Proceedings of the 3rd Asia Pacific International Conference on Industrial Engineering and Operations Management, Johor Bahru, Malaysia, September 13-15, 2022

Project Management Model Applying Agile, Design Thinking and Lean Methodologies for the Improvement of Customer Service in an Insurance Brokerage SME

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Abstract

The following article is based on the approach of a project management model that aims to solve business problems from an innovative perspective, based on consumers' needs. This model is based on integrating Design Thinking, Agile and Lean methodologies. The case of a brokerage insurance Peruvian company was analyzed, which perceived various drawbacks around the customer service area. This article recognizes the most appropriate improvement for the case studied, by following the steps of the adapted management model; starting with the traditional stages of Design Thinking to make a precise diagnosis of the situation and with this information, improvement proposals that solve what has been identified are established. Subsequently, the most appropriate improvement is selected under objective criteria, and sprints that allow making good use of Agile are organized to develop the specific execution using a sequence of steps according to the PDCA cycle, a characteristic technique of Lean where the goal is to ensure a constant reevaluation of processes. After the results obtained from the simulation of the studied process, an increase in attention span of 88% was obtained, which allows us to calculate a significant economic benefit in the company that would represent 29.25% of the revenues achieved in 2021. In conclusion, it's possible to validate the proposed model, verifying its original properties of adaptability and replicability without limit of scenarios regarding the sector, area, or company size due to the great synergy existing between the three innovative methodologies unified for the development of the proposed model.

Keywords
Agile, Design Thinking, Lean, PDCA cycle, Continual improvement.

1. Introduction

In today's days, the service experience has become a differentiating element for consumers when choosing companies that offer various products or services. However, a greater selectivity is shown with companies that provide services, since customers do not finalize the transaction with tangible elements, so the main attraction is the treatment received (Julca, et al., 2021). For Theresia and Tan (2021), services that require periodic payments must have good and constant communication with customers, because this will increase their trust in the company and establish bonds of loyalty.
To achieve success, companies must focus on the constant analysis of needs and manage projects based on them, which allows adding value and raising the bar in the market to satisfy increasingly demanding customers (Arias-Bareño, 2020). As stated by D'Mello (2018), there is a high interest among stakeholders in the insurance sector to implement innovation projects, because the benefit that these would bring to the experience of consumer users is recognized.

Certain methodologies work as key tools to achieve process innovation (Lichtenthaler, 2020). According to Ciappi, et al. (2016), Lean has been a revolutionary concept in the business world, which is recommended to be implemented by companies that wish to achieve successful results in the short term. Like Design Thinking, Lean is a methodology based on obtaining immediate customer satisfaction through continuous consultation. Furthermore, both Lean and

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Design Thinking have been successfully integrated with the Agile methodology independently. In the case of Design Thinking, for example, this approach can be used to promote good communication between developing technologies and the customers served. While the integration of Lean and Agile can be used to sustainably optimize processes in companies through a reduction in attention times and better usage of resources (Pereira and Russo, 2018 and Agarwal, et al., 2021).

According to Arias-Bareño (2020), integrating the three mentioned methodologies increases the probability of achieving objectives in less time. For its application, it is important to know how to recognize when to choose to use these methodologies together or independently for specific processes of the same project.

Articles about the integration of Agile, Design Thinking, and Lean methodologies, beyond confirming their viability, show that this alliance strengthens the scope of a business by increasing its resolution and innovation capacity (Dobrigkeit, et al., 2020; Lichtenthaler, 2019; Ximenes, et al., 2015). From the theoretical research carried out based on the results of successful companies worldwide, which have obtained favorable results by implementing novel improvements based on one or more of the methodologies above; Lichtenthaler (2019), concludes that the appropriate combination of these methodologies can achieve an increase in the flexibility and agility of innovation processes.

Studies focused on the experience of consumers in the insurance industry, allow us to recognize the importance of originality in these processes to achieve a higher level of satisfaction. Following the article by Khan and Reddy Alla (2021), which seeks to understand the relationship between customers and companies in the sector through a study carried out in the United Arab Emirates; it is evident that the implementation of measures that increase the protection of clients, as well as the reduction of incidents, allow reaching a level of satisfaction above the average, thereby generating added value in the company compared to the market. In addition, Guzmán-Ortiz, et al. (2020) present a study based on 4 insurance companies that operate in different regions of Peru with a similar orientation, which advice engaging with new emerging technologies, since they lead to a concrete and feasible adaptation to process innovation through digital transformation, which in turn contributes to reinforcing the quality of customer service.

According to an article published by Chiu and Len (2020), customer loyalty equates to the level of engagement and their desire to re-consume the products or services provided in the future and to recommend them to other customers. The importance of customer satisfaction has been demonstrated since it is directly related to loyalty. Nevertheless, it should be noted that this relationship has always been questioned, because there are certain cases in which, despite having delighted customers, they seek to change suppliers for additional reasons. Even so, it is worth emphasizing that, in most cases, satisfied customers are the ones who remain most loyal to their provider.

In this way, the importance of having a reliable procedure to quantify customer satisfaction and brand loyalty is detected. One of the most outstanding and used measurement techniques is the Net Promoter Score (NPS); a method that was designed and implemented for the first time in 2003 by Fred Reichheld. This consists of analyzing the responses to a single question: “How likely is it that you would recommend our company/product/service to a friend or colleague?”, which will range on a scale of 0 to 10. Interviewees who respond with a 9 or 10, will be known as "Promoters", responses with 7 or 8 will be known as "Passives", and finally, those who respond in the range of 0 to 6 will be called "Detractors". The final value of the NPS is found by subtracting the percentage of "Detractors" from that of "Promoters" (Baquero, 2022).

