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*Original Article*

# Design of a Web Application to Manage the Costs of the Basic Family Basket in Metropolitan Lima

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***Abstract*** *- In this research, a web application was designed to make a comparative analysis of the prices of certain products that make up the basic family basket, which is sold at different distribution points such as supply centers, supermarkets, local markets, and others. According to information obtained from the National Institute of Statistics and Informatics (INEI), the Peruvian population amounts to 33, million 396 thousand 700 inhabitants and in Lima, reaching 9 million 943 thousand 8 inhabitants, these go to the supply centers to obtain necessities that are considered in the basic family basket, with this web application will have the option to search for those products that are sold at lower prices. This web application design was executed according to the agile SCRUM methodology since it offers flexibility and adheres holistically during the period of each Sprint proposed in this research, which is the reason why some of the works had optimal results. Additionally, the fallibility of the instrument has been validated, where a result with acceptable values was obtained.*

***Keywords*** *- Scrum, Application web, INEI, Basic basket, Supply centers.*

## 1. Introduction

Due to the context of the pandemic in the world, many countries opted for social isolation for public health measures. This caused some products to be sold at a higher price than expected. In this context, this research is carried out to give an alternative to consumers to look for products at a better accessible price. In Peru, there is a rise in the value of products that are essential for the consumption of the citizens of Lima, which has been continuous since 2020 with the arrival of COVID-19; at the same time, the volatility and variation of the exchange rate sun to the dollar were increasing from month to month, and what is worse, the speculations of different sectors certainly added to it.

The analysis of the problem is oriented to the economic crisis faced by Peru since the arrival of the COVID-19 pandemic. Indeed, to address the seriousness of the problem, different sources have been consulted to explain the context to be considered, the monetary authority, demand and supply. However, the shortage of products has generated drastic changes bringing with it the difficulty of the situation, aggravating the rise in the price of food in the country, which is why it is considered a highly relevant issue to facilitate a solution to help manage the prices of products to the citizens of Metropolitan Lima, since it is the city where the highest percentage of residents is concentrated with an approximate of 9 million 943 thousand 8 inhabitants according to INEI [1] and growth projection. Based on the above, the regulatory entity Instituto Nacional de Defensa de la Competencia y de la Protección de la Propiedad Intelectual (Indecopi), which is the consumer's protector, monitored on August 11 and 12, 2021, at a national level the products categorized as basic necessities [2], the information collected was processed in an Excel file and then made available to the public in a PDF file as an informative guide where it is detailed so that the end user can plan his or her purchases. Even so, a homemaker who shops daily or weekly will not find it easy to locate this file to compare prices. According to what was commented in the initial lines, today has as a consequence that the price of basic necessities is still high, and it is necessary to say that now is added the rise of commodities.

In view of this, it is necessary to design a web application to manage the price of basic family basket products in Metropolitan Lima and thus facilitate the population with the contrast of prices.

## 2. Literature Review

The COVID-19 pandemic that started in 2019 caused drastic changes in different areas, especially in the world economy and food supply [3]. In Peru, the percentage of the price of products has increased drastically in the last two years; it is true that the pecunium is the symbol of the value of the products that allow exchange in the current emporium

and its circulation in each nation; it is clear that each country has its own currency, and the exchange rate is variable. The Peruvian economy is based on the political constitution of 1993, which governs the general rules in the context of the price and individual comfort of the population where it specifies [4].

It is relevant because it is in line with the research topic, and it provides information on how and from where the price increase in the economy starts and, consequently, who intervenes. [5] and [6]. On the other hand, it is necessary to mention how the increase and instability of prices have affected the most consumed basic foodstuffs in the family basket. This impacts the household economy, becoming a problem for society, especially for vulnerable households, as mentioned by [7].

In addition to the above, our economy was affected in macroeconomic terms and, in spite of the agreement between the entities in charge of maintaining monetary stability, such as the MEF and the BCRP, our economy was affected in macroeconomic terms and, in spite of the agreement between the entities in charge of maintaining monetary stability, such as the MEF and the BCRP, our economy was affected in macroeconomic terms.

In that sense, it is understandable that the price of basic foodstuffs has increased due to strict restrictions and mandatory confinement since March 2020 with the emergence of Covid-19. [8]. During the confinement of COVID-19, it has been evidenced a lot of variability in the prices of the different products that are essential for the consumption of a human being; Peru is a country that has a limited economy, importer of agricultural food and oil that faces an inflationary collision, both internally and externally coming from the rest of the countries.

The analysis of inflation projection in our country [9] mentions that Peruvian inflation has low inaction. On the other hand, due to the confinement, the supply of products to the distribution centers has not been satisfactory to the consumer [10] changes in the practice of food consumption in terms of good nutrition, where it is recommended to prioritize local products. On the other hand, in Peru, the state allocated a budget to municipal authorities to distribute food baskets in areas of urgent need. [11] because many families did not cover the cost of food. In the same way, the socioeconomic analysis of the different countries that make up the Latin American Confederation is considered. [5]. This indicates the effect and economic losses caused by the arrival of the COVID-19 pandemic, in addition to the representative risk to private investment, harming and limiting the population's consumption [8]. In addition to the aforementioned sources, international studies confirm its impact on the economy due to external conflicts [12].

For the proposed topic, the application of different research methodologies has been found in the publication of the following publications [13]**,** outlining types of research methodology and mentioning in which context each of them can be applied and which have been corroborated in the present sources. Thus, the research focuses on identifying factors that intervene in the price increase of essential products for household consumption, which gives us ideas of solutions to design a web platform that simulates the price of basic family basket products from different distribution centers, to which the work strategy for the application progress that best suits it indicates the following [14].

Based on the above-mentioned scopes, digitalization is urgent nowadays due to the need to communicate in the personal and work environment, as well as companies and suppliers with their customers or end users, which corroborates the following [15], as a case example of virtualization of [16] in the educational field it is relevant to take their references to design a web page to manage the price of products. According to the above, the author specifies that web platforms or web pages can be applied in different areas according to the need [17] who idea development of web page that simulates the processes and phenomena directed to physics. For the present trends, the author [18] proposes to collect them for metadata creation through web archives which would be for future studies.

## 3. Methodology

Since its first launch in 2013, with the support of subject matter experts from more than 10 countries, its application has been successful. Being so, the 2017 edition scaled scrum to large companies and projects. The agile methodology SCRUM consists of working together with stakeholders and those involved. There are some works that have had results with this type of methodology, such as: applied to an online store, see [19]. In addition, another study has been applied to the monitoring of post-COVID-19 patients [20]. As well as another related research on a mobile application to optimize sales in a Peruvian company [21].

On the other hand, the guide points out that those who work under this framework have purposes oriented to efficient results, i.e., when a member is late or does not know a part of the task, he/she will be supported by the team. They are also flexible to the changes required by the project [22]. The application of the Scrum methodology in the engineering of programs directed towards cyber physics is shown below; see [23].

