

E-commerce for sale of ornamental flowers**Comercio electrónico para la venta de flores ornamentales**

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Abstract

The objective was to develop an e-commerce system for a flower shop located in Ixmiquilpan, Hidalgo, Mexico; which allows the diffusion of cut flowers in arrangements and their online sale, through different payment methods. An agile methodology for its development called Scrum was used and the software tools used were MySQL, XAMPP, Laravel, Visual Code Studio and Paypal SDK. As a contribution, this tool allows the florist to have an additional option for their business that allows them to sell and deliver their floral arrangements, despite the occurrence of an event that forces them to suspend their business face to face, as in this case was the worldwide impact of the COVID-19 pandemic and that on the recommendation of the health and government authorities, non-essential activities, such as the sale of ornamental flowers, were suspended.

Resumen

El objetivo planteado fue desarrollar un sistema de comercio electrónico para una florería ubicada en Ixmiquilpan, Hidalgo, México; el cual, permita la difusión de flores de corte en arreglos y la venta en línea de estos, a través de diferentes métodos de pago. Se empleó una metodología ágil para su desarrollo denominada Scrum y las herramientas de software utilizadas fueron MySQL, XAMPP, Laravel, Visual Code Studio y SDK de Paypal. Como contribución, se tiene que, esta herramienta le permite a la florería, contar con una opción adicional para su negocio que le permite vender y entregar sus arreglos florales, a pesar de que ocurra un evento que le obligue a suspender su negocio de manera presencial, como en este caso lo fue la afectación a nivel mundial de la pandemia por COVID-19 y que por recomendación de las autoridades sanitarias y de gobierno, las actividades no esenciales, como la venta de flores ornamentales, fueron suspendidas.

E-commerce, Ornamental flowers, Pandemic**Comercio electrónico, Flores ornamentales, Pandemia**

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Introduction

The COVID-19 pandemic, in addition to being a health problem, caused economic, employment and social problems. In terms of health, at the national level, as of July 2022, there were 6,448,477 cases and 326,504 deaths (Statista, 2022).

According to INEGI, between March and April 2020, 12.5 million jobs were lost in Mexico. However, informal workers absorbed the greatest impact. Of the initial job losses, 10.4 million were in the informal sector and 2.1 million in the formal sector (Government of Mexico, Hacienda and Consar, 2021, p.1). In economic terms, by 2021, 1.6 million businesses had disappeared nationwide, including microenterprises (INEGI, 2021, p.2).

Faced with this problem, a web system has been proposed that allows the sale of flowers online through e-commerce for the Rosita flower shop located in the municipality of Ixmiquilpan, Hidalgo, Mexico.

Specifically, the following objectives have been set:

- To carry out an analysis to determine the requirements and needs of customers when making a purchase of flowers through an Internet web system.
- To implement a catalogue of floral arrangements that will be divided into categories of events so that the customer has a wide variety of options.
- Develop the code of the web system using the results of the analysis to meet customer requirements.
- Perform testing to verify the functioning of the web system and avoid errors.

This e-commerce application allows the Rosita flower shop to disseminate its products and is an additional option that allows it to sell despite the occurrence of an event, as in this case, the pandemic, and, therefore, will enable it to stay in the market or be a more competitive company.

The following sections will address some data on the impact of the COVID-19 pandemic on businesses established in Mexico, the theoretical framework, the methodology used for the development of the project, the results obtained and conclusions.

Data on the impact of COVID-19 on established businesses in Mexico

In 2019, there were 4.9 million businesses in Mexico, of which; according to size, 94.9% belonged to the micro classification, 4.9% were small and medium-sized, and only 0.2% were considered large (INEGI, 2021, p.2). Following the COVID-19 pandemic, in 2020, health and government authorities took measures to prevent the spread of the virus, including constant hand washing, use of masks, use of antibacterial gel, confinement and closure of businesses whose activities were not considered essential. These measures had consequences, and by the year 2021, 1.6 million businesses (INEGI, 2021, p.2), mostly small ones, had closed nationwide, but 1.2 million new businesses had opened (INEGI, 2021, p.2).

Another consequence of the COVID-19 pandemic was the increase of e-commerce in micro, small, medium and large businesses. In 2020, according to the Mexican Association of Online Sales it increased by 81% with a value of 316 billion pesos, however, in 2021, it slowed down (2021, p.11).

For flower and plant producers, 2020 was a difficult year as sales of cut flowers fell by 70% and ornamental plants by 30% (Forbes, 2021).

