Design of an M-Commerce mobile application to reduce the cessation of operations of textile companies due to the social isolation generated by SARS-CoV-2 in Peru

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Abstract*— This research includes the design of an M-Commerce application to reduce the cessation of operations of textile companies in Lima-Peru; due to the SARS-CoV-2 health emergency declared in the country. Being the objective of this investigation, to reduce the cessation of the textile companies affected in their sales and processes. This technological design allows entrepreneurs to offer their products, control sales, profits and reduce order service times through the mobile application. The research methodology is applied, and a pre-experimental design was considered that measures the registration time of generating orders, the quality of the orders and the follow-up. Two companies from the Gamarra Shopping Center were used as samples, to whom a pre-test and post-test were applied; obtaining as a result, in the indicator, time of registration of orders generated, an average time reduction of eight minutes. Likewise, for the quality indicator of generating orders, an average growth of 19.05% was obtained. Finally, for the order tracking indicator, an increase in the satisfaction of the order process was obtained.

***Keywords*— movil app, m-commerce, textile business**

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I. Introduction

Worldwide, the health emergency of SARS-CoV-2 is causing enormous negative effects on humanity, mainly the loss of human lives and millions of sick people around the world. It is currently considered one of the largest public health crisis and has also become an economic crisis, since economic sectors have been paralyzed. Reference [1] the International Labor Organization (ILO) foresees numerous bankruptcies among SMEs as a consequence of the economic crisis. Reference [2] the Organization for Economic Cooperation and Development (OECD) has estimated that more than 50% of pymes may not survive in the coming months. In [3] this data is confirmed by the consultation carried out by the International Trade Center (ITC), which concludes that 25% of micro-enterprises risk closing their business in the next three months and another 20% within six months.

In the countries of Latin America and the Caribbean there is great concern, due to the economic crisis that occurs in all countries as a result of the health emergency produced by the SARS-CoV-2; which seriously affects the sectors that generate more than a third of formal employment and contribute to the representation of the market value of the final production of goods and services in the country, generated by residents and non-residents, known as Gross Domestic Product (GDP). Reference [3] according to the information indicated by the Economic Commission for Latin America and the Caribbean (CEPAL), indicates that the crisis that affects all companies in the current context, predicts that the impact will be much greater in the case of textile companies, this sector being strongly destabilized. It is estimated that approximately 2.7 million formal companies in the region would have to cancel their activities, of which 2.6 million would be textile companies.

In Peru, textile companies play a fundamental role in the development of the national economy. Reference [4] according to official data, they constitute more than 99% of business units, create around 85% of total jobs and generate approximately 40% of Gross Domestic Product. During the year 2020, in Peru; textile companies are the most affected; the state of emergency and the mandatory isolation caused the demand for their products to decrease markedly. Reference [6] as show in Fig. 1, "The percentage in negative figures, with respect to the decrease in the number of companies according to their category".

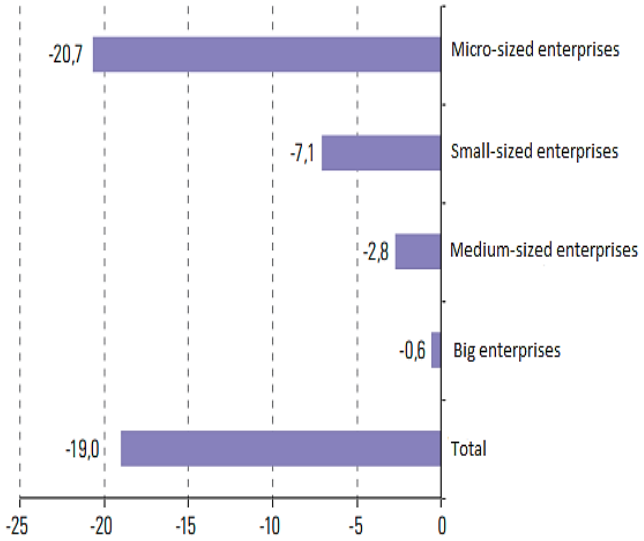

Fig. 1, "The percentages are expressed in negative figures to highlight that it is a decrease in the number of companies in each category"

This situation caused the cancellation of planned and budgeted activities of the textile sector companies. Reaching during the first quarter of 2020, 944 closed companies in the country. Delving into this scenario below, as show in Fig. 2, a list of companies that, according to their economic activity, were closed in Lima-Metropolitan, considering retail trade and wholesale trade as the most affected economic activities. Within these groups are textile establishments.