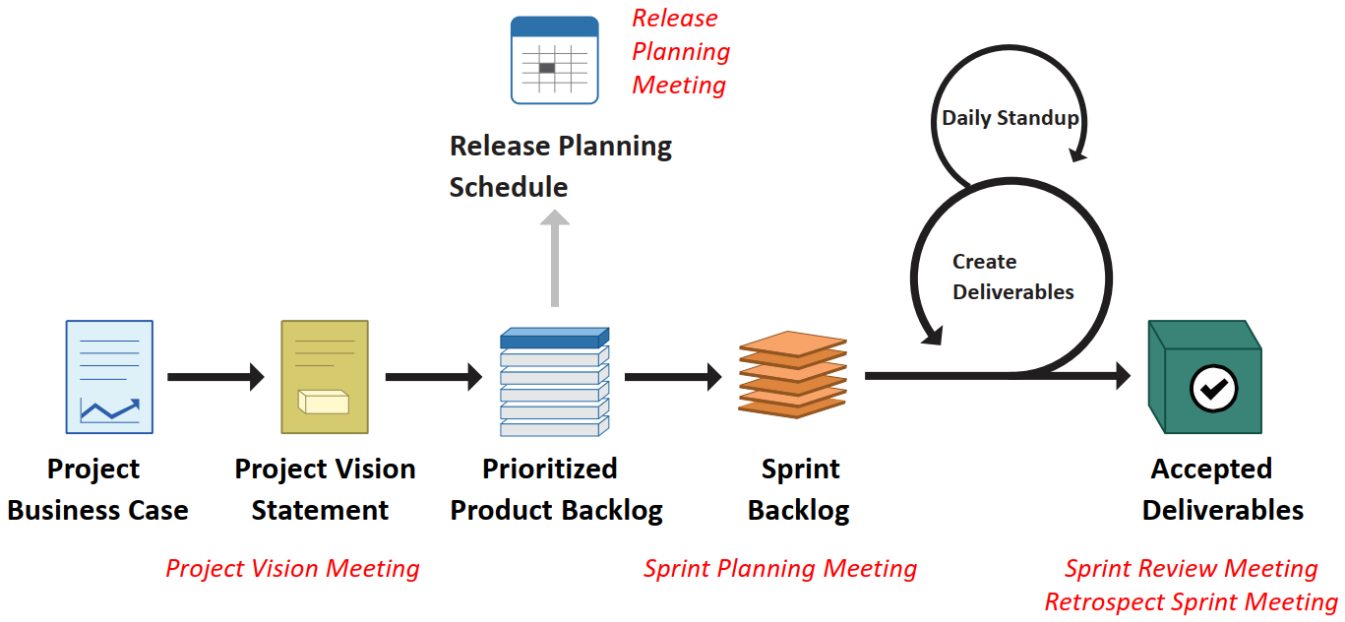


**Fig. 1 Life cycle of a Scrum**

**Table 1. Roles de equip scrum**

| Roles | ID | Actions |
|---|---|---|
| Cano Lengua, Miguel Ángel | PO | Responsible for the responsible and effective management of the Product Backlog. |
| Chávez Herrera, Miguel Ángel | SM | It focuses on the Scrum Team achieving effectiveness. |
| Llocclla Huaman, Luisa | DT | He is committed to meeting the Sprint target. |

### *3.1. The Life Cycle of a SCRUM Project Consists of 5 Phases [14]*

*3.1.1. Start of the Project*

In this part, the project vision is implemented, which becomes the basis for executing the epics, as well as the identification of the roles according to the requirements required by the Scrum team. The following is the scrum team structure with the identified roles.

Continuing on, it is essential to outline the scrum team structure and how they are related during the project execution process [24].

It is necessary to point out that the items considered in phase one in this part have created a prioritized Backlog, which determines launch planning for the prototype design of the project.

*3.1.2. Planning and Estimation*

Then, it starts with planning, HU creation and estimation of user history, tasks, and Sprint backlog. The person responsible for this work is the Scrum Master, who, together with the assigned team, will carry out the following points: HU estimation and Sprint Burndown Chart elaboration to follow up on the progress of the HU.

*3.1.3. Implementation*

To continue, the Scrum Team sets in motion the creation of the deliverables, and each Sprint goes through a daily meeting during the execution of the tasks. In other words, in this phase, it is advisable to use the Scrum board to have better visibility of the progress of the activities being carried out. On the other hand, Sprint Burndown Chart will show the status of the tasks, which suggests updating every time a task is finished. On the other hand, Daily Standup will focus on the daily meetings to see the progress or to know if there is any event that delays their continuity.

*3.1.4. Review and Retrospective*

Subsequently, this phase is responsible for constantly validating the Sprint that each task is accomplished. The Scrum group exposes the Sprint deliverables to the Product Owner. The main objective of the meeting with those involved in the task is to identify the needs of the team, and the information received is documented as lessons learned to be replicated for similar cases.

*3.1.5. Deploy or Launch*

Finally, we proceed with the release of the deliverables that have passed through the filter and were accepted. Then, the stakeholders and the Scrum core team met for the project's final review. Of course, the projects go through an exhaustive validation before being delivered.

***3.2. Desarrollo de Metodología***

*3.2.1. Application Development Tools*

This section presents the project's design, where the prototypes corresponding to each defined Sprint of the web application will be shown. The screenshots inserted are the designs of the forms that have been considered in each user story according to the criteria set out in the project. In that sense, to know the tool with which the prototype was designed, it is necessary to mention the multiplatform open source library Bootstrap, this Framework Twitter implemented in its business, according to the authors. [25]. On the other hand, the most used tool for functionality is the Java platform, and with the NetBeans ID and for data storage, MYSQL is considered since it has been used in other projects [26] due to its performance.

*3.2.2. Programming in Java Language*

Java is a secure, multithreaded programming language that offers different platforms and adjusts depending on the work environment required. In addition, the multithreaded architecture ensures that applications are scalable, accessible, and easy to manage [29].

*3.2.3. IDE Apache NetBeans*

According to the documentation on the official website of the IDE indicates that its source code was ceded by Oracle in 2016; since then, it has had many partners for its progress. Hence, it remains one of the most solid IDE for the development of applications and therefore has been selected for this research.

*3.2.4. Data Base MYSQL*

For data and information management, MYSQL Workbench 8.0 has been considered since it offers significant improvements in security, performance, and also online transaction processing, as documented on its official website.

*3.2.5. Design Pattern MVC*

The use of this pattern allows for solving the problems of decoupling and code reuse and supports different components that have been included [29].

*3.2.6. Solution Architecture*

Web application architecture is planned under the MVC pattern as it helps to make communication more fluid due to the reuse of accesses [29].

Table 2 below presents the HU considered for this web application design project.

**Table 2. HU**

| ID | User Stories |
|---|---|
| HU01 | Main Form |
| HU02 | Register, Edit User |
| HU03 | Administrator Profile (Login) |
| HU04 | Product Listing |
| HU05 | Add, Edit Product Brand |
| HU06 | Register, Edit Products |
| HU07 | Add, Edit Store Distribution |
| HU08 | Add, Edit Department |
| HU09 | Search Products |
| HU10 | Search by Brand |
| HU11 | Filter by Product |
| HU12 | Search by Store |