1.1 Objectives

According to the presented framework, the objectives of the research were adequately raised, being the main one to demonstrate the impact of a management model based on Agile, Design Thinking and Lean methodologies, through a case study. From this, certain goals were identified that guided the course of this research, called "specific objectives". These are the following:

- Evaluate the feasibility of integrating Agile, Design Thinking and Lean methodologies in a management model
- Evaluate the effectiveness and replicability of the proposed project management model
- Identify the appropriate tools to optimize an area or problem in the application of the management model

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According to the experts of each of the methodologies, it is possible to affirm that a management model developed from Agile, Design Thinking and Lean will have a positive impact on a company of any kind, which is why this article will seek to demonstrate this first hypothesis through a case study.

In addition, the following hypotheses are proposed:

- The integration of Agile, Design Thinking and Lean methodologies in a management model is feasible
- The proposed project management model is effective and replicable in different sectors, regardless of the size of the company
- It is possible to identify the appropriate tools to optimize an area or problem in the application of the management model

2. Literature Review

For the current project, a deep investigation of the state of the industry was carried out which will seek to validate the management model based on innovation methodologies, in order to recognize the main indicators and standards of the insurance category. According to data compiled from the international consulting firm McKinsey & Company (2022), can appreciate an increase in the income of the insurance companies for the year 2021, which represents a recovery of these in the face of the difficulties that were created due to the COVID-19 pandemic. This happens the same way; both in the companies in America, and the whole world **(see Figure 1)**.

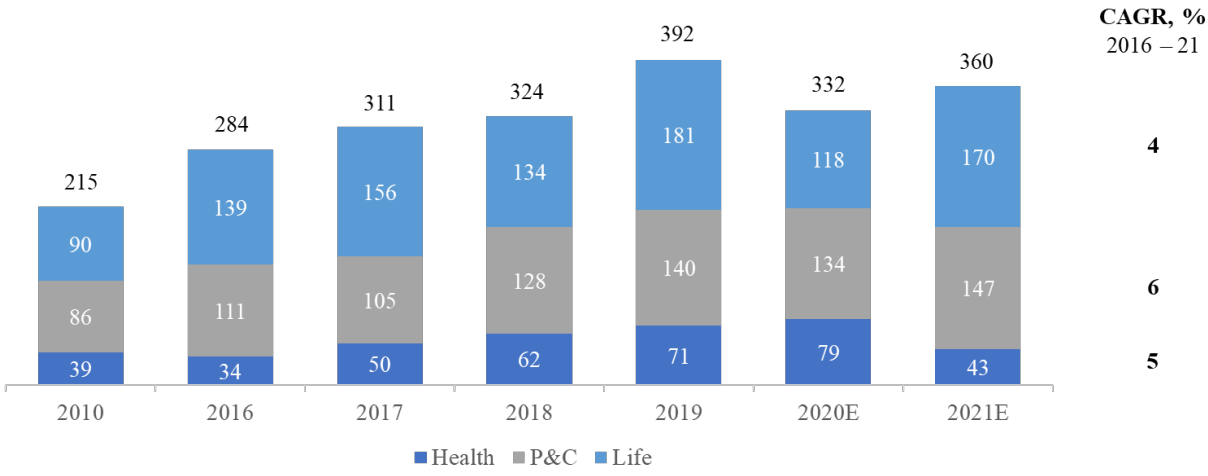

Figure 1. Global insurance after-tax profits (USD$ Billions), McKinsey Global Insurance Pools (2022)

Additionally, a notable peak can be seen in the insurance sector in Latin America compared to the rest of the places covered by the research **(see Table 1)**, since it is the geographical sector with the highest growth in insurance issuance, mainly health, vehicle, and housing classifications.

Table 1. Insurance market development by region 2021 (USD$ Billions), McKinsey Global Insurance Pools (2022)

	Motor	Fire and property	Liability	Accident	Other P&C	Health	Total
North America	3.1	4.8	3.2	1.3	4.1	4.8	4.3
Western Europe	1.9	2.8	3.3	2.3	3.2	3.2	2.7
Emerging Asia	-2.3	2.4	16.5	4.5	7.7	10.4	4.1
Developed Asia	0.8	3.6	3.9	3.5	-2.5	2.5	1.9
Latin America	4.3	9.5	10.7	10.2	11.6	8.6	7.9

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Africa and Middle East	4.2	6.3	7.3	5.1	9.4	7.2	6.0
Eastern Europe	3.1	3.0	1.2	15.2	3.8	1.6	4.0
Total	1.6	3.6	3.4	2.9	3.6	4.4	3.5

After decades of stable performance, nowadays insurance is destroying the value of the industry in which half of the participants fail to recover their costs of capital (McKinsey & Company, 2022). This has been demonstrated with around 50% of the companies in the sector trading on the stock market for less than their book value in the last 5 years, as can be seen in the following graph **(see Figure 2)**. This means a high probability of a tie-up regarding the development of this market, principally for independent companies since an action strategy is not being generated regarding the evidenced situation, which could result in a strong effect on the insurance sector in the long term.