Locally, businesses located in Ixmiquilpan in the state of Hidalgo were affected by the aforementioned pandemic, with some micro-enterprises, in particular, disappearing.

In general, the businesses that remained, survived or emerged had e-commerce platforms, while others had to innovate and adapt to new ways of marketing their products in the face of the pandemic that forced them to avoid face-to-face transactions.

Theoretical framework

According to Gayosso, the management of ornamental plants arises from the origins of man and is part of his culture (2015, p. 11), since ancient times they have been used to decorate the environment for religious, festive or historical reasons (Carrodegua-González, Zúñiga-Orozco and Ortiz-Cruz, 2021, p.41).

Ornamental plants are cultivated and traded for decorative and cultural purposes, they can be classified by their use (indoor, outdoor), aesthetic characteristics, such as flowers, leaves, the peculiarity of their foliage, fruits or stems, by their colour, shape, texture or a combination between them (Pérez-Nicolás, et al., 2021, p.2).

Cut flowers are flowers and buds with stems and leaves that are removed from the plant for ornamental purposes. The cultivation of cut flowers, called floriculture, is a specialised value-added crop (González, 2016, p.120), linked to the global economy and represents an economic income opportunity for families (Vargas et al., 2021, p. 9).

On the other hand, according to Jiménez, Martínez and Silva, e-commerce "is the buying and selling of products or services through the Internet" (2021, p.5); or simply, it can be conceived as "commercial transactions through the Internet" (Robayo-Botiva, 2020, p.5). It is a channel increasingly used by businesses and customers, through online platforms online forms a diversified network of consumers and suppliers internationally (Salas-Rubio, Abrego-Almazán and Mendoza-Gómez, 2021, p.153);

"E-commerce takes place through diverse business relationships, involving any possible combination of consumers (C), businesses (B) or governments (G)" (OECD, 2019, p.16).

Therefore, e-commerce can be classified into several types (Herrera, Vázquez and Jacobo, 2019, p.64) which are identified below:

- Business to Consumer (B2C): the process of buying and selling goods or services is between businesses and end consumers.
- Business to Business (B2B): the process of exchanging goods or services, in addition to the purchase of goods or services, takes place between companies, i.e. between wholesalers or manufacturers.
- Consumer to Consumer (C2C): sales and purchase transactions are carried out between end consumers, usually through social networks.
- Government to business (G2B): allows product or service transactions between governments.
- Business to employee (B2E): refers to companies that offer electronic services.

There are authors such as Montenegro-Ramírez, et al. (2019, p. 23) who add an additional classification called M-commerce, aimed at the sale of products or services through mobile devices.

Methodology

Scrum was used for the development of the project, as an agile methodology, since it makes it possible to develop software projects in a short time and with the participation of a small team and with a short time for its development.

In the first phase of Scrum, called initiation, the project vision was established, the Scrum Master was identified and the roles of the other members of the Scrum team were defined. The epics were developed, which in this case were considered to be seven. The list of epics is shown in table 1.

The first version of the prioritised Backlog was formalised (table 2) in the second phase called Planning and Estimation. In this phase, seven work blocks were established, ordered by delivery priority. Each of the blocks corresponds to the number of iterations and deliverables. Accordingly, the first or highest priority Sprint is related to the visualisation of the flower catalogue.

Development of epics	Nº H. U.	User Stories
As a customer I need a username and password to make an online purchase.	HU-1	Display the interface to access the system.
	HU-2	Validate the username and password entered by the administrator or employee.
	HU-3	Display the welcome portal to the system in case of access.
	HU-4	Recover password in case of forgetting it.
As a customer I need to view the flower catalogue.	HU-5	List flower arrangement catalogues available by event.
	HU-6	Search for specific flower arrangements.
	HU-7	View details of a specific arrangement.
As a customer I need to view the catalogue of accessories.	HU-8	
	HU-9	List the add-on catalogues that are available by event.
As a customer I need to add floral arrangements and/or complements to my shopping cart.	HU-10	Search for specific add-ons.
	HU-11	List flower arrangements and accessories in the cart.
	HU-12	Remove flower arrangements and accessories from your shopping cart.
	HU-13	Modify floral arrangements and accessories in the cart.
As a customer I need to order flower arrangements and/or accessories that are in my shopping cart.	HU-14	Get a quote.
	HU-15	Enter shipping details.
As a customer I need to pay for the order of flower arrangements and/or accessories in my shopping cart.	HU-16	Choose payment method.
	HU-17	Display the taxes generated by the payment.
As a customer I need to receive confirmation of the purchase of flower arrangements and/or accessories in my shopping cart.	HU-18	Receive notification of purchase via email.