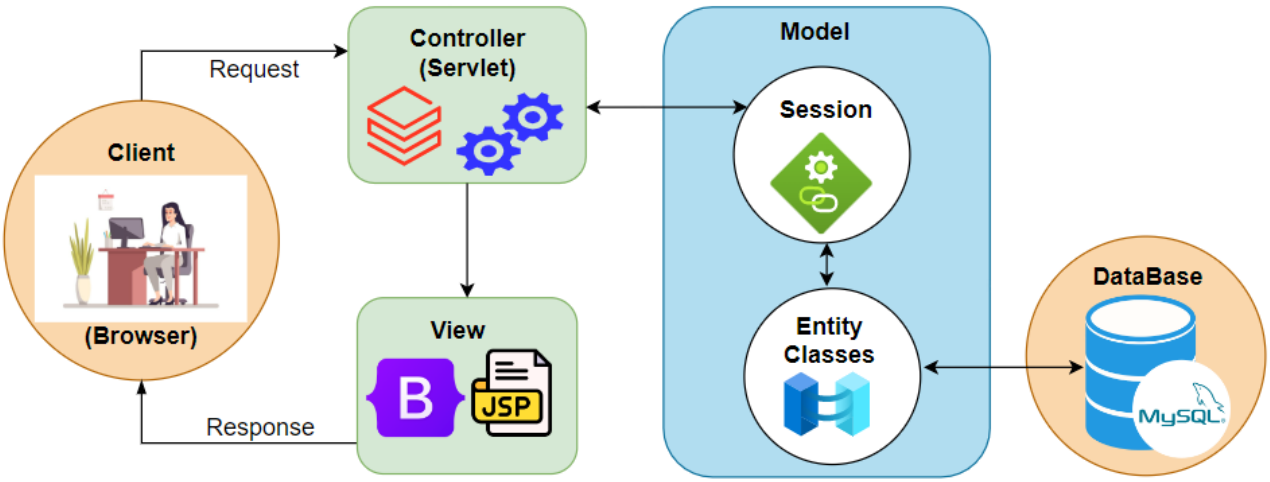


**Fig. 2 Pattern MVC**

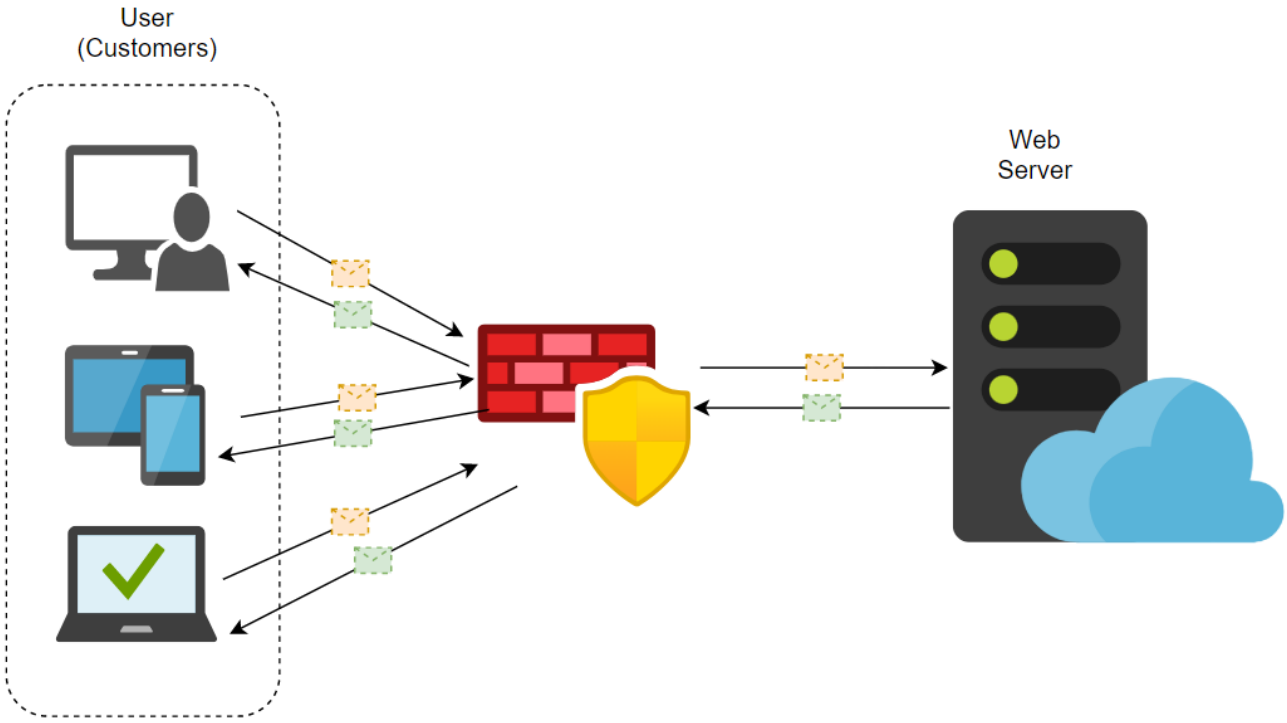


**Fig. 3 Architecture**

Table 3 shows the present research product backlog, where the scrum team, together with the stakeholders, assigns priority and estimation to each user story.

## 4. Results and Discussion

### *4.1. Development of Prototypes by User Stories*

*One Sprint*

The HU that has been considered in this Sprint are 3 HU01, HU02, and HU03. Table 4 of the mentioned HU's to be designed is attached below.

Figure 4 refers to the main interface of the HU01 ID to the end user, which is the citizens of Lima.

**Table 3. Product backlog**

| ID | User Stories | Priority | Estimate |
|---|---|---|---|
| HU01 | Main Form | Medium | 3 |
| HU02 | Register, Edit User | Medium | 5 |
| HU03 | Administrator Profile | High | 10 |
| HU04 | Product Listing | Medium | 6 |
| HU05 | Add, Edit Product Brand | High | 10 |
| HU06 | Register, Edit Products | High | 10 |
| HU07 | Add, Edit Store Distribution | High | 10 |
| HU08 | Add, Edit Department | High | 10 |
| HU09 | Search Products | Medium | 6 |
| HU10 | Search by Brand | High | 8 |
| HU11 | Filter by Product | High | 10 |
| HU12 | Search by Store | High | 8 |

**Table 4. Sprint defined**

| Sprint | ID User Stories | Development time |
|---|---|---|
| Sprint 1 | HU01, HU02, HU03 | 12 days |
| Sprint 2 | HU04, HU05, HU06, HU07, HU08 | 18 days |
| Sprint 3 | HU09, HU10, HU11, HU12 | 17 days |

**Table 5. Sprint 01**

| Release | ID | User Stories |
|---|---|---|
| Sprint 1 | HU01 | Main Form |
| | HU02 | Register, Edit User |
| | HU03 | Administrator Profile |

This form of Fig. 5 of ID HU03 is intended for the user who is going to manage the web page for updating the price of the basic family basket products.

The following Fig. 6 shows the HU02 ID form to add and update the users with administrator roles, who, with this profile, will be assigned as needed.

*Second Sprint*

In this section, the following ID's have been estimated, which are: HU04, HU05, HU06, HU07 and HU08. In the next line, table 6 is added to design the sprint prototypes.