Fig. 2, "Metropolitan Lima: Monthly average of Companies that have closed, according to Economic Activity, I Quarter 2020"

The Gamarra Commercial Emporium is a place of great commercial movement for high and low turnover companies specifically related to the fashion and textile industry. Reference [7] in 2016, a total of 27,280 companies carried out economic activities in the Gamarra Commercial Emporium. 93.5% of the total number of companies (25,497) are micro-companies. 99.5% of the total companies corresponds to 27,139 textile companies, which due to the pandemic in the country have closed their commercial activities.

[8] In the thesis "Development and implementation of a mobile application to place orders for the Motzuki company", it mentions that the company does not have a mobile application or system that allows it to control its products. This has harmed the administrative part of the company, since throughout the time it has not been possible to maintain its order (sales) record in an adequate way. That is, they do not keep a control, the objective of the research work is to turn the mobile application into a digital tool so that it can guarantee the purchase of the product, generating that the profit increases and they can continue to remain in the market. It can be concluded that in order to keep track of orders it is important that every company has an application that can be used by both suppliers and demanders.

Due to technological advancement and the current context that is presented by the pandemic called SARS-CoV-2 around the world, all business businesses are migrating to digital platforms, represented as E-Commerce and in mobile applications such as M-Commerce. Considering this new reality, strategies must be designed to reduce the concentration of people in commercial premises, and in turn allow companies to stay in the market.

[9] M-commerce is all about wireless electronic commerce, that is, where mobile devices are used to conduct business over the internet. As such m-commerce is a subset of e-commerce. The great development of the capabilities of mobile communication networks and their rapid growth, present a new commercial profile that every day acquires a greater apogee and will become the new form of commerce of a mobile society such as the one in which we find ourselves. The use of these mobile devices allows the user to access m-commerce applications anywhere and at any time, providing comprehensive accessibility to the user, this is presented as one of the greatest advantages of m-commerce.

At present, it is not enough for a company to have an online store, but it is necessary to innovate a catalog showing the different products, so that a consumer, based on his search, feels motivated to buy it from his computer at home. In [10] the increase in the use of smartphones, tablets or other types of connection devices together with the use of social networks (Facebook, Twitter, Instagram, among others) is giving a complete turn in the habits of relationships and, of course, to the buying habit. This necessarily implies that providers adapt their way of interacting with their customers through electronic commerce. Numerous applications are already being implemented in many countries and surely with the expansion of the capabilities of current mobile communications networks and security mechanisms, mobile commerce will have a greater acceptance by the users of these networks and further development in a near future. According to a study developed by IAB Spain (Annual Mobile Marketing Study, 2017) In [11] there is a significant increase in mobile commerce. The growth is due, among other factors, to the convenience and ease of mobile purchases.

[12] These technologies play a vital role in the exchange, promotion and sales of products and services today and their use is increasing. The use of electronic commerce generates millionaire profits, during 2015 the global electronic commerce market exceeded 25 trillion dollars and contributed in 2016 to the increase of 2.92% of GDP worldwide according to data from the ECommerceWiki site. Also, 22% of the world population used this technology during 2017 according to information from the We Are Social site. This new form of business undoubtedly represents a promoter for the economic progress of the business sector.

Electronic businesses are currently one of the largest sources of economic development for companies and businesses. Over time it has gained more popularity in the global business sector, becoming today the object of study of the international scientific community. In this sense, it is proposed to design an M-Commerce mobile application to reduce the cessation of operations of textile companies due to the social isolation generated by SARS-CoV-2 in Peru, since companies must take on the new challenges that have been presented as: adapt to the new situation, enhance the digitization of your businesses and take advantage of new market trends.

Therefore, the design and implementation of the application will be a technological tool that will allow entrepreneurs to adapt to the new situation, have control of their sales and profits, manage their products and that the sale is made through a mobile application. Likewise, end customers can make purchases through their mobile from wherever they are. The purpose of this research is to improve and present new business scopes. Likewise, sales would be made in person and online.

The research work presents the following structure: In section II, the methodology will present the stages and academic strategies applied by levels. In section III, the results of the application of the strategies will be shown. Finally, in section IV, the conclusions of the research work will be presented.

II. METHODOLOGY

The research work has been developed as an Applied research, quantitative cut with a pre-experimental design, for which the following steps were carried out:

- Define the population and sample.
- Apply the technique and instrument for data collection and analysis.
- Instrument validation and reliability.
- Design and implementation of the mobile application.

A. *Define the population and sample*

[13] The population "is the grouping of all the cases that coincide with certain definitions", these must be clearly located by their characteristics of content, place and time. The sample is a subgroup of the population from which the data are collected and which must be representative of it.

