14th Annual International Conference on Industrial Engineering and Operations Management
Dubai, United Arab Emirates (UAE), February 12-14, 2024
Publisher: IEOM Society International, USA DOI: 10.46254/AN14.20240345
Published: February 12, 2024

Risk Management Model Based on 5S and Work Standardization to Increase Efficiency in the process of disengagement in a Banking and Finance Sector Company

Jose Antonio Cornejo-Linares and Tomas Ferreyros-Sylvester
Facultad de Ingeniería. Universidad de Lima, Perú
20180497@aloe.ulima.edu.pe, 20183905@aloe.ulima.edu.pe

Martin Fidel Collao-Diaz
Research Professor
Facultad de Ingeniería. Universidad de Lima, Perú
mcollao@ulima.edu.pe

Abstract

The present study examined the impact of Lean service methodology and work standardization on the customer disengagement process in a Peruvian based company in the banking and finance sector. Data was collected before and after implementation to identify issues and design solutions based on 5S and work standardization. The results highlighted the significant impact of these methodologies on the customer disengagement process. By conducting root cause analysis using the problem tree tool, issues such as low standardization in creating letters and information request emails, delays in identifying responses to customers and relationship managers, disorganized databases storing historical communications, lack of standardization in comments for manager approval, and delays in confirming information receptions were identified. Implementing engineering solutions based on the mentioned methodologies, such as mass creation and standardization of information requests, setting up an automated flow for request reception, organizing and standardizing information databases, and eliminating unnecessary data within these, led to an 80% improvement in the disengagement process efficiency. The application of the 5S methodology and work standardization proved effective within the company. It allowed for the identification and addressing of root causes, resulting in time improvements such as a 94% reduction in registration and query time in the customer response reception database, a 66% reduction in time for sending requests to managers, and a 91% reduction in registration and query time in the manager's database. These contributed to reducing operational recurrence costs by over 70,000 Peruvian nuevos soles (PEN) per year. These findings underscore the importance of implementing Lean Service tools in the banking and finance sector to achieve greater operational efficiency and service quality for customers and stakeholders.

Keywords
Customer disengagement, Standardization, Lean service, Operational efficiency, Productivity

1. Introduction
With the fourth industrial revolution came the era of digitalization, sparking a rapid competition to transform the internal processes of multiple companies across various sectors into efficient digital workflows. This competition provides these companies with the capacity to reach and serve a vast number of clients. Within this context lies the issue addressed in our research work, where the current resources, valueless activities, and outdated, highly bureaucratic processes managed by the ethics and compliance division of a financial entity in Peru fall short in

handling the significant volume of clients to be disassociated due to unjustified suspicious operations. This situation exposes the financial entity to reputational risks and potential loss of commercial relationships with correspondent banks.

This research project aims to identify the main causes and reasons behind the existing disengagement process failing to meet the desired levels of effectiveness and efficiency as per market standards. It will propose solutions using industrial engineering tools that align with the issue and will measure and document the impact of implementing the proposed solution.

1.1 Objectives

The main objective of this research is to increase the productivity of the established steps in the customer disengagement process. Consequently, the aim is to achieve a significant improvement in the area's productivity, leading to better utilization of all resources employed in the process. Ultimately, this translates to better economic results and significant cost savings for the company.

Specifically, the project's objectives will be detailed as follows:

- Reduce the time for receiving, processing, and sending requests between field representatives and analysts by implementing automation and standardization of processes.
- Decrease response identification times by employing Business Process Management (BPM) methodologies.
- Reduce query and record times by applying 5s methodologies in the processes.

2. Literature Review

As the application of Lean tools in the banking sector has gained popularity, numerous scientific studies have addressed this topic, seeking to understand and analyze the outcomes obtained through its implementation. In this regard, various typologies of results found in the scientific literature have been identified, allowing for the examination and evaluation of the impact of Lean-based improvements in the banking sector. The objective of this section is to analyze the different results found in scientific articles related to the implementation of improvements in the banking sector through the use of Lean tools. In this context, Lean Management is proving more and more its legitimacy in services, especially in the banking sector (Tamtam & Tourabi, 2018). The application of Lean tools in the digital transformation of banks has demonstrated a positive impact on several aspects:

Waste elimination: In the banking realm, this may involve eliminating manual processes and automating routine tasks to reduce waiting times and errors (Ravi, Chourasia & Dr. Archana Nema, 2016). Continuous workflow: In digital transformation, technologies like artificial intelligence and machine learning can be employed to optimize and streamline processes (Villar, A.S. & Khan). Employee autonomy: There are crucial advantages of digital transformation for the business enterprises. It helps users to gain better experience, whether employees or customers (Havane, 2020). Continuous improvement: Digital transformation provides opportunities to gather and analyze data, aiding in the identification of areas for improvement (Randhawa, J.S. & Ahuja, I.S. 2017).

In conclusion, based on the present systematic literature review, the application of Lean tools in the digital transformation of banks has proven to be an effective strategy for enhancing operational efficiency, reducing costs, and increasing customer satisfaction.

An example of success in the application of Lean tools in the digital transformation of banks is the case of (Ravi, Chourasia & Dr. Archana Nema, 2016). The analysis of this case reveals that the effective implementation of 5S principles within an organization contributes to a secure environment, optimal space utilization, and enhanced quality. The findings of this investigation suggest that service industries, including hospitals, hotels, banks, and higher education institutions, have successfully employed lean principles and tools to boost their competitiveness. Specifically, 5S methodology, which governs item storage and organizational order maintenance, fosters improved coordination among employees and heightened staff productivity. It also results in reduced service times and increased customer satisfaction. Moreover, 5S establishes the foundation for creating an organizational culture centered around continuous improvement. As a quality and value-oriented business model, 5S is deemed suitable for service industries.