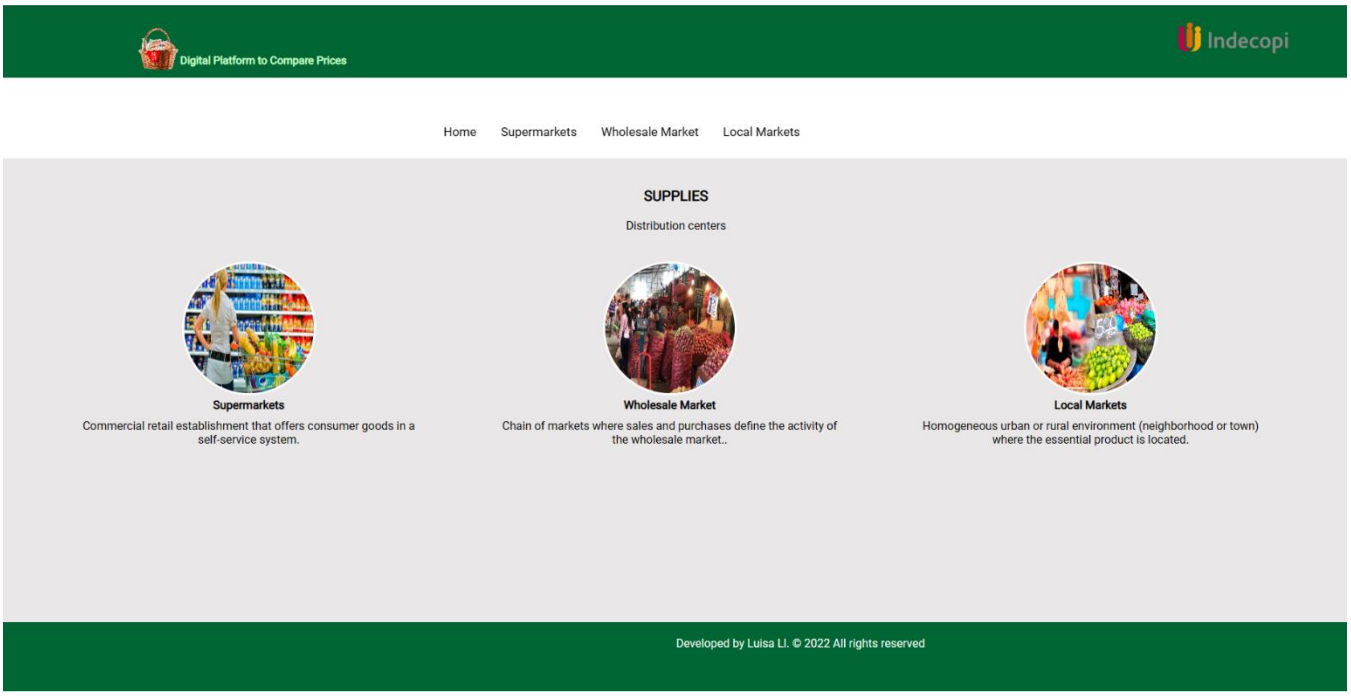


**Fig. 4 HU01 main form**

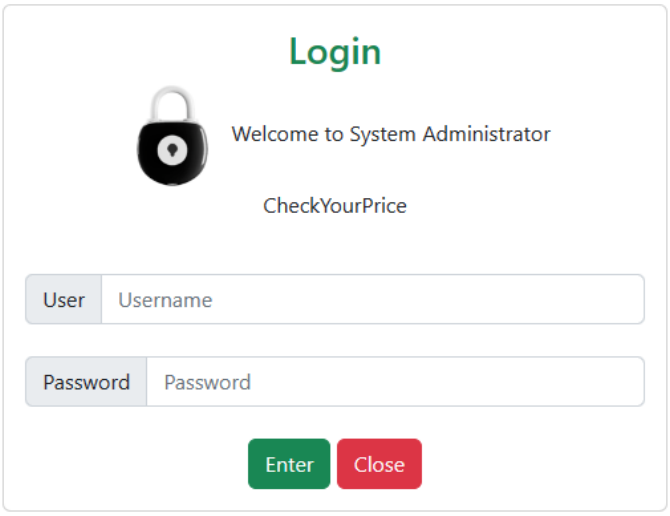


**Fig. 5 HU03 administrator profile**

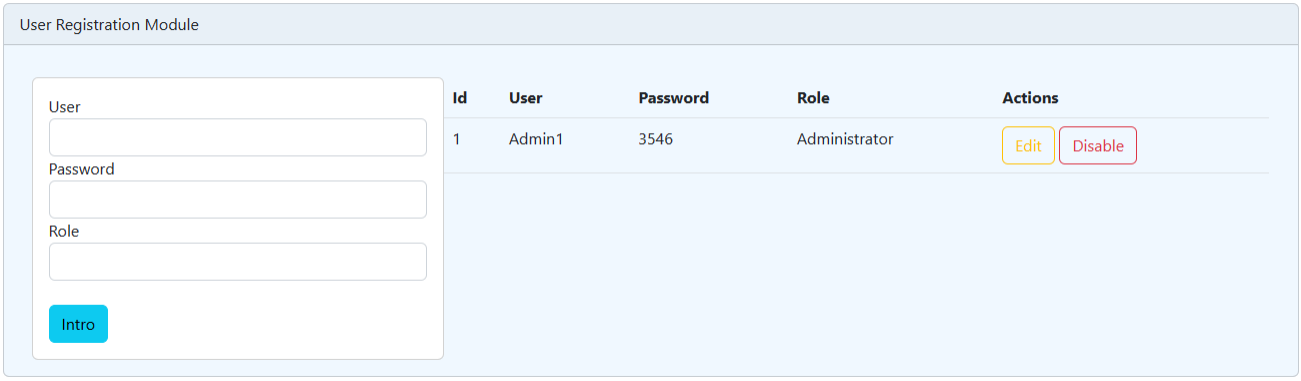


**Fig. 6 HU02 register, edit user**

**Table 6. Sprint 2**

| Release | ID | User Stories |
|---|---|---|
| Sprint 2 | HU04 | Product Listing |
| | HU05 | Add, Edit Product Brand |
| | HU06 | Register, Edit Products |
| | HU07 | Add, Edit Distribution Store |
| | HU08 | Add, Edit Department |

Continuing with the following, Fig. 7 as a query response, the end user will get a list of products where it will show the district, distribution center, address, telephone, and reference price.

The order of following Fig. 8 of HU comes to be a trademark registration module and its edition if the case warrants it.

The HU of Fig. 9 refers to the form to register new products; in the inserted capture, you can see its relevant attributes.

The function of Fig. 10 is to update the data and, most importantly, the price of the products in accordance with external changes in the national economy or other events that require it to be updated.

On the other hand, Fig.11 has considered a module for establishment or store, which also has its respective attributes and functionalities for its correct administration. In addition, a prototype of a form to update the attributes of the store has been considered.

Following the previous form by clicking on the action column and editing where it will allow to update the store if it changes its name. From the indicated, we have Fig. 12 that adds in the following line.

