



Design of a Web System for Sales Processes in a Microenterprise in Peru

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ABSTRACT

The present research was submitted as a potential solution to the continuous upgrading demands that companies are currently experiencing. Using the Scrum methodology, it has been possible to streamline the project of designing a sales website that allows managing the daily sales data in a company in Puente Piedra, Lima; as well as the stock of products and customer information. The design of the prototype was successfully executed through Balsamiq Mockups, a tool that served in the creation of the prototypes of the web system. The results presented in this research may be useful for those entrepreneurs who need the design of web sites like ours for their proper implementation.

Key words : Balsamiq Mockups, Scrum, Web System Design.

1. INTRODUCTION

Nowadays the control of the sales process has suffered great alterations; therefore, companies are forced to have an active participation in the use of communications and new technologies. Thus, this has become an indispensable requirement for those new companies that want to stand out from their competition, which also causes the economic market to become increasingly competitive and hostile [1]. In Peru, different studies have been presented in this regard, mainly because it has been recorded that in 2017 SMEs represent 96.5% of all companies [2]. In order to prove this point, some of the studies of microenterprises that do not have optimal control over their sales are cited, such as the one conducted for the company Angelito in the city of Chepén [3] and the company Vasgar, located in San Juan de Lurigancho [4]; both cases are highlighted in order to emphasize the importance of optimizing this process since in both cases it is observed that the companies manage their profit and payment controls manually, wasting time and complicating customer service.

Regarding the methodology to be used for this study, different options were evaluated, such as Scrum, a methodology that

stands out for the agility and flexibility which can benefit the project through the selection of Sprints [5]. Likewise, the UML methodology was assessed, which has an agile planning for the progress of the software and requires a complete documentation [6]. In addition, the RUP methodology was considered, known for the software process development framework that extends into the unified process [7]. Finally, the MVC Pattern was proposed, known to developers because it interacts with databases and storage systems [8]. From the proposals, it was decided to use the Scrum methodology, since it helps to streamline the project by executing it in time cycles with a specific time frame.

Thus, the application will be covered in the micro-companies located in Puente Piedra. The web system will be developed through the creation of prototypes, supported by the Balsamiq Mockups tool; likewise, the web server will work with the PHP language [9]. Finally, the methodological process will be through the 5 phases of Scrum.

The objective of this work is the creation of the design of a web system with which it is possible to manage a control of the sales of a small company in Puente Piedra, Lima. This with the purpose of having a greater knowledge with respect to the available quantity of the products, their requests and to obtain a data base of the clients improving the administration of information and the quality of the service.

The work is organized by sections, in section II the methodology to be developed will be presented; in section III the application of the case study will be explained in greater detail. In stage IV the results and discussions are observed. Finally, Section V presents the conclusions of this work.

2. METHODOLOGY

This research will be done with the following tools and methodology:

2.1 PHP

PHP or Hypertext Processor is a server-side scripting language designed for the web. PHP will be explained on the

web server and will process the HTML code or other output that visitors can see. PHP is an open source project that allows everyone to access the source code at no charge, it also has many integrated functions to perform many useful tasks related to the web [9].

2.2 Balsamiq Mockups

Once methodology of the project is mentioned, the tool Balsamiq Mockups will be introduced, which will benefit us for the creation of the interface views that will show us the system, such as buttons, links, tables, etc. In other words, it will be the tool with which we will be able to design the model of what we plan to implement in the finished system [10].

2.3 SCRUM

Scrum proposes a personalized image to work on different projects that have a diversity of conditions. This methodology is applied through stages called Sprint, which are not only beneficial for an optimal organization, but also flexible because there is no chronology or order to follow. This last feature also enables the adaptation of an external methodology in its development if it is considered relevant [11].

A. Backlog Product

This is the stage in which the functionality requirements specified by the customer with respect to the final product are listed.

B. Sprint Backlog

Based on the previous task stage, the tasks to be assigned are prioritized in the Sprint Backlog. Therefore, the team formations to complete each task will be evaluated, as well as the resources that these will have at their disposal.