The selected population includes companies that belong to the textile sector, because this item has achieved a strong position due to the quality, prestige of Peruvian yarns and the high level of unification of the sector over time ". In [7] it will be made up of those companies that meet the following requirements. First, the study condition covers micro and small companies. As a second condition, the companies belong to the textile sector of the wholesale and retail trade. Since during the pandemic these are one of the sectors most affected, and finally, the textile sector companies are located in the district of La Victoria.

The Gamarra Commercial Emporium is the largest commercial and industrial center of the textile sector is located in Peru, it has 31 737 establishments. 99.5% of the total number of companies corresponds to 27,139 textile companies. Being 22,529 that are engaged in wholesale and retail trade, Therefore, the population is 22,529 companies. Reference [14] probabilistic samples are essential in research designs. These variables are measured and analyzed with statistical tests on a sample, from which it is assumed that it is probabilistic, and that all elements of the population have the same probability of being chosen.

To calculate the sample, equation 1 will be used, the finite population formula, which is known the size of the population. As show in Fig. 3, "STATS program for the sample calculation process". It is observed that the calculation process for the sample was used by the STATS program. The sample being 2 textile companies.

$$n = \frac{N * z^2(p * q)}{d^2 * (N-1) + z^2 * p * q} \qquad (1)$$

Where:

n = Sample
z = Confidence level
p = Probability of success or expected proportion
q = Probability of failure
d = Accuracy
N = Population size

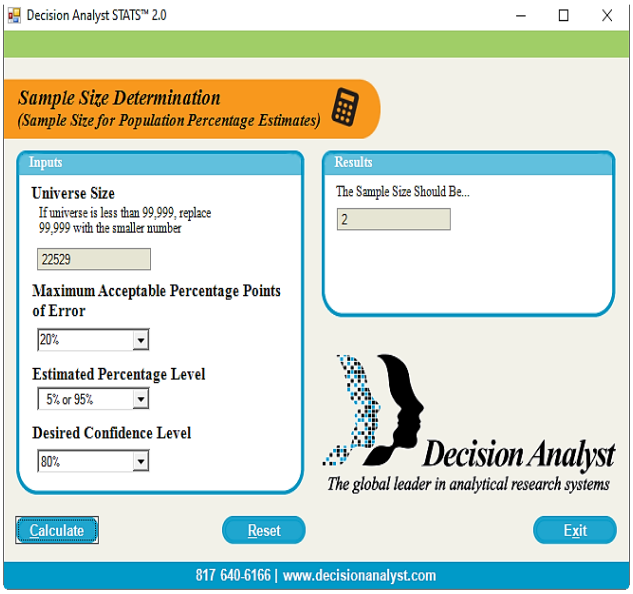

Fig. 3, "STATS program for the sample calculation process"

B. *Apply the technique and instrument for data collection and analysis*

[14] The survey is considered in the first instance as a technique that uses a set of standardized research procedures through which a series of data is collected and analyzed from a sample of representative cases from a broader population or universe, from which aims to explore, describe, predict and / or explain a series of characteristics. In [15] clocking is a technique that allows the registration of information selected for the investigation process. Likewise, its application requires the use of files to help us collect and organize the information extracted from various sources of interest, according to the nature of the investigation.

[15] The questionnaire is a research instrument. This instrument is used, preferably, in the development of an investigation. The Record Sheet is a format where data can be collected in a systematic way and with an adequate structure so that the facts that were observed can be manipulated.

For the research, the survey and registration technique and questionnaire instruments and registration form were used. In this research, the registration form will be used as an instrument for data collection, in order to provide an adequate and normal execution, the survey was carried out by the owners of the companies in order to evaluate how the order management process. In this way, the indicators will be evaluated both in the Pre-Test and in the Post-Test. The following Table I shows each of the data collection instruments.

TABLE I
DATA COLLECTION

Variable	Indicator	Techniques	Instruments	Source	Informant
	Registration time of generated orders	Technical sheet	Registration form	Daily order log schedule	Business owner

Dependent variable order management	Quality of orders generated	Technical sheet	Registration form	Daily order log schedule	Business owner
	Track generated orders	Survey	Questionnaire	Business owner	Business owner

C. Instrument validation and reliability

The quantitative data analysis method is being used, because it is pre-experimental and the variables can be expressed in statistical data. In [10] the reliability of a measuring instrument refers to the degree to which its repeated application to the same individual or object produces the same results, the reliability of a measuring instrument can be determined by various techniques.