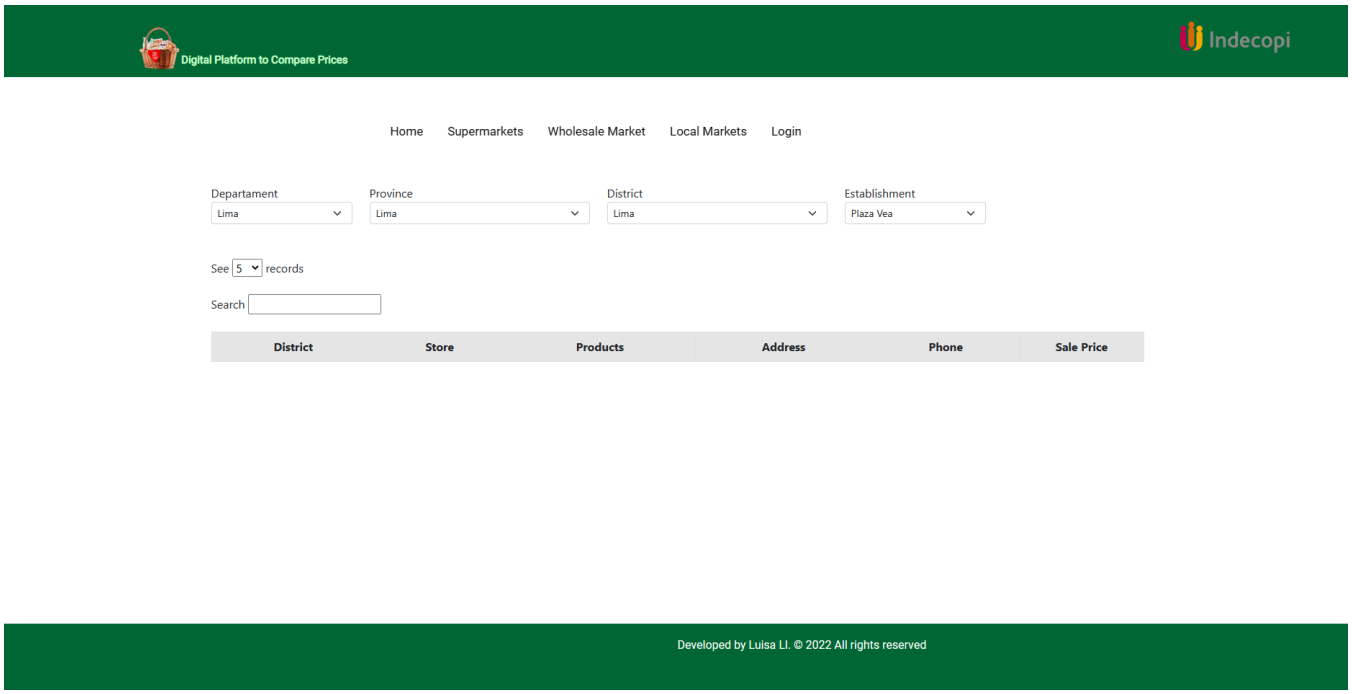


**Fig. 7 HU04 product listing**

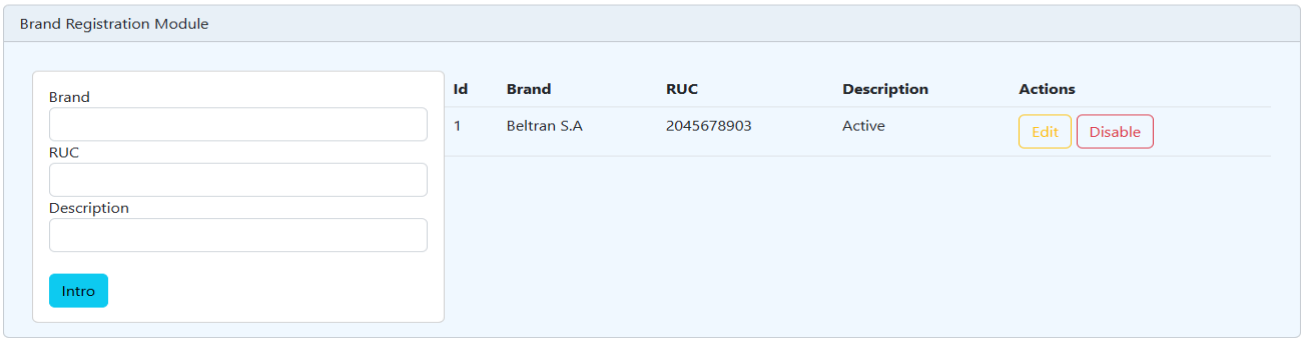


**Fig. 8 HU05 add, edit product brand**

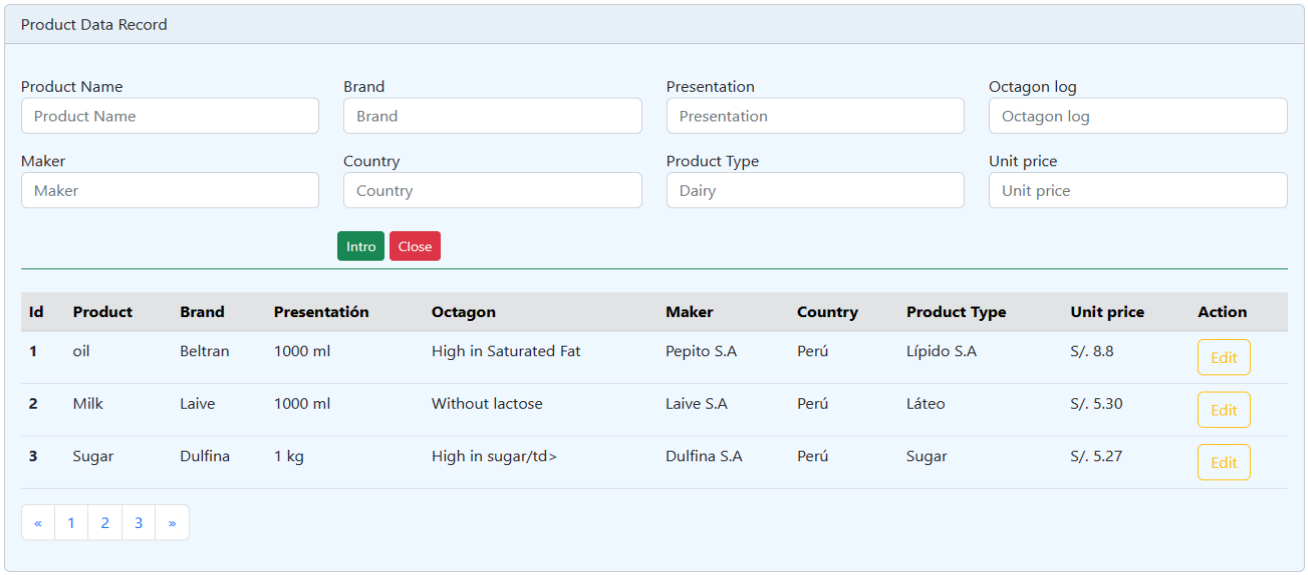


**Fig. 9 HU06 register products**

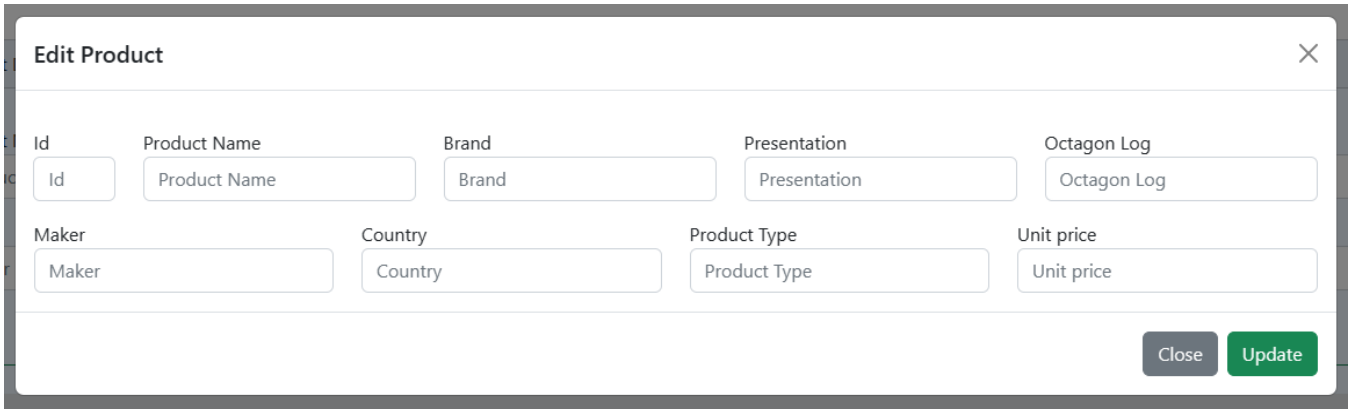


**Fig. 10 HU06 edit products**

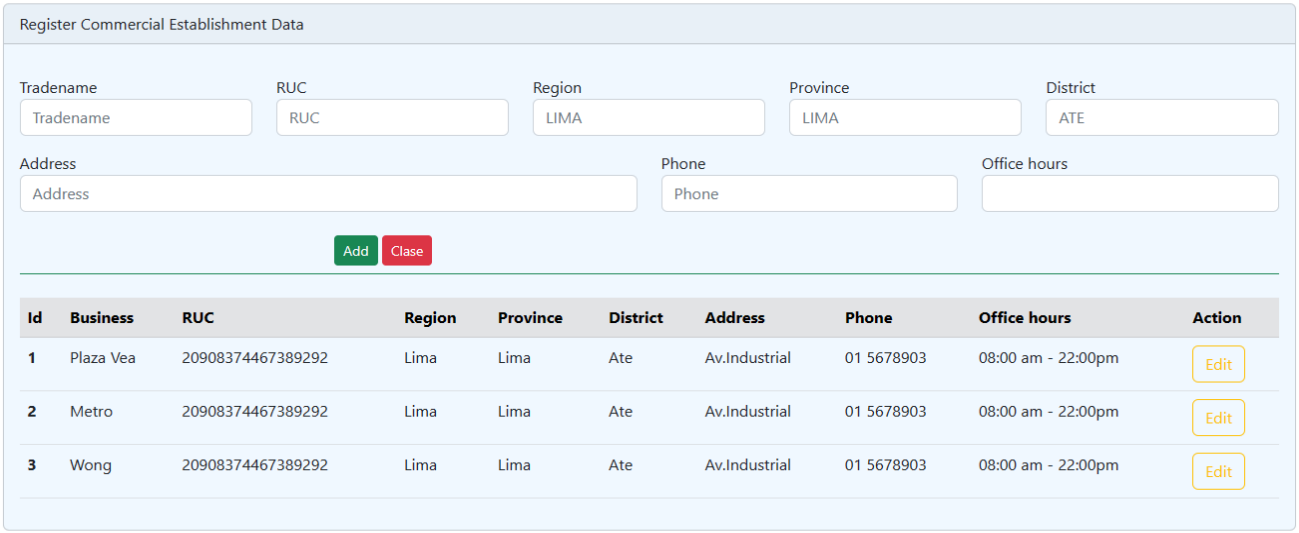


**Fig. 11 HU07 add distribution store**

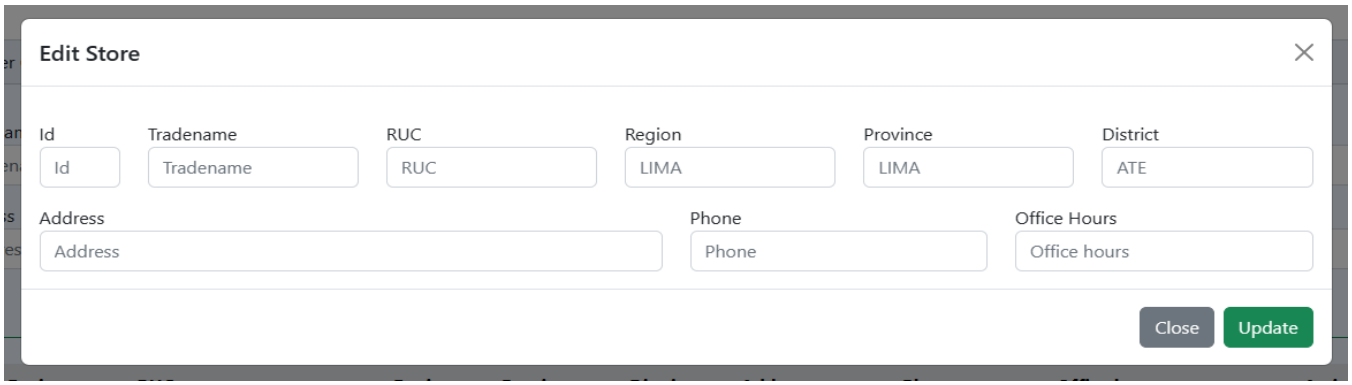


**Fig. 12 HU07 edit distribution store**

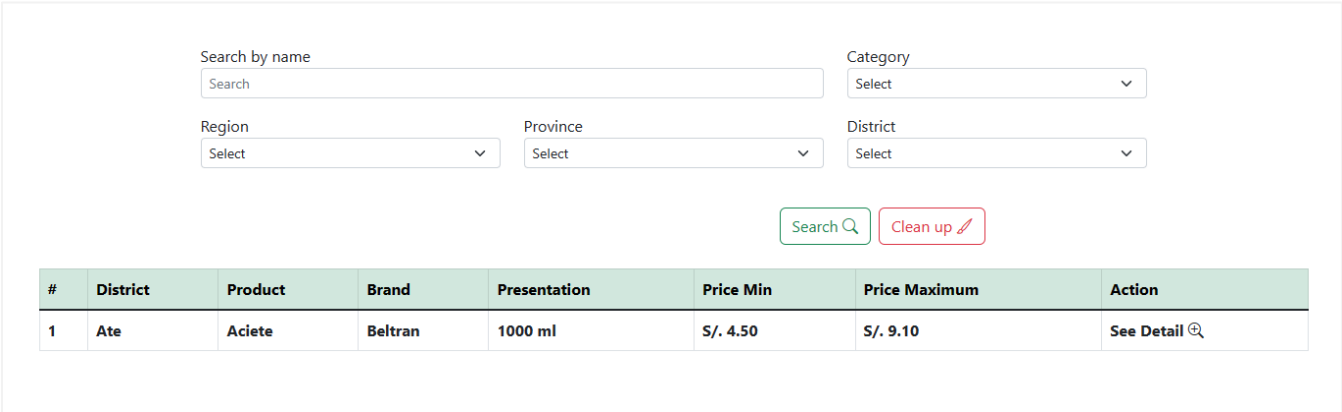


**Fig. 13 ID's HU09, HU10, HU11, HU12**

**Table 7. Sprint 3**

| Release | ID | User Stories |
|---|---|---|
| Sprint 3 | HU09 | Product Search |
| | HU10 | Search by Brand |
| | HU11 | Filter by Product |
| | HU12 | Search by Store |

**Table 8. Scrum board**

| Epics | Ended |
|---|---|
| Security Module | HU01: Main Form |
| | HU02: User Register, Edit |
| | HU03: Administrator Profile |
| Maintenance Module | HU04: Product Listing |
| | HU05: Add, Edit Brand Products |
| | HU06: Register, Edit Products |
| | HU07: Add, Edit Shop Distribution |
| | HU08: Add, Edit Department |
| Query functionality | HU09: Product Search |
| | HU10: Search by Brand |
| | HU11: Filter by Product |
| | HU12: Search by Store |

*Third Sprint*

In closing, we can say that the prototype design of the web page that manages the price of basic family basket products has been completed. The items of this SP 03 are: HU09, HU10, HU11, and HU12; in lines below are shown (Table 6) of the completed design development sprint.

This module, shown in Fig. 13, has the function of displaying information by product name, brand, and store, and when completed, it will only show what is required. On the other hand, when selecting category, region, province, and district, it will list all the products of the basic food basket of the store that has been selected.

### *4.2. Results and Validation*

*4.2.1. Scrum Results*

The application of the scrum methodology in this research confirms its reliability. However, considering its components at each stage during the development of the prototype of this web application. In (Table 9) according to Scrum Board, its completion is evidenced.