Table 1 List of epics

Source: Own elaboration

The prioritised backlog for Sprint 1 is shown in table 3. Also, in this phase, the user stories were created and the estimate in days for their completion was made. The user story for Sprint 4 is shown in table 4. Mockups were also created for the design of interface prototypes.

Development of epics		N° H.U.	User Stories
SPRI NT 4	As a customer I need to add floral arrangements and/or complements to my shopping cart..	HU-1	Add flower arrangements and accessories to the cart.
		HU-2	Remove flower arrangements and accessories from the cart.
		HU-3	Modify flower arrangements and add-ons in the shopping cart.
		HU-4	Get a quote.
SPRI NT 2	As a customer I need to have a username and password to make an online purchase.	HU-5	Show the interface to access the system.
		HU-6	Validate the username and password entered by the administrator or employee.
		HU-7	Display the welcome portal to the system in case of login.
		HU-8	Recover password if forgotten
SPRI NT 5	As a customer I need to place an order for flower arrangements and/or accessories in my shopping cart..	HU-9	Enter shipping details.
SPRI NT 6	As a customer I need to pay for the order of flower arrangements and/or accessories in my shopping cart..	HU-10	Choose payment method.
		HU-11	Display the taxes generated by the payment.
SPRI NT 1	As a customer I need to view the flower catalogue.	HU-12	List flower arrangement catalogues available by event.
		HU-13	Realizar búsquedas de arreglos florales en específico.
		HU-14	View details of a specific arrangement.
SPRI NT 3	As a customer I need to view the catalogue of accessories.	HU-15	List the catalogues of accessories that are available per event.
		HU-16	Search for specific add-ons.
		HU-17	View details of a specific add-on.
SPRI NT 7	As a customer I need to receive confirmation of the purchase of flower arrangements and/or accessories in my shopping cart.	HU-18	Receive notification of purchase via email.

Table 2 Prioritised backlog

Source: Own elaboration

In the third phase called Implementation, the first deliverable related to the first sprint was created.

In the next phase called Review and Foresight, the first block of work was compared with the desired objective, and functionalities were added that had not been contemplated in the first instance; again, virtual meetings were held with the Scrum team through the Zoom platform.

In the last phase, Launching or Closing, tests were carried out for each user story, three types of tests were performed: unit, integration and acceptance; subsequently, the requested changes were checked.

Once the first block (flower catalogue) was completed, the credentials block was continued and iterated again. The iterations were repeated until the blocks were completed; subsequently, the first version of the system documentation was produced.

Prioritised backlog of the final product for the first sprint	
HU-12	List the flower arrangement catalogues that are available by event.
HU-14	View details of a specific arrangement.
HU-13	Search for specific floral arrangements.

Table 3 Prioritised backlog for the first Sprint

Source: Own elaboration

The programming language was Php, the database used was MySQL. The software tools for the development were Laravel and Visual Code Studio, while the web server used was XAMPP. All of the aforementioned are freely licensed. For the e-commerce part, the Paypal SDK was used for the integration of payments in Laravel.

User story title: Add flower arrangements and add-ons to cart.	Id: HU-1
Description: As a customer of FloresVent I want to add flower arrangements and complements to my shopping cart.	
Acceptance criteria: The application is installed free of charge via the internet browsing link.	
Responsible: Yolanda Marysol Escorza Sánchez	
DoD: Approved by the developers of the application.	
Observations: Test the functionality of the application.	
Priority: 1	Estimate: (1 hour)

Table 4 User story

Source: Own elaboration

Results

The result of the project was an e-commerce system containing catalogues of the cut flower arrangements offered by Rosita Florist. The main interface is shown in figures 1 and 2. The catalogues of flower arrangements classified by event are shown in figure 3, including arrangements for all occasions, for cars, weddings, quinceañeras, first communions and baptisms, among others.