[16] The Normality Test the values of the dependent variable must follow a normal distribution. To verify this, a visual exploration of the data can be carried out or preferably other measures are used such as normality and hypothesis contrast graphs that allow deciding, in a more rigorous way, whether or not the sample comes from a normal distribution. The most used tests are: Kolmogórov-Smirnov that is applied when the sample is greater than 50 and Shapiro-Wilks is used when the sample is less than 50.

The Kolmogórov-Smirnov test indicates that the test is applied only to continuous variables and tries to measure the fit between the empirical distribution function of a sample and the theoretical distribution function. It is, therefore, a distribution adjustment test of a given sample to a given continuous distribution. The Shapiro-Wilks Test, the contrast measures the fit of the sample in a line, when drawing it on a normal probabilistic paper. The hypothesis is rejected when the adjustment is low, which corresponds to small values of the test statistic.

Therefore, the test was carried out to know the normality of the indicators: registration time of generated orders and quality of orders generated through the Shapiro-Wilks test, due to the information provided by the companies, the sample was made up of the 21 registration cards for each indicator in the time of a month. For the third indicator follow-up of the order, surveys was conducted by the owners of the companies, each piece of information was calculated with the response provided by the owners. Likert scale (range: [1-5]) was set as a reference for each question that was applied through surveys.

Definition of indicators:

Indicator 1: Registration time of generated orders.
Hypothesis 1: The registration of orders in the implementation of the m-commerce mobile application influences the improvement of the order management of companies in the textile sector.

- Null hypothesis H_0: The time of registration of orders in the implementation of the mobile application does not influence the improvement of order management.
- Alternative hypothesis H_1: The order registration time in the implementation of the mobile application influences the improvement of order management.

Indicator 2: Quality of orders generated.
Hypothesis 2: The quality of the order generated in the implementation of the m-commerce mobile application influences the improvement of customer satisfaction in the order management of companies in the textile sector.

- Null hypothesis (H_0): The quality of the order generated in the implementation of the mobile application does not influence the improvement of customer satisfaction in order management.
- Alternative hypothesis (H_1): The quality of the order generated in the implementation of the mobile application influences the improvement in the satisfaction of order management.

Indicator 3: Track generated orders
Hypothesis 3: The follow-up on the order in the implementation of the mobile application m-commerce influences the improvement of the order management of companies in the textile sector.

- Null hypothesis (H_0): The monitoring of the order in the implementation of the mobile application does not influence the improvement of customer satisfaction in order management.
- Alternative hypothesis (H_1): The follow-up on the order in the implementation of the mobile application influences the improvement of customer satisfaction in order management.

D. Design and Implementation of the mobile application

Mockplus was used to design the prototypes, this prototyping tool helps to design faster and more intelligently. In addition, it is especially focused on making mockups and wireframes for apps with templates for Android, iPad and iPhone. As shown in Fig. 4, “Interface for the user to enter the application with their credentials” and Fig. 5, “Interface where the user can see the products that the company sells”, you can see the implementation of the prototypes, through the Java Android language and with integration to the Java REST service using the Spring boot framework.

Fig. 4, “Interface for the user to enter the application with their credentials”

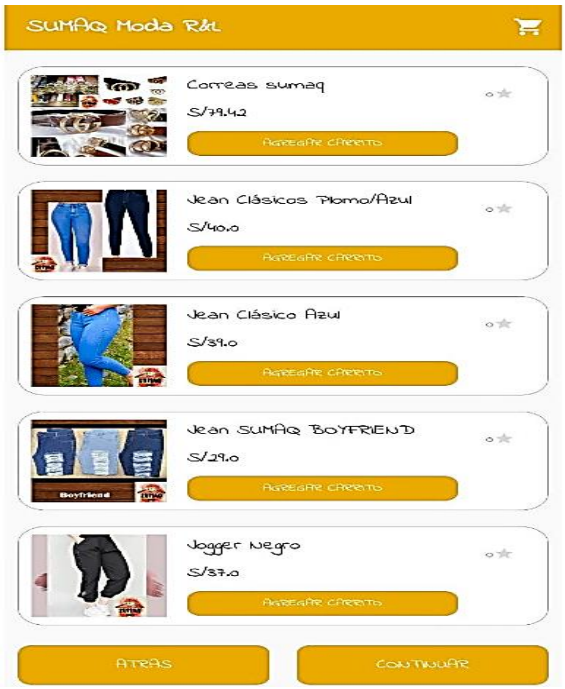

Fig. 5, "Interface where the user can see the products that the company sells"

For the design of the database architecture, MySQL 5.6 was used; as shown in Fig. 6, the structure of the physical data model is shown.