As a result, it is necessary to narrow down the differences found between the traditional model methodology and scrum; thus, the following table is detailed.

**Table 9. Differences in methodologies**

| Waterfall | Scrum |
|---|---|
| • Predictive model.<br>• Relay race, to start a phase, you have to finish the previous one.<br>• Hierarchically organized<br>• Complete objectives<br>• Controlled in time, budget, scope and quality. | • Adaptive model.<br>• Holistic.<br>• Allows parallel execution of tasks.<br>• Responsibility for tasks is shared by all team members.<br>• It is self-managed.<br>• Incremental deliveries with continuous value.<br>• Time-controlled. |

**Table 10. Questions**

| Dimensions | ÍTEMS |
|---|---|
| Quality | 1. About the design of the web application, Is the prototype presented agreeable to you?<br>2. In your opinion, would the design be easy to understand and navigate? |
| | 3. About the design of the web application, Would you use a web page that compares the price of the products?<br>4. Do you think a web application would make it easier for you to decide where to buy?<br>5. Do you think Indecopi should consider this web page for its price disclosure? |
| | 6. About the design of the web application Do you consider that the web application will be useful for the citizens?<br>7. Does the web application show purchase alternatives regarding product pricing? |
| Time | 8. About the design of the web application, How often do you access web pages? |
| | 9. Regarding the response time of the application for you, should the response to the consultation be immediate? |
| Availability | 10. Would the web page help monitor the price of basic foodstuffs?<br>11. Will the web application allow to optimize search hours and store selection? |
| Continuity | 12. Do you consider that prices should be updated monthly?<br>13. Will citizens verify the price of products with the different distribution stores? |