C. Sprint Planning Meeting:

It deals with the planning of the Sprint, the inspection and the adaptation of the advances are prioritized more than anything else of the tasks of the product backlog.

D. Sprint execution

We will have a review of the increase (of the Sprint) as it will last 2 to 4 weeks deadline. There should be no Sprint extensions under any circumstances; the times for continuity of the increment must be respected.

E. Inspection and Interaction:

It is the presentation of the finished sprint with the requirements indicated by the client from the beginning. In Figure 1 you can see the graph of the Scrum methodology where it covers all the phases already mentioned:

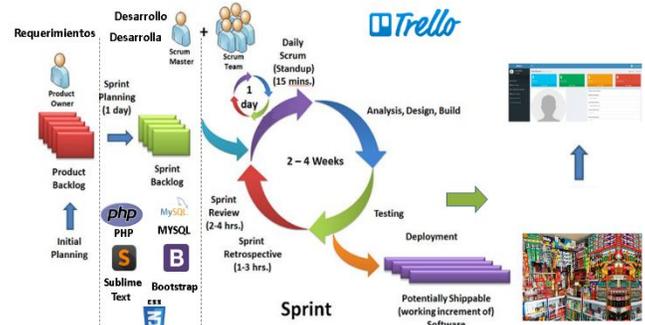


Figure 1: Scrum Cycle Diagram [12]

3. APPLICATION

3.1 Application Architecture

The architecture of the application took into account the PHP which, as shown in Figure 2, benefited the project because when the request for the page is made from a navigator to the Web Server, the PHP language processes the information so that the page is sent to the client through the HTML code.

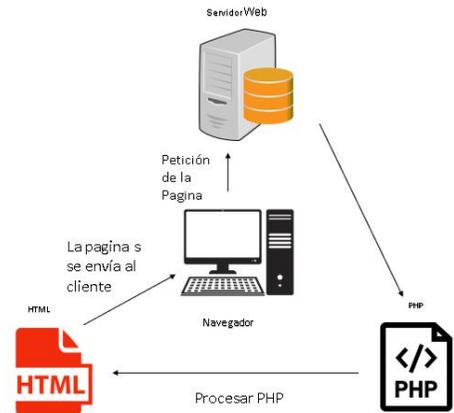


Figure 2: Client and server communication diagram

3.2 Prototype Design

The design of the web system was developed with the implementation of Balsamiq Mockups software. This design will be implemented in the micro enterprises in Puente Piedra, Lima, to have a good control of sales, products and clients, and thus have a good administration of the data.

A. Backlog Product

The specific requirements vary from the responsibilities and position that the user will have in the company. The requirements that have been registered are as follows:

- As an administrator I need to register to be able to enter the system in a secure way.

- As a user I need the system to approve my data in order to enter the system securely.
- As a seller I need to register a customer to make the sale.
- As a seller I need to register the categories for each type of product.
- As a seller I need to register a product to make the sale.
- As a seller I need to register a client's order to make the sale.
- As an administrator I need to produce a report to have a control of the registered customers.
- As an administrator I need to produce a report to have a control of the registered products.
- As an administrator I need to produce a report to have a control of the sales.

B. Sprint Backlog

a) Sprint 1: User Registration

In this increase the user (administrator or seller) logs were presented, as shown in Figure 4.

b) Sprint 2: Registration of the sale

In this increase we have the registration of customers, categories, and products, as well as the registration of orders and sales, see Figures 5, 6 and 7.

c) Sprint 3: Sales report

In this increment we will have the verification of the sale and the administrator is allowed to generate reports of the clients, products and sales, which can be seen in Figure 8.

C. Sprint Planning Meeting:

At this stage we will see the planning of the Sprints, that is, user registration, sales and reports, and the length of each one. This planning is shown in Figure 3.

