothesis is denied, and the alternative hypothesis is recognized. It is concluded that the implementation of a web system significantly improves the fulfillment of quotations delivered in the quotation process for the business of KSF Representaciones EIRL, 2022.

VI. DISCUSSION

The results achieved in this work confirmed that the use of technology through this web system really helps to generate quotes more quickly, obtain the necessary information, access it quickly and easily, therefore the general hypothesis can also be confirmed and the general objective can be achieved, so it is determined that implementing a web system optimizes the quotation phase in the KSF Representaciones EIRL business, since the time of generation of the quote was optimized to 28 minutes on average and the level of compliance increased to 89.8%.

Regarding the first specific objective, the results of the pre-test showed that generating a quote takes on average 55.8 minutes, while with the implementation of the system this time decreased, so the post-test indicates that it takes on average 28 minutes to generate a quote. The time to generate quotes was reduced, all of which corresponds to the first dimension "Quotation Generation" which resulted in the validation of the hypothesis raised, where a lower level of significance is shown (<0.05). The research coincides with the results of [28], which shows that after implementing the web system, the approved quotes increased to 67.08%. For [33], after the implementation of the web system, the accepted quotes increased by 77.26%, significantly increasing the level of accepted quotes in this process.

Similarly, in the second specific objective, the results of the pre-test showed that the level of compliance with the quotes was 49.9%, while with the implementation of the system the level of compliance with quotes increased to 89.8%. Therefore, the

degree of compliance with the quotations could be improved, all of which corresponds to the second dimension "Compliance with quotations" which resulted in the validation of the hypothesis raised, where a lower level of significance is shown (<0.05). The research coincides with the results of [33], this shows that, after the implementation of the web system, the level of compliance with deliveries rose to 75.44%. According to [28], the adoption of a web-based system managed to increase the percentage of compliance with the delivery of quotations to 71.25%.

VII. CONCLUSIONS AND RECOMMENDATIONS

Through statistical tests conducted on the dimensions, it can be confirmed that the implementation of the web-based system significantly improves the quoting phase for the company's clients. This is due to the improved and reduced quote generation time and the degree of compliance, which allowed us to achieve the objectives of this study.

Using the Mann-Whitney U test, which was significant, quote generation times were optimized for system implementation, with a sig of 0.006 less than 0.05. Furthermore, the implementation resulted in an average time saving of 27.8 minutes per quote.

With the help of the T test demonstration, a significant result is reflected, so that the implementation of the quotation system optimizes the level of compliance of the quotations with a Sig. < 0.05. This is manifested through the improvement in the percentage of the number of quotations delivered to the client with respect to the number of quotations that are requested by the client daily. Furthermore, the implementation of the web system helped the quoters to make a greater number of daily quotes, since, for the pre-test, the degree of compliance of the quotes was 49.9% on average and for the post-test, the degree of compliance of the quotes was 89.8% on average. An improvement in the percentages can be seen by analyzing the before and after of 39.9% on average.

The developed web system achieved a compliance rate of 89.8% for submitted quotes due to the increase in quotes completed on the day.

Since the implementation of the system was successful and the expected results were obtained, it is recommended to maintain the web system and improve it by developing new functionalities to be able to cover other company processes and not only the quotation process.

In addition, it is suggested to provide technological solutions to the different processes that the company has, such as the billing or inventory process, involving the existing web system and thus provide greater functionality and help to employees in the different areas of the business. Likewise, this study can be applied to other companies that need it.

For maintenance, it is recommended to automatically make backups of the web system database from time to time to avoid loss of information, as well as to purge unnecessary information to guarantee the correct functioning of the system.

To improve the quotation system, it is suggested to add a module where you can see the inventory of the products, the stock in real time and generate alerts when the product is running out of stock, etc. Likewise, implement the sales module that allows generating invoices or sales receipts, delivery guides and have all these documents stored. Finally, add a module where you can view dashboards and generate reports with relevant information to help in the company's decision-making.

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