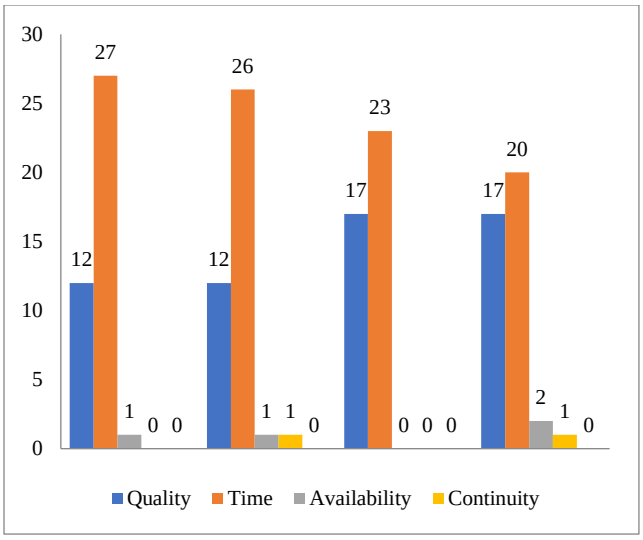


**Fig. 14 Result of the questionnaire**

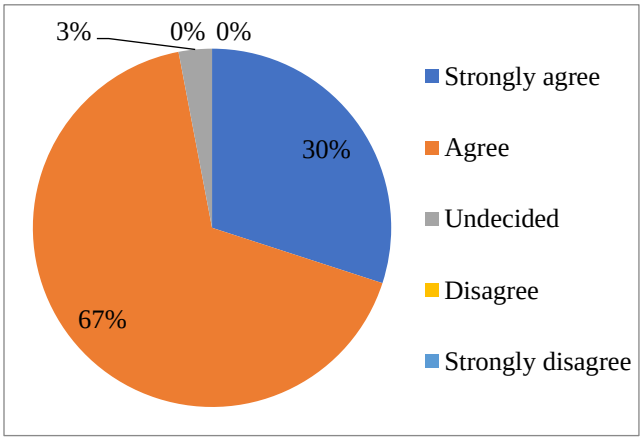


**Fig. 15 Result range**

*4.2.2. Population*

This research is aimed at the residents of Metropolitan Lima; a questionnaire of 13 closed questions was elaborated considering the Likert scale, where a representative sample of 40 citizens has been considered. On the other hand, to measure the results of the dimensions considered, which are quality, time, availability, and continuity. The survey technique and the questionnaire instrument (Table 10) were used and completed by the citizens of Metropolitan Lima; the results obtained can be seen in (Fig. 14).

Next, the validity obtained by the measurement instrument is evaluated and where the authors point out. [27].

The questionnaire has the following characteristics of closed questions. Strongly agree (1), Agree (2), Undecided (3), Disagree (4), Strongly disagree (5).

*4.2.3. Sample*

For the project, a sample of 40 people has been taken for the probability sampling of the population considered.

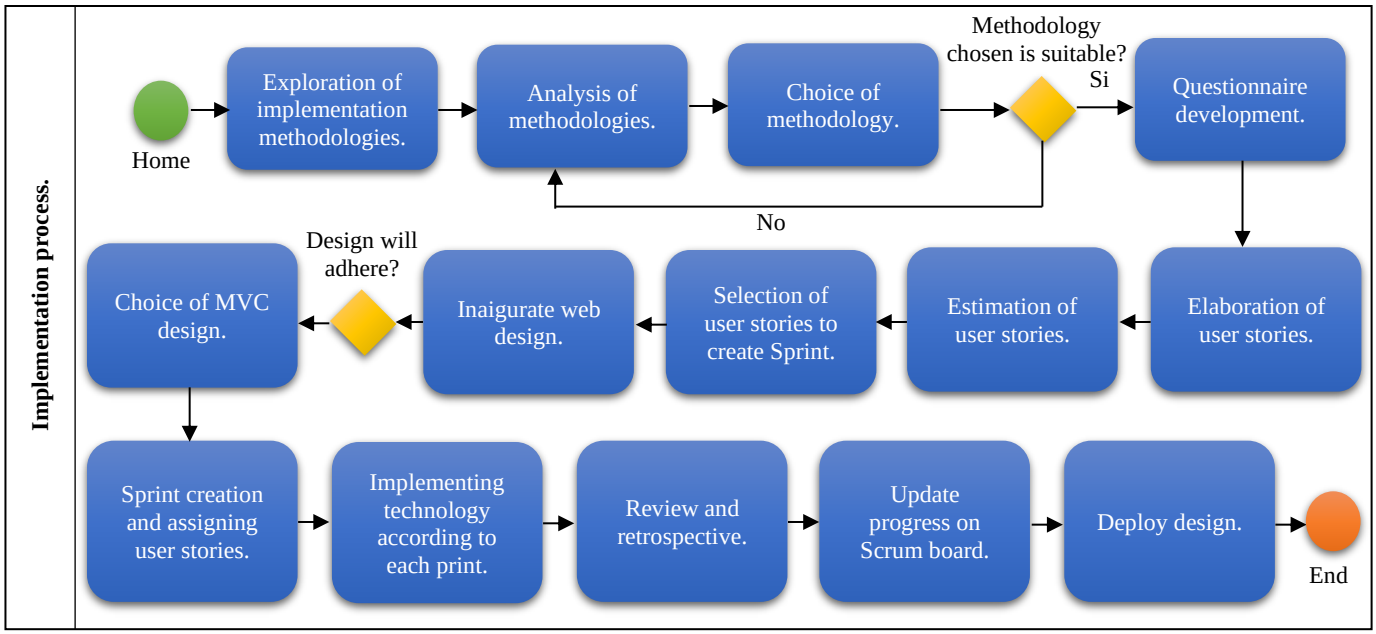


**Fig. 16 Implementation process**

**Table 11. Cronbach's rating level**

| Interval | Valuation |
|---|---|
| [ 0 - 0,5] | Unacceptable |
| [ 0,5 - 0,6] | Poor |
| [ 0,6 - 0,7] | Weak |
| [ 0,7 - 0,8] | Acceptable |
| [ 0,8 - 0,9] | Good |
| [ 0,9 - 1] | Excellent |

**Table 12. Cronbach's reliability**

| Reliability statistics | | |
|---|---|---|
| Cronbach's alpha | Cronbach's alpha based on standardized items | N of elements |
| ,855 | ,870 | 13 |

*Dimensions*

The attached image shows the measurement of the dimensions selected for this research, which indicates that the sample is concentrated in a range of 50% - 67% in the alternative Agree in each dimension.

*Survey Analysis*

Cronbach's alpha was used for data analysis, and Cronbach's alpha was used as a guideline [28]. The interval achieved for this research project, according to Cronbach's Alpha, is .855 with the rating Good, which indicates that the citizens of Lima require a web page for price disclosure.

The attached table is the result of the analysis of Cronbach's coefficient applied to the instrument proposed for this work.

*4.2.4. Methodology Implementation Process*

The following Fig. 16 is the sequence of the implementation process from the inquiry of the research methodology and the whole process of development of the methodology according to the proposed structure. This provides a more detailed understanding of the tasks executed in each item.

## 5. Conclusion

The present research on the design of a web page for the disclosure of the prices of the products of the basic family basket, with the purpose of replacing the publication of prices in a PDF and Excel file by the Indecopi entity, has been completed. Hence, the development of the website prototype has been successfully completed according to the objectives set. As a first point, the development methodology was identified under the SCRUM structure, where the HU to be designed was defined, followed up with the Scrum board and Sprint Burndown Chat. In addition, in order to define the development and research methodology, different bibliographic sources have been consulted.

As a second point, for the construction of the design, Bootstrap structure was used so that the designed HU can be visualized clearly and understandable for the citizens of Metropolitan Lima because the design is aimed at them. In addition, the design has been categorized into two levels of search by product and store distribution. In closing, the dimensions declared for the design are successful since for each dimension, it is 50% - 67% in the alternative Agree. Thus, the reliability of the questionnaire was evidenced according to Cronbach's Alpha, 855, with a value of Good and Cronbach's Alpha based on standardized items, 870.