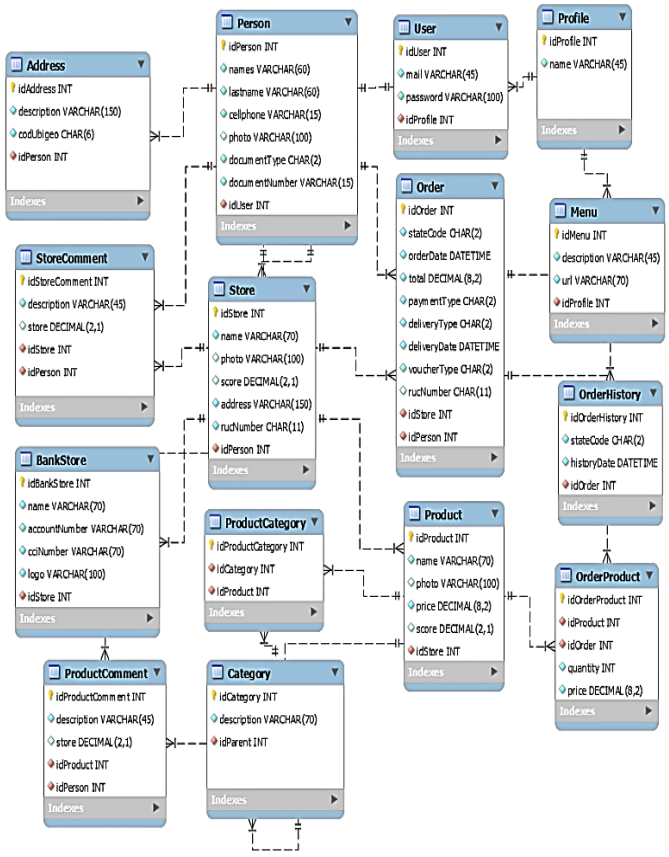

Fig.6, "Design of the physical model of the database"

Likewise, the deployment diagram was designed, as shown in Fig. 7, which specifies the essential elements for the operation of the application in the different architecture layers. The elements are as follows:

- API-Gateway: Service that provides a REST service, which serves as an entrance to internal services.
- Load Balancer: Service that automatically distributes incoming application traffic through multiple destinations.
- EC2 Instance: Service that provides computing environments in the cloud for the development, testing and management of applications.
- RDS MySQL: Web service that facilitates the configuration, operation and scaling of a relational database.

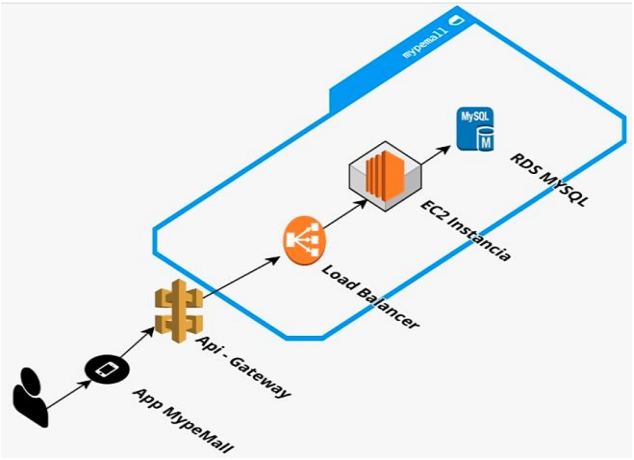

Fig.7, "Deployment diagram"

III. Results

After applying the methodology described in the previous section, the mobile application was integrated in the companies selected for the research, it was decided to apply the post-test for each of the indicators. As the sample obtained according to the statistician was from 2 companies, the results of each one will be detailed; being for the first company, the following results:

Indicator 1: Registration time of generated orders.

TABLE II
PRE-TEST AND POST-TEST VALUES OF THE TIME OF GENERATED ORDERS

Item	Average time (min) pre-test	Average time (max) post-test
1	8.29	2.41
2	10.67	2.66
3	9.50	2.61
4	9.88	2.40
5	7.43	2.58
6	8.75	2.36
7	9.63	2.28
8	10.78	2.23
9	11.86	2.36
10	12.44	1.66
11	8.00	1.75
12	9.14	2.46
13	8.44	2.29
14	7.75	2.31

15	9.88	2.31
16	8.75	2.07
17	9.57	3.01
18	9.88	2.23
19	9.70	2.73
20	11.90	2.35
21	10.89	2.03

Table II shows two columns each with the values of the log times generated before the implementation of the application (pre-test) and after the implementation of the application (post-test).