Icon	Nombre	Duracion	Inicio	Terminado
	SISTEMA DE VENTA EN LA MICROEMPRESAS	45 days	08/09/19 08:00 AM	08/11/19 05:00 PM
	1.Registro Usuario	10 days	10/09/19 08:00 AM	23/09/19 05:00 PM
	Modulo de Usuarios	10 days	10/09/19 08:00 AM	23/09/19 05:00 PM
	2.Registro de la Venta	20 days	23/09/19 08:00 AM	18/10/19 05:00 PM
	Modulo de Clientes	5 days	23/09/19 08:00 AM	27/09/19 05:00 PM
	Modulo de categorias	5 days	28/09/19 08:00 AM	04/10/19 05:00 PM
	Modulo de Productos	5 days	04/10/19 08:00 AM	10/10/19 05:00 PM
	Modulo de la Venta	5 days	10/10/19 08:00 AM	16/10/19 05:00 PM
	3.Gestio de Reportes	15 days	16/10/19 08:00 AM	05/11/19 05:00 PM
	Reporte de Clientes	3 days	16/10/19 08:00 AM	18/10/19 05:00 PM
	Reporte de Productos	3 days	18/10/19 08:00 AM	22/10/19 05:00 PM
	Reporte de los pedidos	4 days	22/10/19 08:00 AM	25/10/19 05:00 PM
	Reporte de la Venta	5 days	25/10/19 08:00 AM	31/10/19 05:00 PM

Figure 3: Sprint Planning

D. Sprint execution

a) Sprint 1: User Registration

For user registration, both administrators and sellers must log in with their user ID and chosen password to ensure data confidentiality and security, as shown in Figure 4.



Figure 4: Login Administrator

b) Sprint 2: Registration of the sale

Once entered into the system, when a sales record is required, the seller must enter customer, product and final sale data. As shown in Figure 5, to enter a new client it is necessary to place key data such as name, type of client, type and number of identification document, telephone and address.

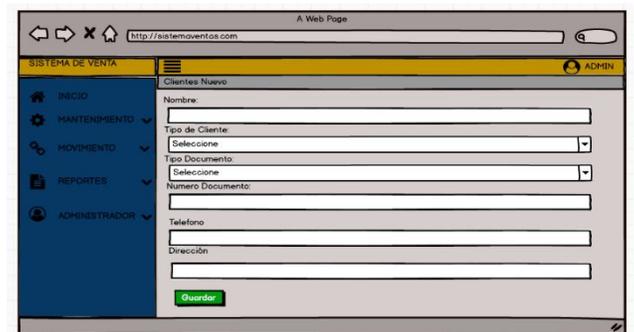


Figure 5: Client Registration

When the product is to be registered, primary information must be entered as well, such as the product code, name, a brief description, price, stock and category; as shown in Figure 6.

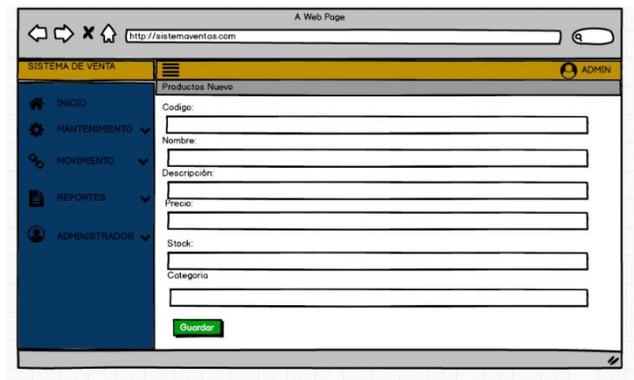


Figure 6: Product Registration

Finally, with regard to the registration of the sale, the sale itself must be recorded. To do this, information such as the type of voucher desired, the date of the day of the sale, the product and

how many units were sold will be entered, while the voucher series and number, as well as the price will be automatically recorded, and the customer's name will have to be searched for on the system's database. This is shown in Figure 7.