Figure 1 Main interface

Source: Own elaboration



Figure 2 Main interface (continued)
Source: Own elaboration



Figure 3 Catalogue of flower arrangements
Source: Own elaboration

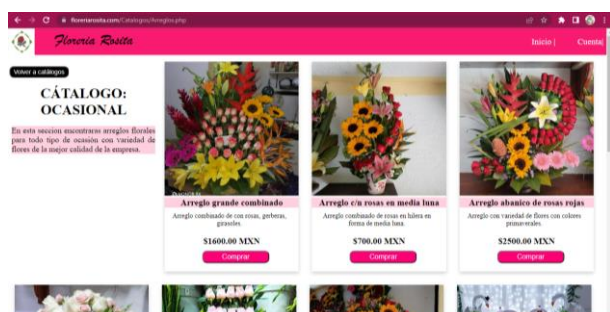


Figure 4 Details of the floral arrangements
Source: Own elaboration

In turn, each catalogue contains the products offered, with the details of these, including characteristics and prices.

If a customer wishes to make a purchase of floral arrangements or details, he/she must register the first time or log in with his/her user name and password the subsequent times.

Figure 5 shows the user registration interface, while Figure 6 shows the login of a previously registered user.

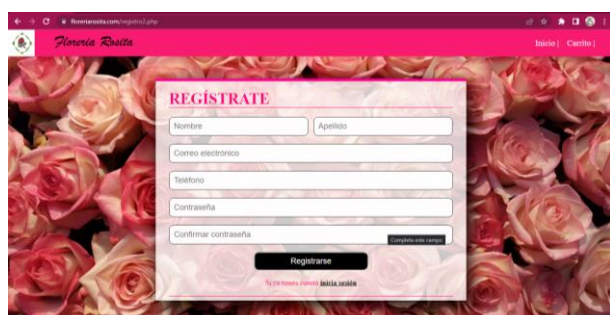


Figure 5 User registration
Source: Own elaboration

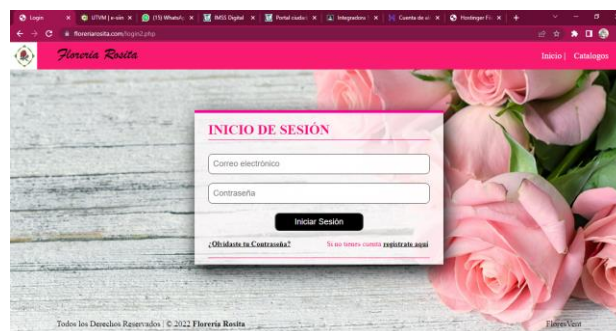


Figure 6 User login
Source: Own elaboration

Once the floral arrangements have been added to the shopping cart and the shipping information has been entered, proceed with the payment of the purchase, this can be PayPal, Mercado Pago or credit or debit card, as shown in figure 7. The shipping information must be entered, as requested in figure 8.

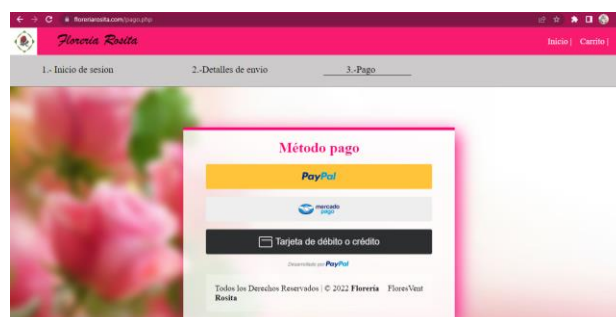


Figure 7 Choice of payment method
Source: Own elaboration



Figure 8 Shipping data
Source: Own elaboration

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Conclusions

The e-commerce web application presented above aims to be an additional option to market flower arrangements for the Rosita flower shop; in addition, it allows a greater dissemination of its products, which enables it to position itself not only locally, but also at state and national level, and therefore to be a more competitive microenterprise.

At the beginning of the project, the general objective was to sell flowers online through e-commerce for the Rosita flower shop; this objective was achieved, since, as shown in the results section, an e-commerce application was developed that meets the determined objectives, through the dissemination of online product catalogues (floral arrangements and accessories), shopping cart, payment of products through various methods and delivery of products to the customer's home.

Specifically, an analysis was carried out through user stories to determine the requirements of customers when making a purchase of flowers through an Internet web system, which allows the first specific objective to be met.

To meet the second specific objective, not only a catalogue of floral arrangements was implemented, but also a catalogue of complements that was classified into event categories.

Subsequently, the web system was coded based on customer requirements, and with this, the third specific objective was achieved.

Finally, tests were carried out to verify the functioning of the web system and to avoid errors, firstly, unit tests were carried out for each user story that was being released, then integration tests with other user stories and acceptance tests with the Rosita flower shop.

Therefore, it can be concluded that both the general objective and the specific objectives that were set at the beginning were met.

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