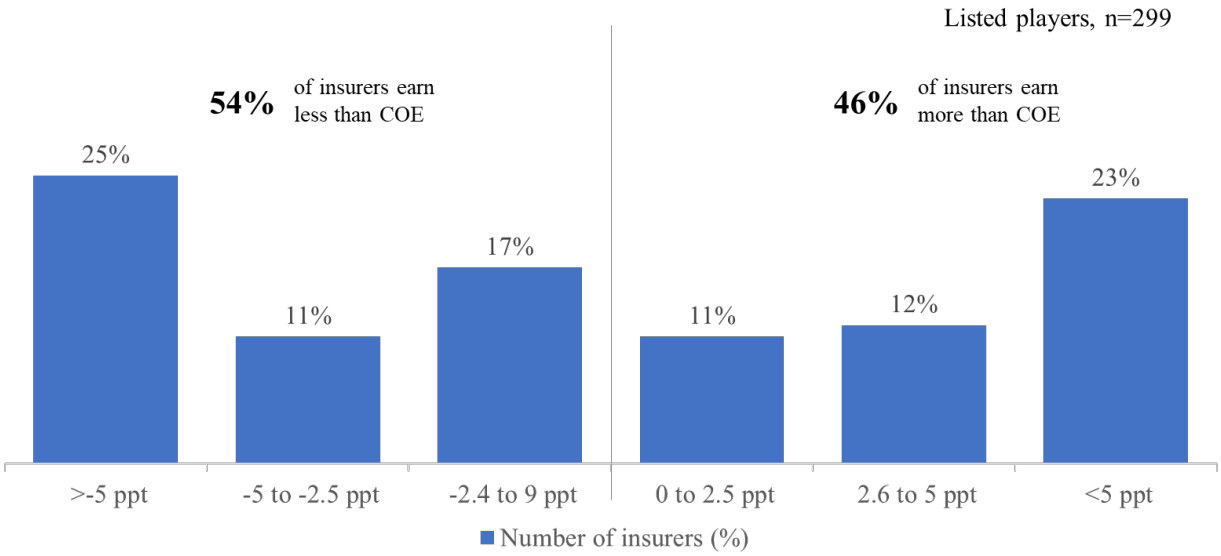

Figure 2. Cost of capital average distribution in the Insurance market, McKinsey Global Insurance Pools (2022)

On the other hand, according to Ernst & Young (2022), workers in the sector seek greater tolerance in work schedules and demands in terms of deadlines. For this reason, 54% of employees in this sector have shown a willingness to resign if their flexibility preferences are not met.

Finally, it is possible to highlight that the participation of insurance brokers is stopping in the growth curve, since from 2005 to 2015 there was an increase of at least 30% in all regions of the world, while, from the beginning of 2015 to 2020 their participation; for example, in America, it has only increased by 1% **(see Figure 3)**.

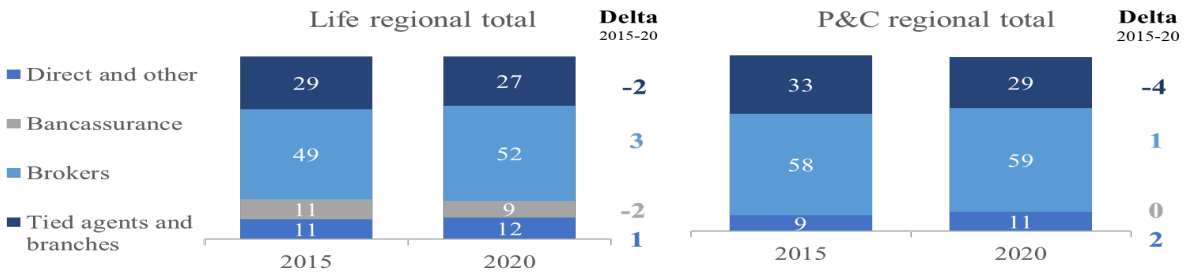

Figure 3. Participation growth by policy type and distribution channel in America, McKinsey Global Insurance Pools (2022)

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Design Thinking:
According to the British academic Nigel Cross (2011), the researcher responsible for developing the first design courses, among which is Design Thinking, it is important to recognize that human beings have a long history with this methodology, and this is reflected in artifacts and creations acquired in different civilizations throughout history. However, there are people with greater easiness and interest in designing, thanks to them, inquiries have been developed that allow constant growth in the field of design, such as the following methods for investigating their capabilities: interviews with designers, reflection, theorizing, and, especially, the observation of case studies, as well as experimental studies and simulations. The methods have made it possible to optimize the study of Design Thinking through insights, which continue to be evaluated to this day.

Agile:
Ken Schwaber and Jeff Sutherland are the two main creators of the Agile methodology, which enables better method development through evolutionary planning, adaptation, and response. The gurus mentioned are also the designers of the initial version of Scrum and in their latest joint publication, the book The Scrum Papers (2012) highlights an important quote related to the methodology in question: "Agile has to do with experimentation and the ability to inspect and adapt as an empirical approach".

Lean:
Dr. Jiju Antony is a recognized expert in the Lean methodology, mainly in the Six Sigma philosophy, this allows to reduce time, effort, and costs of manufacturing and services of a company; it also stands out for eliminating waste and optimizing processes, increasing efficiency in search of a Lean company. It should be noted that achieving the results in the development of this methodology is not so easy, since the execution of the project is generally abandoned after the theoretical approach of the implementation, giving up the measurement of results and demonstration of the viability of Lean ideas. (Antony, 2021).