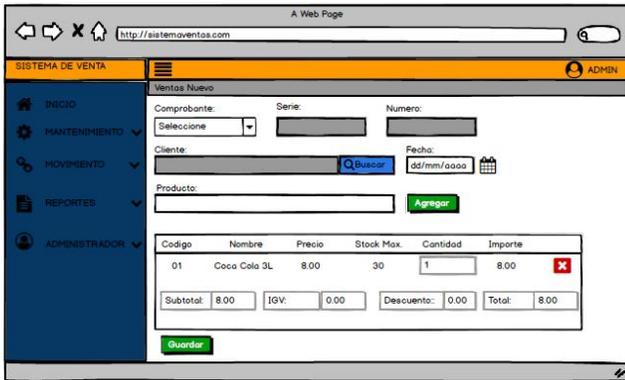


Figure 7: Sale Registration

c) Sprint 3: Sales report

In the last Sprint, the design of the sales report function was carried out, in which it is possible to appreciate the sales that have taken place in a time interval; likewise, it is possible to appreciate those that have been to a certain client, category of voucher, exact date and total amount. After this information has been subtracted, each specific sale can be seen. The design of this Sprint can be seen in Figure 8.

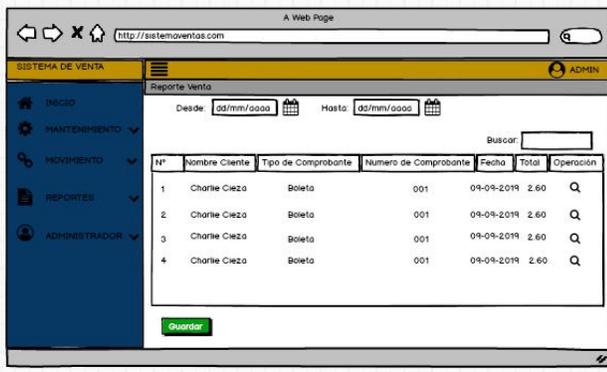


Figure 8: Sales Report

E. Inspection and Interaction:

The last phase is the completion of the sprints with the requirements that were given to us at the beginning; in this stage the design of the developed system was evaluated completely together with its functionalities.

4. RESULTS AND DISCUSSIONS

4.1 About the Implementation

The prototype design of the web sales system for the micro-companies in Puente Piedra was completed, finishing with the requirements already requested for its future

implementation, with the objective of having an optimal control of the sales.

With respect to a study that presented a web platform for clients and designers who wish to obtain prototypes of their own web sites [13], it has been observed that MockingBird (the tool used in the aforementioned paper), is a tool to be considered because, similarly to Balsamiq Mockups, it has the purpose of creating designs for the prototypes of the web system and can be assumed to be an equally effective tool.

4.2 About the Methodology

A. Advantages

One of the advantages with the Scrum methodology is that the development team meets every day for about 15 minutes to complete some elements of the sprint backlog to be a review of the project which will be presented, obtaining a constant feedback on what could be done better and how to avoid certain errors that had the previous day [14].

B. Disadvantage

One disadvantage to note is that the control the methodology may have would vary if the project were larger and/or the number of team members were greater.

C. Differences

In the differences found with respect to the scrum methodology, it can be observed that its focus is on streamlining projects; however, if we used the UML methodology, its focus would have been on larger and heavier projects such as the implementation of the mobile device based monitoring sales system in Semi Tani Shop [15].

5. CONCLUSIONS

The design of the proposed web system has been effectively completed. In this way the implementation of the web sales system will help with the improvement of the sales process, so there will be no more issues with the calculations as for the elaboration of a ticket, or the control of the products. The tool used, Balsamiq Mockups, proved to be suitable and effective in case studies such as this one, as it benefited the design of the interfaces for the prototype design.

The Scrum Methodology accelerated the project process through its 5 development phases and its demand for execution in time cycles with a duration established by Sprint of 2 to 4 weeks, guaranteeing the project delivery deadline. In future research, a version of the website could be implemented with the client's perspective, so that the client can be aware of and have access to their electronic invoices if needed. Also, a chatbot could be added for this version, by which the client would absolve his doubts regarding the products offered to ensure the best quality of service possible.