In conclusion, an excellent result was obtained regarding the design of a web application prototype directed to the needs of the population residing in Metropolitan Lima. Firstly, we conclude the development of the implementation methodology oriented to the prototype design based on the SCRUM structure, according to the web application's architecture, which has important results, see [20,21,30]. In addition, this progress leads to the implementation of the web page in the future, where it is proposed for public use. Secondly, implement a web application usage meter module and capture application valorization control and thus adjust to the need and convenience of the user. Finally, the application orientation is scalable according to the evolution of technology.

## References


[1] C. Carhuavilca Bonett et al., "50 Years of Demographic Changes and Trends," *National Institute of Statistics and Informatics*, p. 210, 2022. [Publis her Link]

[2] Indecopi, Product Comparison Guide, Lima, Perú, 2021. [Online]. Available: https://www.gob.pe/es/i/2083136

[3] Sangha Han et al., "COVID-19 Pandemic Crisis and Food Safety: Implications and Inactivation Strategies," *Trends in Food Science & Technology*, vol. 109, pp. 25-36, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[4] Vladimir Rodríguez Cairo, "View of Constitutional Regime of the Currency and Stability of the General Level of Prices in Peru," *Derecho PUCP*, 2020. [Google Scholar] [Publisher Link]

[5] Rodrigo Valdes, "The Role of Fuel Prices in the Spatial Transmission of Prices in Horticulture Markets in Developing Countries," *Magazine of the Faculty of Agricultural Sciences - UNCuyo*, vol. 53, no. 2, pp. 1853–8665, 2021. [Google Scholar] [Publisher Link]

[6] Elizabeth Pasteris, "Pricing Policies in Retail Markets with Multi-Product Sellers," *Leeward M.B.A.*, no. 30, pp. 20-31, 2019. [CrossRef] [Google Scholar] [Publisher Link]

[7] D. R. Carhuavilca Bonett, Evolution of Monetary Poverty 2008-2019, Lima, pp. 1-182, 2020. [Online]. Available: https://www.inei.gob.pe/media/cifras_de_pobreza/informe_pobreza2019.pdf

[8] G. E. Reyes Ortiz, "Pacific Alliance Countries 2000-2021: Effects of COVID-19 on Growth and Economic Recovery," *Finance and Economic Policy Magazine*, vol. 13, no. 1, pp. 99–113, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[9] Joao Ribeiro, "Food Inflation in Peru: The Role of Monetary Policy," *Economic Analysis Magazine*, vol. 34, no. 2, pp. 81–98, 2019. [CrossRef] [Google Scholar] [Publisher Link]

[10] P. Saralegui Díez, "Changes in Consumption Practices in COVID-19: Challenges for Agroecological Scaling from Consumption," *Journal of Ibero-American Anthropology*, vol. 17, no. 1, pp. 117–145, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[11] Bladimir Morales-Cahuancama et al., "Analysis of the Distribution of Macronutrients in Food Baskets Delivered by Municipalities during the COVID-19 Pandemic in Peru," *Peruvian Journal of Experimental Medicine and Public Health*, vol. 39, no. 1, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[12] BEI, "Foreign Trade Prospects in the International Scenario of 2022," *ICE Economic Bulletin*, no. 3145, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[13] C. Fernandez Collado, and P. Batista Lucio, *Research Methodology*, 6th Edition, Interamericana Editores, S.A. DE C.V, vol. 59. p. 634, 2015. [Google Scholar] [Publisher Link]

[14] Marco Vinicio Estrada-Velasco et al., "Systematic Review of the Scrum Methodology for Software Development," Rev. Cient., vol. 7, pp. 434–447, 2021. [Google Scholar] [Publisher Link]

[15] L. Usatorre, Online Market for Suppliers and Capital Goods, 2020.

[16] R. A. Carrera-Aguirre, D. V. Ponce-Ruiz, and L. O. Albarracín-Zambrano, "Web for Professional Training in Titling Processes," *Interdisciplinary Arbitrated Journal Koinonia*, vol. 6, no. 11, p. 117, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[17] E. Gual, L. Soft, and S. Plus, Web Platform for Simulation of Physical Phenomena, *Revista Odigos*, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[18] Joel Antonio Blanco-Rivera, "Trends and Challenges in Creating Metadata in Web Archiving Projects," *E-Information Sciences*, vol. 12, pp. 79–95, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[19] S. B. Ramirez, B. A. S. Diestra, and M. A. Cano Lengua, "Implementation of a Virtual Store to Exponentiate the Flow of Product Sales in a Private Company in the City of Lima," *IEEE Engineering International Research Conference*, pp. 1–4, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[20] Jean Carlo Palomino Gonzales, Miguel Angel Cano Lengua, and Laberiano Andrade-Arenas, "Multiplatform Mobile: Post-COVID-19 Patient Management in Lima, Peru," *International Journal of Engineering Trends and Technology*, vol. 70, no. 10, pp. 415–427, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[21] Joel Ricardo Ligarda Motta et al., "Implementation of a Mobile Application : Sales Optimization in a Peruvian Company," *International Journal of Engineering Trends and Technology*, vol. 70, no. 11, pp. 58–69, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[22] Martina Díaz-Rosado et al., "Automation of Large-Scale Diagnostic Assessments through the SCRUM Methodology," *Technological Awareness*, 2018. [Google Scholar] [Publisher Link]

[23] Gabriela Sobrevilla et al., “Applying Scrum and Software Engineering Practices for the Continuous Improvement of the Development of a Cyber-Physical System,” *Electronic Journal of Computing, Informatics, Biomedical and Electronics*, vol. 6, no. 1, pp. 1–15, 2017. [Google Scholar] [Publisher Link]

[24] K. Schwaber, and J. Sutherland, *Scrum Guide V7*, Agile Metrics: Agile Health Metrics for Predictability, pp. 133–152, 2020.

[25] Diego Javier Bastidas-Logroño, Espíndola-Lara, and Alex Darío Palma-Rivera, “Implementation of Bootstrap as an Agile Methodology on the Web,” *Interdisciplinary Arbitrated Journal Koinonia*, vol. 5, no. 9, pp. 268-286, 2020. [CrossRef] [Google Scholar] [Publisher Link]

[26] Doina R. Zmaranda et al., “An Analysis of the Performance and Configuration Features of MySQL Document Store and Elasticsearch as an Alternative Backend in a Data Replication Solution,” *Applied Sciences*, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[27] Ronald Toro et al., “Empirical Analysis of Cronbach's Alpha Coefficient according to Response Options, Sample and Atypical Observations,” *Rev. Iberoam. Diagnosis and Evaluation – and Psychological Assessment*, vol. 63, no. 2, p. 17, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[28] Kleeder Bracho Pérez, and Andry Ardila Moreno, “Comprehension Strategies and Interpretation of Argumentative Texts in Higher Education Students,” *Electronic Journal on Education and Pedagogy*, vol. 4, no. 6, pp. 56–68, 2020. [CrossRef] [Google Scholar] [Publisher Link]

[29] J. M. Ordax Cassá, Web Programming in Java, Madrid: Ministry of Education and Vocational Training of Spain, 2013. [Online]. Available: https://elibro.net/es/ereader/utpbiblio/49347

[30] Mayorga Lira Sergio Dennis, Laberiano Andrade-Arenas, and Miguel Angel Cano Lengua, "Credit Risk Analysis: Using Artificial Intelligence in a Web Application," *International Journal of Engineering Trends and Technology*, vol. 71, no. 1, pp. 305-316, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[31] Enrique Lee Huamaní et al., "Design of an IoT Prototype for the Prevention of Robberies in the Young Areas of Lima," *International Journal of Engineering Trends and Technology*, vol. 70, no. 9, pp. 111-118, 2022. [CrossRef] [Google Scholar] [Publisher Link]