3. Methods
Throughout the present investigation, it was sought to apply the three methodologies mentioned above to verify their joint efficiency. The implementation of an improvement in customer service in a Peruvian insurance brokerage SME with 15 years of experience and approximately 10 workers is shown below. Following the steps of the model, an implementation plan could be drawn up comprising a 4-phase process presented in the table below **(Table 2)**.

Table 2. Improvement implementation phases for the case study

Phase	Scope	Techniques	Instruments
Preliminary diagnosis	Identify the main difficulties that the company maintains	Systematic literature review	Background table (Excel)
		Semi-structured interview	Semi-structured interview guide
		Customer surveys	Questionnaire
		Identification of root causes	Ishikawa diagram
Implementation design and validation	Develop strategy and following steps to achieve improvements in the customer service area	Evaluation of improvement proposals Setting improvement schedule	Agile methodologies
Improvement proposals implementation	Instruct and guide workers in the appropriate usage of methodologies	PDCA Cycle	Gantt Chart
			Training plan
Evaluation of results and feasibility	Analyze the viability of the proposed implementation through the established indicators	Process simulation	Arena Simulation Software
		Process performance measurement	Comparison chart

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As shown in the previous table, the first phase covers the preliminary diagnosis, in which a study and analysis of the initial situation of the company was carried out, following the process observation technique, and implementing semi-structured interviews aimed at workers who maintain direct communication with the insurance contracting parties. This was done following the first part of the model in which Design Thinking is applied to empathize and understand the main problems, which allowed obtaining an accurate vision of the main problems involved in customer service; based on this, the root causes were detected and reflected through an Ishikawa Diagram. The latter allowed identifying the most relevant causes to proceed with the next phase, the implementation.

The second phase consisted of two stages; the design and validation of the management model, following the development of the Agile methodology where the aim is to internalize and become experts in the problem to be solved, to continue with the elaboration of the improvement proposal, a stage of the project that is created in conjunction with Lean methodology, following the characteristic process of this methodology called PDCA cycle (Plan, Do, Check, Act). The design was based on structuring a specific process with the steps to follow to improve customer service in the company. In addition, improvement implementation deadlines were established through a Gantt Chart. From this stage, specific corrections were made that allowed an ideal model to continue with the methodological sequence.

Subsequently, the phase called "Implementation of improvement proposals" was carried out, which is aligned to the second segment of the PDCA cycle, referring to simulating the start-up of the proposed improvements, following the third methodology of the model. Finally, the evaluation phase of the implementation results was developed through a simulation model. This process includes the Check & Act subgroups and allows the generation of conclusions about the viability and conformity of the interested parties with the integration of innovative methodologies for the improvement of customer service based on the case studied. For this, the results of the post-implementation indicators were considered and a comparative table was prepared that allowed obtaining a better overview of the changes achieved in the present study.

For the measurement of each of the phases, which include customer service as the main dimension, 4 main variables were considered with their respective indicators, considering the article Impact of digital transformation on the individual job performance of insurance companies as the main reference in Peru (Guzmán-Ortiz, et al., 2020).

Among the variables is the responsiveness of customers, measured by the indicator (Average number of customers served per day per worker); service uniformity, calculated through service time per customer and the average number of customers served per day per worker; empathy in care, quantified through the level of customer satisfaction (NPS). Finally, the reliability of customers is reflected in the percentage of satisfied customers per day per worker.

Next, a graph is presented to visualize the relationship between indicators and variables used to measure progress, as well as the interference that includes the intervention in the area of customer service **(Figure 4)**. These indicators will make it possible to quantitatively analyze and compare the state or situation of the company in the studies before and after the implementation of the integrated methodologies.

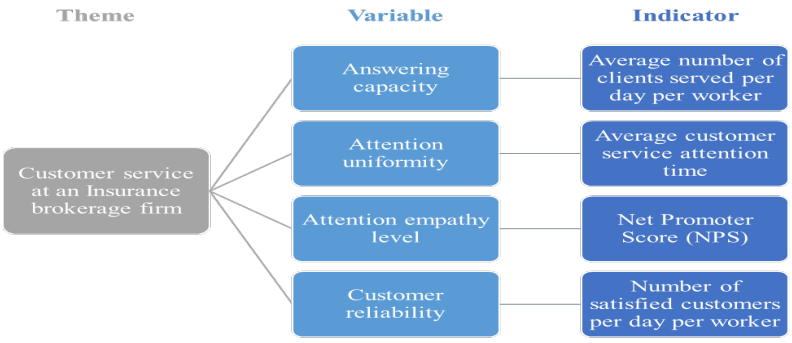

Figure 4. Variable-indicator connections

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4. Data Collection

To develop an integral diagnosis of the company under study, the insurance sector's quality of attention and user satisfaction were collected through a survey aimed at the general public, to later be able to contrast it with the opinion of direct customers and thus recognize improvement opportunities. For the following analysis, the sample size was calculated taking into consideration 20,000 people as the maximum population allowed by the formula, the number of people to be surveyed to find out their level of satisfaction with the care provided was determined through the sample size formula (Arias-Baroja, 2005).

$$n = \frac{N \cdot Z^2 \cdot \sigma^2}{(N-1) \cdot e^2 + Z^2 \cdot \sigma^2}$$

Equation 1. Sample size formula

Table 3 presents the values used to develop the calculation of the sample size by applying the previously mentioned formula (Equation 1).