TABLE III
PRE-TEST AND POST-TEST VALUES OF THE TIME OF GENERATED ORDERS

	N	Minimum	Maximum	Mean	Std. Deviation
Registration_time_Orders generated_by_the_CompanyA_pre_test	21	7.43	12.44	9.6729	1.3823
Registration_time_Orders generated_by_the_CompanyA_post_test	21	1.66	3.01	2.3376	.30571
N valid (according to list)	21				

TABLE IV
T-STUDENT TEST FOR THE AVERAGE RECORDING TIME INDICATOR OF ORDERS GENERATED BEFORE AND AFTER THE MOBILE APPLICATION IS IMPLEMENTED

		t	gl	Sig. (bilateral)
Par 1	Registration_time_Orders generated_by_the_CompanyA_pre_test Registration_time_Orders generated_by_the_CompanyA_post_test	22.913	20	.000

There is a significant difference in the means of the average registration time of the orders generated before and after the implementation of the mobile application. Therefore, it is concluded that the implementation of a mobile application does have significant effects on the average registration time of the generated orders. In fact, in Table III, the average registration time of the generated orders decreased from 9.7 minutes to 2.3 minutes. In table IV, it is observed that the P-Value = 0.000 is less than the significance 0.05. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted with 95% confidence.

Indicator 2: Quality of orders generated

TABLE V
DESCRIPTIVE STATISTICS OF THE PRE-TEST AND POST-TEST OF THE QUALITY INDICATOR OF GENERATED ORDERS

	N	Minimum	Maximum	Mean	Std. Deviation
Indicator Quality_of_orders_generated_companyA_pre_test	21	50.00	77.78	67.16	7.37
Indicator Quality_of_orders_generated_companyA_post_test	21	75.00	100.00	86.21	6.35
N valid (according to list)	21				

For the indicator quality of orders generated, in the pre-test a value of 67.16% was obtained, while in the post-test it was 86.21% (see Table V); this indicates a big difference to us before and after the implementation of the mobile application. Likewise, the minimum order quality generated before implementation was 50.00%, and after implementation it was 75.00%. The maximum generated order quality before the implementation was 77.78% and 99.00% after the implementation of the mobile application.

TABLE VI
T-STUDENT TEST FOR THE QUALITY INDICATOR ORDERS GENERATED BEFORE AND AFTER IMPLEMENTING THE MOBILE APP

		t	gl	Sig. (bilateral)
Par 1	Quality_of_orders_generated_companyA_pre_test Quality_of_orders_generated_companyA_post_test	-10.068	20	.000

There is a significant difference in the means of the quality indicator of the orders generated before and after the implementation of the mobile application. Therefore, it is concluded that the implementation of a mobile application does have significant effects on the quality of the orders generated. In fact, in the pre-test a value of 67.16% was obtained, while in the post-test it was 86.21%, the quality of the generated orders increased by 19.05%. It is observed that the P-Value = 0.000 is less than the significance 0.05 (see Table VI). So, the null hypothesis is rejected and the alternative hypothesis is accepted with 95% confidence. Therefore, the implementation of the mobile application increases the quality of the generated orders.

Indicator 3: Track generated orders

TABLE VII
PRE-TEST AND POST-TEST SCORE OF THE INDICATOR TRACK GENERATED ORDERS

Variable	Question	Pre-test Score (max. 5)	Post-test Score (max. 5)
Q1	Does the establishment notify in approximately how long the product arrives at an address?	2	5
Q2	Is the order that is generated, sent in a shorter time than that established for delivery?	2	4

Q3	When a purchase is made, does the establishment have a system that notifies the shipment of the product?	1	5
Q4	When a delivery is made, does the establishment contact the customer to confirm delivery of the order?	2	4

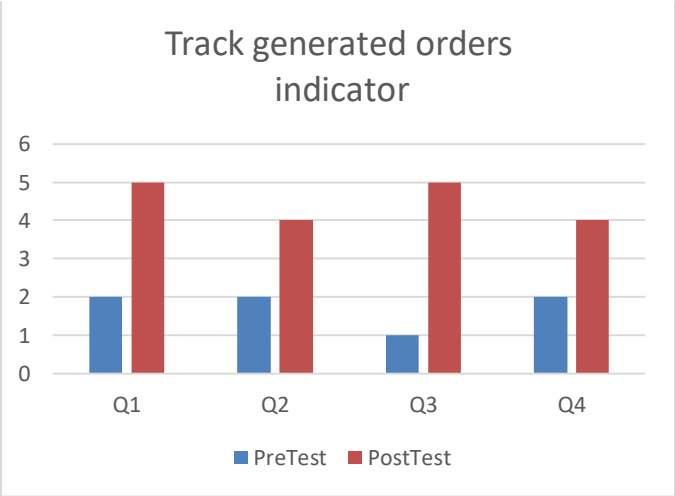

Fig.8, "Descriptive statistics of the pre-test and post-test of the indicator track generated orders"

In Fig. 8, shows two columns each with the score corresponding to each question of the order tracking indicator generated before the implementation of the application (pre-test) and after implementing the application (post-test). In Table VIII, shows the summary of each indicator for the first company.