REFERENCES

1. J. B. Huaman and C. Huayanca, **Development and implementation of an information system to improve purchasing and sales processes in the company Humaju –Desarrollo e implementación de un sistema de información para mejorar los procesos de compras y ventas en la empresa Humaju**, 2017.
2. **SMEs are 96.5% of companies in Peru | Peru Retail –Las Pymes son el 96.5% de las empresas que hay en Perú | Perú Retail**. [Online]. Available in: <https://www.peru-retail.com/pymes-empresas-peru/>. [Accessed: 19-dec-2019].
3. M.Sacasqui,J.Luyo,A.Delgado,A **Unified Index for Power Quality Assessment in Distributed Generation Systems Using Grey Clustering and Entropy Weight**, 2018 IEEE ANDESCON, ANDESCON 2018 - Conference Proceedings, 8564631. <https://doi.org/10.1109/ANDESCON.2018.8564631>
4. R. Assado and R. Morales, **Implementation of a web-based sales management system to improve the sales process of the Vasgar trading company – Implementación de un sistema web de gestión comercial para mejorar el proceso de ventas de la empresa comercial Vasgar**, Universidad de Ciencias y Humanidades, 2017.
5. P. Ounsrimuang and S. Nootyaskool, **Introducing scrum process optimization**, in Proceedings of 2017 International Conference on Machine Learning and Cybernetics, ICMLC 2017, 2017, vol. 1, pp. 175-181. <https://doi.org/10.1109/ICMLC.2017.8107761>
6. E. Braude, **Incremental UML for Agile Development: Embedding UML Class Models in Source Code**, in Proceedings - 2017 IEEE/ACM 3rd International Workshop on Rapid Continuous Software Engineering, RCoSE 2017, 2017, pp. 27-31. <https://doi.org/10.1109/RCoSE.2017.1>
7. P. Borges, P. Monteiro, and R. J. Machado, **Tailoring RUP to small software development teams**, in Proceedings - 37th EUROMICRO Conference on Software Engineering and Advanced Applications, SEAA 2011, 2011, pp. 306-309.
8. A. Singh, P. Chawla, K. Singh, and A. K. Singh, **Formulating an MVC Framework for Web Development in Java**, in Proceedings of the 2nd International Conference on Trends in Electronics and Informatics, ICOEI 2018, 2018, pp. 926-929. <https://doi.org/10.1109/ICOEI.2018.8553746>
9. Hardono, I. Surjandari, A. Rachman, Y. A. B. Panjaitan, and A. Rosyidah, **Development of theses categorization system search engine using PHP and MySQL**, in 2017 International Conference on Information Technology Systems and Innovation, ICITSI 2017 - Proceedings, 2017, vol. 2018-January, pp. 194-199.
10. A.Delgado,A.Aguirre,E. Palomino,G.Salazar, **Applying triangular whitenization weight functions to assess water quality of main affluents of Rimac river**, in Proceedings of the 2017 Electronic Congress, E-CON UNI 2017, 2018-January, pp. 1-4.
11. A. Srivastava, S. Bhardwaj, and S. Saraswat, **SCRUM model for agile methodology**, in Proceeding - IEEE International Conference on Computing, Communication and Automation, ICCCA 2017, 2017, vol. 2017-January, pp. 864-869. <https://doi.org/10.1109/CCAA.2017.8229928>
12. **Scrum Master 5 steps - Los 5 pasos del Scrum Master**. [Online]. Available in: <http://www.dimajeff.com.mx/blog/articulos/item/42-los-5-pasos-del-scrum-master>. [Accessed: 18-dec-2019].
13. T. Soutome, D. K. Ling, M. Niibori, and M. Kamada, **A web-based platform for clients and designers to prototype web sites**, in Proceedings - 16th International Conference on Network-Based Information Systems, NBiS 2013, 2013, pp. 459-463. <https://doi.org/10.1109/NBiS.2013.76>
14. R. J. MacAsaet, **Just in Time Demos in the Scrum Framework**, in Proceedings - 2018 3rd International Conference on System Reliability and Safety, ICSRS 2018, 2019, pp. 21-24. <https://doi.org/10.1109/ICSRS.2018.8688864>
15. A.Delgado, D.Vriclizar, E.Medina, **Artificial intelligence model based on grey systems to assess water quality from Santa river watershed**, in Proceedings of the 2017 Electronic Congress, E-CON UNI 2017, 2018-January, pp. 1-4. <https://doi.org/10.1109/ECON.2017.8247310>