Table 3. Sample size calculation

Statistical data	Symbol	Value
Population standard deviation	σ	0,5
Population size	N	20000
Confidence level	p	90%
Confidence coefficient	Z	1,645
Acceptable margin of error	e	0,057
Sample size	n	207

This is how it was defined that by surveying 207 insurance users, representative data would be obtained regarding the level of loyalty and satisfaction with the care received by the company under study. To collect this information, a brief questionnaire was prepared and distributed to recognize the population's level of satisfaction with the attention received from the insurance sector. The main findings of this survey were the following:

- Percentage of clients who contracted their insurance with a broker: 53.4%
- Percentage of clients whose case was resolved: 83.3%
- Level of satisfaction with the service provided (NPS): 46.3%

For the present study, a private company dedicated to insurance brokerage in Lima, Peru was taken as a reference. This company has 15 years of experience in personalized advice to companies and individuals; as well as a wide portfolio of products. The company's customer service area is made up of 03 workers and each one of them performs a different task to collaborate with the after-sales service of its consumers. There is a person dedicated to making collections, another dedicated to dealing with legal matters, and the third focuses on providing direct advice on particular cases of insurance users. The company's share of the Peruvian insurance market is known to be 6%. Relevant data of this SME in the Peruvian market is shown below **(see Tables 4 and 5)**

Table 4. Company's income variation in the last 5 years

Year	2017	2018	2019	2020	2021
Annual income (USD$)	19.721,10	22.613,42	33.419,73	88.389,86	132.594,52

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Table 5. Company's number of clients in the last 5 years

Year	2017	2018	2019	2020	2021	2022(*)
Number of clients	82	125	212	450	700	1600

(*) Expected projection.

The survey described previously was adapted and distributed to 187 customers of the company under study right after receiving attention from the customer service area. The results obtained lead us to specify the following indicators:

- Level of satisfaction with the service (NPS): 88.89%
- Response rate: 9.73%

Likewise, the personnel of the customer service area were interviewed to recognize their perspective regarding the initial situation of the service by the company, to contrast these results with the previously presented opinion of the clients. These interviews also made it possible to distinguish the processes that each sub-area follows to serve its policyholders. The summary of these interviews is shown in **Table 6**.

Table 6. Main problem detections in customer service by workers

	User experience area	Collection area	Legal area
Main customer dissatisfaction	The company does not send complete characteristics of the insurance acquired and the details of the service they provide when purchasing a policy.	Receive calls exclusively to ask them for their payment regularization	Delay of insurance companies in responding to their claims
Main difficulty in achieving customer satisfaction	Lack of preparation towards health crises by staff	The communication of the company is not very fluid between areas. This generates discomfort in customers due to cross-examination, reprocessing, improper charges, and delays	The saturation of insurance companies generates disgust in customers since they do not resolve claims or reimbursements on time.
	Low agility of attention due to the lack of staff		
Improvement proposal for the area	Establish attention protocols	Periodically provide benefit information and insurance updates to clients	Provide clear information about the status of the process through a service tracking system
	Implement tools which help attention staff develop their tasks in a simpler way	Facilitate the automatic information of punctual policy data	

In addition, through a time study in the working day of the 03 workers focused on the study area carried out by the company's quality area, the established indicators were compiled to quantify the progress after the improvement. In the stage before implementation, the results shown below were obtained.

- Average customer service time: 6 minutes
- Average number of clients served per day per worker: 33 clients
- Average number of satisfied customers per day per worker (under the perception of the worker): 28 customers
- Customer satisfaction level (low worker perception): 8/10

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5. Results and Discussion

Once the most relevant data of the present case study was collected, the following results were obtained, which led to simulate a realistic scenario where the impact of the joint methodologies is proven, allowing the calculation of its economic impact. Also, a subsequent discussion will evaluate the feasibility of the applied model and its future replication.

5.1 Graphical Results

The main findings extracted from the survey and interviews reflect that; although the company prioritizes dedicated customer service to maintain customer loyalty over time, innovative processes have not been established to facilitate and ensure an efficient and effective relationship with consumers. That is why there have been disappointments, both on the part of the beneficiaries due to delays, reprocesses, improper charges, and lack of staff preparation; as well as by care workers, who are saturated due to the high workload, lack of motivation, protocols and tools that facilitate routine procedures. Taking this information into account, an Ishikawa Diagram was developed **(Figure 5)**, to find the root causes of the main problem detected, low customer loyalty rate.