TABLE VIII
DESCRIPTIVE STATISTICS OF THE PRE-TEST AND POST-TEST INDICATORS BEFORE AND AFTER THE IMPLEMENTATION OF THE APPLICATION

Dimensions	Indicators	Without the application implementation	With the implementation of the application
Order control	Registration time of generated orders	9.7 minutes	2.3 minutes
Order entry	Quality of orders generated	67.16%	86.21%
Order tracking	Track generated orders	7 points	18 points

For the second company, the following results were obtained:

Indicator 1: Registration time of generated orders.

TABLE IX
PRE-TEST AND POST-TEST VALUES OF THE TIME OF GENERATED ORDERS

Item	Average time (min) pre-test	Average time (max) post-test
1	14.40	2.11
2	10.67	2.43
3	9.43	2.17
4	13.22	2.53
5	11.18	2.35
6	8.75	3.45
7	9.63	2.78
8	13.57	2.64
9	11.50	2.64
10	14.38	2.74
11	8.33	2.76
12	8.09	2.27
13	9.80	2.76
14	11.67	2.70
15	10.50	2.56
16	13.83	1.82
17	11.38	2.45
18	12.67	2.60
19	8.50	2.92
20	7.83	3.06
21	9.71	3.52

In Table IX, shows two columns each with the values of the log times generated before the implementation of the application (pre-test) and after the implementation of the application (post-test).

TABLE X
PRE-TEST AND POST-TEST VALUES OF THE TIME OF GENERATED ORDERS

	N	Minimum	Maximum	Mean	Std. Deviation
Registration_time_Orders generated_by_the_CompanyB_pre_test	21	7.83	14.44	10.9067	2.13039
Registration_time_Orders generated_by_the_CompanyB_post_test	21	1.82	3.01	2.6314	.40257
N valid (according to list)	21				

In Table X, shows the mean for the pre-test is 10.9 minutes and the mean for the post-test is 2.6 minutes

TABLE XI
TEST T-STUDENT FOR INDICATOR 1, BEFORE AND AFTER THE MOBILE APP IS IMPLEMENTED.

	t	gl	Sig. (bilateral)

Par 1	Registration_time_Orders generated_by_the_CompanyB_pre_test Registration_time_Orders generated_by_the_CompanyB_post_test	16.181	20	.000

There is a significant difference in the means of the average registration time of orders generated before and after the implementation of the mobile application. Therefore, it is concluded that the implementation of a mobile application does have significant effects on the average registration time of generated orders. In fact, the average registration time of generated orders decreased from 10.9 to 2.6. In table XI, it is observed that the P-Value = 0.000 is less than the significance 0.05. So, the null hypothesis is rejected and the alternative hypothesis is accepted with 95% confidence. Therefore, the implementation of the mobile application decreases the registration time of generated orders.

Indicator 2: Quality of orders generated

TABLE XII
DESCRIPTIVE STATISTICS OF THE PRE-TEST AND POST-TEST OF THE QUALITY INDICATOR OF GENERATED ORDERS

	N	Minimum	Maximum	Mean	Std. Deviation
Indicator Quality_of_orders_generated_companyB_pre_test	21	50.00	81.82	67.75	9.04
Indicator Quality_of_orders_generated_companyB_post_test	21	77.78	100.00	88.89	6.03
N valid (according to list)	21				

In table XII, for the quality indicator generated orders, a value of 67.75% was obtained in the pre-test, while in the post-test it was 88.89%, as shown in table 9; this indicates a big difference to us before and after the implementation of the mobile application.

In addition, the minimum order quality generated before implementation was 50.00%, and after implementation it was 77.78%. The maximum generated order quality before the implementation was 81.82% and 100.00% after the implementation of the mobile application.