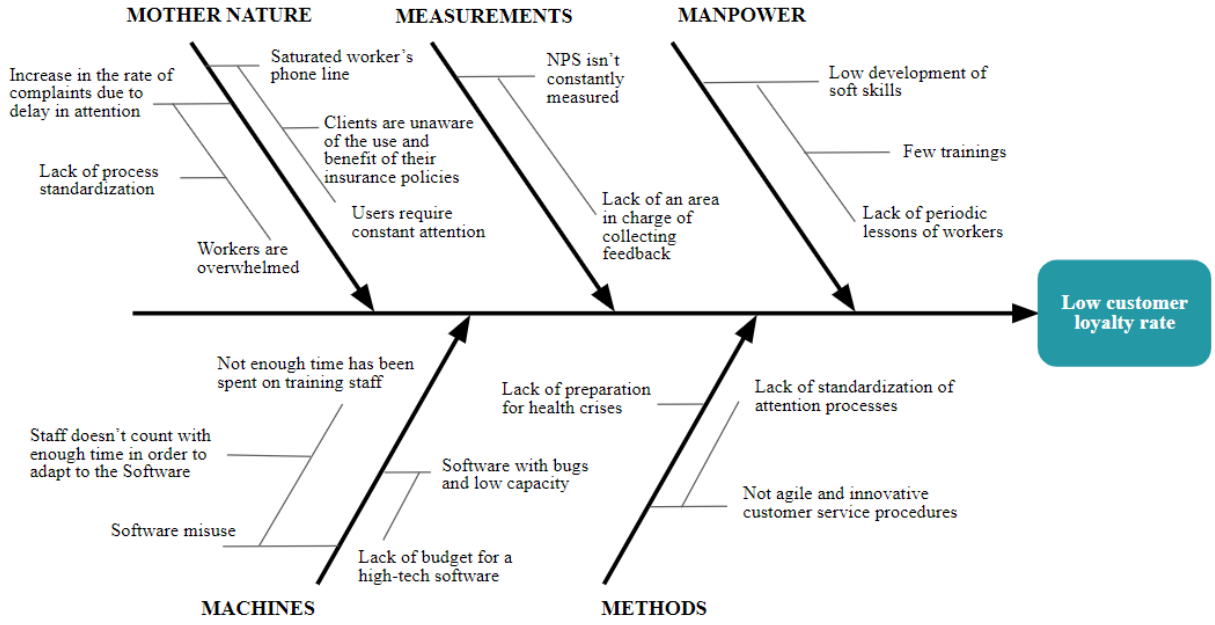

Figure 5. Ishikawa Diagram

This tool allowed us to identify as root causes, the lack of knowledge of the uses, benefits and characteristics of the policies contracted by the clients, because this occupies the important time of the workers; and the lack of standardization of the attention process, which generates procedures that are not very agile and makes communication cumbersome for both the worker and the client. From this, the implementation plan was drawn up with the following Gantt Chart **(Table 7)**.

Table 7. Gantt Chart

Activities	Week 1		Week 2		Week 3		Week 4		Week 5	
Employee training week										
Call for clients to take part in Insurance instructional conference										
Instructional webinar: Policy learning, Q&A										

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Quick response video development										
Weekly meeting to review improvement										
Customer feedback log										

5.2 Numerical Results

The results of the present investigation were obtained through a simulation developed with the Arena software. To obtain these results, the main variables were defined according to the identified processes that the company keeps prior to the implementation of the improvement. The variables for each service sub-area are established below **(see Table 8)**. It is worth mentioning that three events are established in the customer service process for each sub-area, these being the time of arrival; the start of operations, which can refer to the time of arrival of the same, as well as to the end time of customer service of the previous customer, a situation that generates waiting times that can reduce customer satisfaction; and end of operations or check out time.

Table 8. Definition of simulation variables

Entity	Resource	Activity	Event
Collection client	Collection worker	Customer service	Time of arrival (client)
			Start of operations
			Ending of operations
User experience client	User experience worker	Customer service	Time of arrival (client)
			Start of operations
			Ending of operations
Legal client	Legal worker	Customer service	Time of arrival (client)
			Start of operations
			Ending of operations

Based on the variables defined in Table 8, the structure of the simulation was developed from which it was possible to record and identify the results before and after the implementation of the improvement developed for the case study **(see Figure 6)**.

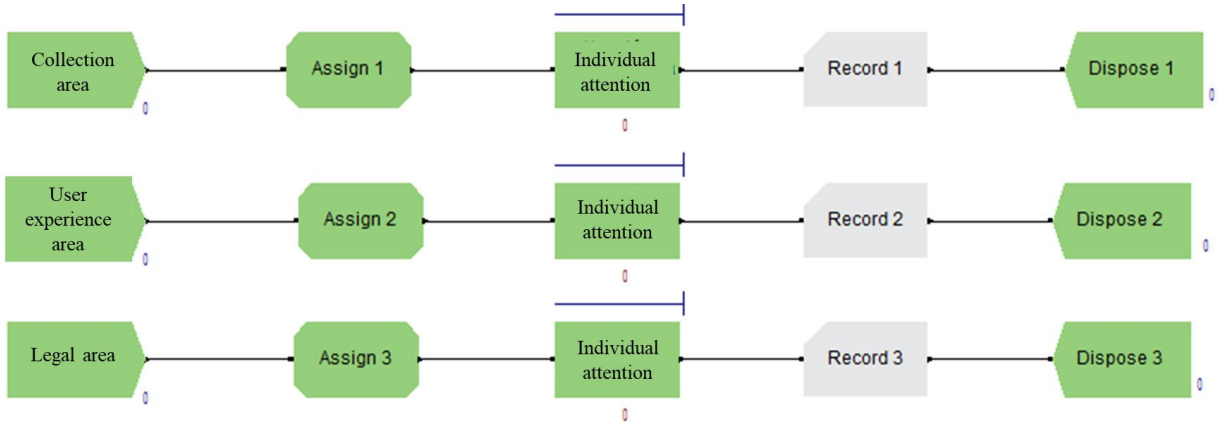

Figure 6. Simulation structure

Subsequently, the most representative values collected from the simulation before the implementation of the improvements will be presented **(see Tables 9 and 10)**. As the total time of the simulation, a period of 6 uninterrupted

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hours was considered, which is equivalent to the average time that workers use to serve customers in their daily work. In addition, for the legal area, a maximum of 5 clients served per day was considered.

Table 9. Initial collected values

Sub-area	Clients time arrival average time (minutes)	Attention average time (minutes)	Number of clients served per day
Collection area	7.5	12.12	39
User experience area	4.5	39.38	64
Legal area	32.5	20.19	5

From the implementations devised and developed following the proposed project management model, the following results were evidenced:

Table 10. Simulation results

Sub-area	Clients time arrival average time (minutes)	Attention average time (minutes)	Number of clients served per day
Collection area	4	4.77	86
User experience area	3.25	2.79	108
Legal area	32.5	12.53	5

There is evidence of a reduction in attention times in each of the workers, which has repercussions in mitigating the saturation in their tasks, approximately 7 minutes per client in the collection area, 36 minutes in user experience and 8 minutes in legal; and, consequently, direct customer service is reduced by an average time of close to 3 hours per worker in the area. This gap can be used to create a customer feedback record, as well as to organize the area and seek to improve service methods, once again applying this management model to achieve continuous improvement.

Table 11. The economic impact of the results

	Capacity before implementation	Capacity post-implementation
Customers served per day	103	194
Average monthly income per client (USD$)	16.00	16.00
Total annual income (USD$)	132,594.52	143,922.52

The time gap in favor of the workers will be adjusted to an increase in the service capacity of 91 clients per day. After that and considering that 65% of the clients served are new, it is possible to affirm that this increase in the capacity of the area will generate a growth in the annual income of the company of approximately 11,328 dollars. For this calculation **(shown in Table 11)**, the data specified in Table 4 and 5 were considered.

On the other hand, it is important to consider that the customer service area is not responsible for collecting new customers, so the money could be invested in the sales force of the commercial area, to find new customers or generate cross-selling with current customers.

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5.3 Proposed Improvements

The main purpose of this article was to develop an adequate management model to solve problems generated in the different areas of a company, regardless of its category or size, under an innovative perspective. This model is developed with a qualitative approach and a proactive intention. The project management model displayed below **(Figure 7)**, adapted from Ximenes et al. (2015) and Arias-Bareño (2020), seeks to unify three methodologies without losing their essence or the simplicity of the solution process, as well as the search for non-conformity through continuous improvement over time.

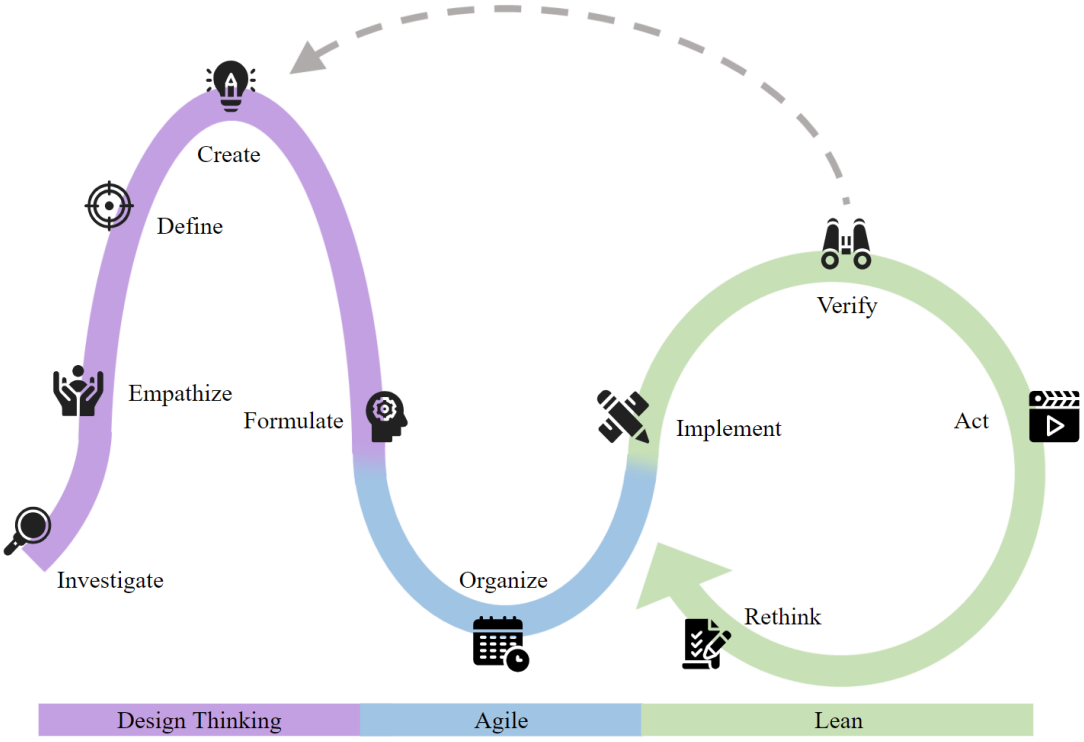

Figure 7. Proposed project management model

As shown in the previous scheme, the process of the proposed management model begins with **research**, which allows discovering the panorama of the initial state of the company. Then, the traditional stages of the Design Thinking methodology are developed, such as **"empathize"**, where the objective is to become an expert in the process that is sought to be improved to recognize the needs of the main stakeholders (customers, workers, managers) regarding the process. evaluated process. Next, in the **"define"** stage, the root causes that do not allow the company to perform in an ideal manner in the process studied are considered. Later, the **"create"** phase is carried out, in which the improvement proposals to be executed are defined; This makes it possible to draw the appropriate goal for the perceived situation based on the knowledge acquired throughout the previous study.