TABLE XIII
T-STUDENT TEST FOR THE QUALITY INDICATOR ORDERS GENERATED BEFORE AND AFTER IMPLEMENTING THE MOBILE APP

		t	gl	Sig. (bilateral)
Par 1	Quality_of_orders_generated_companyB_pre_test Quality_of_orders_generated_companyB_post_test	-7,454	20	.000

There is a significant difference in the means of the quality indicator of orders generated before and after the implementation of the mobile application. Therefore, it is concluded that the implementation of a mobile application does have significant effects on the quality of orders generated. In fact, in the pre-test a value of 67.75% was obtained, while in the post-test it was 88.89%, the quality of generated orders increased by 21.14%. In table XIII, it is observed that the P-Value = 0.000 is less than the significance 0.05. So, the null hypothesis is rejected and the alternative hypothesis is accepted with 95% confidence. Therefore, the implementation of the mobile application increases the quality of generated orders.

Indicator 3: Track the generated order

TABLE XIV
PRE-TEST AND POST-TEST SCORE OF THE INDICATOR TRACK GENERATED ORDERS

Variable	Question	Pre-test Score (max. 5)	Post-test Score (max. 5)
Q1	Does the establishment notify in approximately how long the product arrives at an address?	2	5
Q2	Is the order that is generated, sent in a shorter time than that established for delivery?	1	3
Q3	When a purchase is made, does the establishment have a system that notifies the shipment of the product?	2	5
Q4	When a delivery is made, does the establishment contact the customer to confirm delivery of the order?	2	4

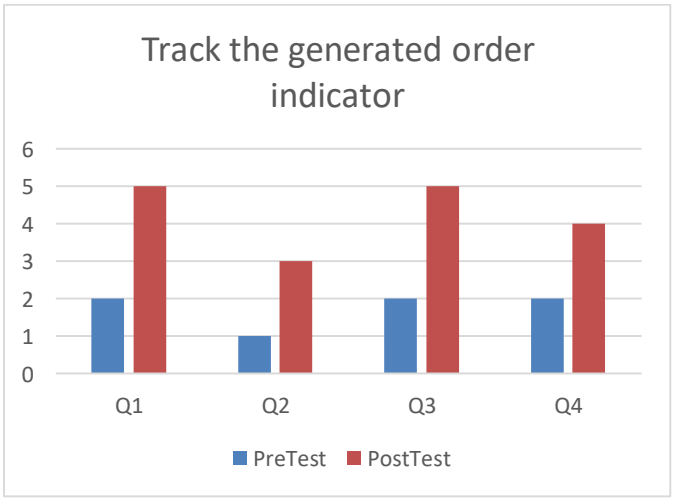

Fig.9, "Descriptive statistics of the pre-test and post-test of the indicator track generated orders"

In Fig. 9, shows two columns each with the score corresponding to each question of the order tracking indicator generated before the implementation of the application (pre-test) and after implementing the application (post-test). In Table XV, shows the summary of each indicator of the second company.

TABLE XV
DESCRIPTIVE STATISTICS OF THE PRE-TEST AND POST-TEST INDICATORS BEFORE AND AFTER THE IMPLEMENTATION OF THE APPLICATION

Dimensions	Indicators	Without the application implementation	With the implementation of the application
Order control	Registration time of generated orders	10.9 minutes	2.6 minutes
Order entry	Quality of orders generated	67.75%	88.89%
Order tracking	Track generated orders	7 points	17 points

Therefore, the implementation of a mobile application based on m-commerce significantly influences the improvement of the order management of companies in the textile sector. Since it allowed the reduction of the order registration time from 10 minutes to 2 minutes. Also, increasing the quality of orders generated by 88.89%. In addition, increased control of the follow-up of orders generated from their generation to the delivery of the order, which made it possible to achieve the objectives set out in this research.

VI. CONCLUSION

Based on the results obtained, we can conclude that the registration time of the average generated orders of the first and second companies decreased from approximately 10 minutes to 2 minutes, which is equivalent to an average decrease of 8 minutes. In other words, the order registration time was reduced by 80%.

On the other hand, it was obtained as a result that, with the implementation of the mobile application, the quality of orders generated for both companies increased from 67.16% to 86.21%, this is equivalent to an average growth of 19.05%. In the same way, for order tracking of 7 points, it increased by 18 points, this is because with the implementation of the mobile application the different status changes of the order tracking are carried out in a controlled manner. And consequently customers receive their products within the established date. In this way, sales are made by delivery, generating an additional service companies.

Finally, in an environment where there is high business competition and where consumers have a wide range of products at their disposal, information systems and mobile applications become an essential tool for optimizing companies' order management processes. And in this way to achieve the satisfaction and loyalty of its customers. Likewise, the implementation of these tools allows companies to adapt to the new situation, enhance digitization and take full advantage of new market trends. Being a competitive advantage since, due to the SARS-CoV-2 pandemic, companies have to adapt to the new commercial profile, continue to grow and strengthen as companies.

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