Then, the **"formulate"** phase is developed, which includes an alliance between the Design Thinking and Agile methodologies, in this stage, it is determined which activities of the process are the main ones to be corrected and from this, the improvement to be implemented to achieve the goal is delimited. Subsequently, times and stages are defined to organize the implementation of the proposed improvement. From this, the sprints to be addressed to specify the solution are proposed, always considering that they must be worked in an orderly manner, according to the impact that their resolution reflects for the client. After that, the implementation stage begins in which the Agile and Lean methodologies are merged. To apply the Lean methodology, the aim is to complete the PDCA Cycle (Plan, Do, Check, Act), starting from the Do phase, where the proposed solution would be carried out following the sprints proposed in the previous stage; The next step is called **"verify"**, where it is sought to check if the proposed objectives are being achieved as expected and analyze if the goal is achievable or not. In case of not finding a significant advance with the

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solution, it would return to the **"create"** phase corresponding to Design Thinking, to look for a different improvement proposal that achieves the expected changes and continue with the cycle.

Once the verification of the adequate implementation is completed, the **"act"** stage is reached, in which action is taken in the event of possible setbacks and an attempt is made to resolve them as soon as possible. Finally, the **"rethink"** stage is developed, corresponding to the Plan phase according to the PDCA, where new opportunities for improvement will be sought, which will allow the application of the philosophy of continuous improvement to be specified.

Quantitative and qualitative approaches have independent approaches in their way of classifying data; however, they are not necessarily mutually exclusive, as they can complement each other for more accurate and reliable results. In this way, the engineering tools classified as qualitative and quantitative must be chosen with ingenuity, depending on the profile or focus of the study that is being carried out (Rau et al., 2019). The proposed management model has been developed under this concept, allowing that, in case of using the model in a different situation, area, or sector, different types of engineering tools are chosen that are adapted to the circumstances, objectives and allow measuring the key indicators, always respecting the steps in which the structure of the proposed model was designed.

5.4 Validation

Everything indicates that a positive result was obtained after the simulation of the improvement scenarios designed under the proposed model since it is evident that the process followed to establish and implement the improvement in the case of the company studied was an efficient way to reduce time and tune up customer service processes. As the authors, Ganesh and Sunder (2021) as well as Nohuddin and Salleh (2019) affirm, a management model developed from innovative methodologies allows a greater scope of the solution that is evidenced both in the short and long term since it directs the ways for an adequate adoption of continuous improvement.

However, other authors disagree on the order of use of the methodologies during their integration into a management model. The case of Ximenes et al. (2015) with the Converge model, as well as that of the author Arias-Bareño (2020) with his Design Thinking, Lean and Agile Integration model. Both models consider the same methodologies; however, a different structure is assigned. The Converge model has a focus on software development, entrepreneurship and user experience that follows the following order of methodologies: Agile, Lean and Design Thinking. On the other hand, the Arias-Bareno model uses the same sequence as this research in its proposal to integrate them for proper project management.

After the investigation and experimentation carried out, greater effectiveness is evidenced in the order of methodologies applied in the model proposed by this investigation; however, it can be agreed with the authors that, with any of the models taken, the integration of these methodologies in the search for the solution to problems is successful and replicability is viable without restrictions of the sector, type or size of the company and even area. This can be verified in various articles such as Ximenes, et al. (2015) and Arias-Bareño (2020) since their different ways of combining the methodologies fail to influence the efficiency of the final result since in both studies the replicability of the adapted models is found as one of the conclusions. The principle of replicability of the management model based on the 3 methodologies is supported by the fact that various articles that, have the same objective for different uses and items, approve its viability.

Following the last of the objectives set for the research, engineering tools were used to carry out the management model according to the needs of the case study. Throughout the investigation, the measurement of times was carried out which allowed us to delve into the knowledge of the established processes of the company. From this, it was possible to define the root causes using the Ishikawa Diagram quality tool. After having found the first and second order causes of the main problem in the area: Low customer loyalty rate, the solution to be implemented was defined to mitigate the impact of the problem on customer satisfaction. Subsequently, the Gantt Chart was used to define the dates of meetings and monitoring of continuous improvement through sprints (a tool that's part of Scrum) and finally, the simulation of the implementation of the processes was developed to obtain results and reports that allowed recognizing the impact of the proposed improvement.

The precision of these engineering tools selected for each of the stages of the project is confirmed by the authors Rau et al. (2019), as well as Hernandez and Moreno (2021); who affirm that the aforementioned tools are commonly used in various engineering case studies. In addition, other authors such as da Silva et. al (2022) also used engineering tools to analyze and check the feasibility of projects with a similar scope.

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6. Conclusion

The present article managed to demonstrate the viability of a project management model based on the Design Thinking, Agile and Lean methodologies since the positive results were obtained in the case of application by following each of the steps established after the review of literature that allowed knowing the existing synergy between these innovation methodologies.

From the investigation and resolution of the practical case using engineering tools, it is feasible to conclude that these are versatile and allow optimal and rapid results to be achieved in any type of proposal or business area. The theory proposed by the authors Rau et. al (2019) classifies various techniques and instruments according to their scope by research topic; This is consistent with what was developed in the present case since what is established is put into practice by using tools that are consistent with the objectives set under criteria justified by the problem detected.

It is important to recognize that once the objectives set before the implementation of the management model have been achieved, all areas of the company must incorporate and maintain the philosophy of continuous improvement to see results with greater impact. This is demonstrated in the present study by finding new opportunities for improvement; Therefore, although it was possible to reduce times and increase customer satisfaction from the application of the management model for consumer service, it is detected that a greater impact would be obtained by reinforcing the company's sales force to take advantage of the positive economic effect obtained and thereby increase profitability. A further investigation could evaluate how to connect different areas for the implementation of the management model at the company level in its entirety.

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