The success of the 5S program is attributed to the active engagement and strong cooperation of all organization staff members.

As another example of success, the investigation of a paper that focuses on the case of Unicredit, examining the use of innovation and lean methodology in the context of digital transformation. Unicredit's case suggests that lean banking should be viewed as a methodology of change rather than merely a cost reduction strategy. The paper concludes by highlighting the original contributions of providing a detailed analysis of Unicredit's lean management and banking strategy and offering a practical framework for lean management and digital transformation in the banking and financial sectors (Angelo Riva & Luciano Pilotti 2018).

3. Methods

After conducting the necessary investigation, it was planned to carry out a case study with the implementation of a pilot test in the ethics and compliance division to quantify and demonstrate the impacts that the improvement project had regarding the timelines and budget invested in implementing the improvements.
Four consecutive phases were identified:

The first phase was based on background research and the design of the state of the art. A complete process flowchart and a PRISMA diagram were applied as main tools.

The second phase aimed to conduct an analysis and diagnosis of the identified problems. To identify these problems and their main causes, a Pareto diagram and a Systematic Interrogation Technique were used. In addition to conducting a comprehensive time study before applying the pilot test, relevant indicators were obtained to quantify the impacts.
In the third phase, a solution proposal was designed, developed, and implemented based on models proposed by engineering tools such as 5S, BPM, and Lean Service. The third phase concluded with the implementation of the pilot test.

The fourth phase involved a study after the pilot test, and the indicators were re-measured once the improvements were applied to verify the results obtained.

Below is a table detailing the 4 phases and their main characteristics (See Table 1).

Table1. Steps of the applied Methodology

Phase number	Phase	Techniques	Tools	Validation
1	Develop the background and state of the art of the project.	Background investigation of the institution, the sector and the tools	Flowchart, Prisma	Field research and data extraction
2	Perform analysis and diagnosis of the problem using engineering tools	Root cause analysis, Problem Tree. Objective Tree	Systematic interrogation technique, Pareto diagram, Time study	Field data research and extraction, and validation with employees
3	Design and develop solution proposals.	Lean Service Standardized work	5S BPM	Pilot test
4	Validate the solution, assess its economic feasibility, and its impact on relevant stakeholders	Economic and social impact of the improvements	(VAN, TIR, PR)	KPIs

4. Data Collection

An exhaustive analysis of each activity in the disengagement process was carried out, with the collaboration of division analysts, measuring times and delays. The process comprises 4 main activities and will be described below.

The process begins when the compliance officer makes the decision to disengage the client conducting the suspicious operation that was reported. Subsequently, the investigating analyst initially assigned to the case sends a letter to the client requesting them to substantiate their operations and indicating that if there is no response or if the response is unsatisfactory, they could be disengaged. Then, the client's response is waited for a period of 5 business days, and upon receipt, it is identified, received, and recorded in the received information database. The approval is then requested from the sector specialist assigned to the client in order to proceed with the disengagement. The response from the sector specialist is awaited, identified, and recorded in the database. With the sector specialist's approval, the deposit management department is instructed to close the client's associated accounts. Finally, upon receiving confirmation from the deposit management department, a letter is sent to the client notifying them that their accounts have indeed been closed, and a restriction is placed preventing them from requesting new bank products. The Figure 1. shows the Process Activity Diagram (PAD), detailing the mentioned operations and inspections.

Figure 1. Process Activity Diagram (PAD)

Analytical course (DAP)								**Operarie/material/equipment**
Diagrama N°: 1 Hoja N°: 1								
Object: Review of tasks within the termination of a client relationship.								
Activity: Termination of a client relationship.								
Method: **Actual**/ Proposed								
Place:								
Workers: 3								
Composed by: Jose Cornejo Date: 2/10/2023 Approved by: Tomas Ferreyros Date: 2/10/2023								

Summary			
Activity	Actua l	Proposed	Econ
Operation	5		
Transport	0		
Waiting time	2		
Inspection	2		
Storage	2		
Distance(m)	-		
Time (min-hombre)	94		
Cost: Labour work Material	84,96 PEN		
Total			

Description	Dist. (m)	Time	○	⇨	D	□	▽	Observation
Creation and sending of a letter		13 min	X					Manual according to client´s profile
Waiting for the customer's response		5> days			X			Within 0 – 5 days
Identification of the customer's response		5 min				X		
Documentation of the customer's response		9 min					X	
Creation and sending of the request for approval from the sector specialist		30 min	X					Manual according to client´s profile
Waiting for sector specialist´s response		2> days			X			Within 0 – 2 days
Identification of the sector specialist´s response		5 min				X		
Documentation of the sector specialist´s response		9 min					X	
Closing the client's accounts		5 days	X					
Creation and sending of the closure letter		13 min	X					Manual according to client´s profile
Customer restriction		10 min	X					
Total			5	0	2	2	2	

4.1 Initial analysis

With the help of the 'DAP,' we were able to determine and recognize the main reasons why the process is inefficient. The following Table 2 lists these reasons.

Table 2. Reasons of the lack of efficiency

List of motives
1. Errors in the request for approval
2. Errors in the request and reception of information
3. Errors in account closure
4. Errors in the documentation of the process

Afterwards, a Pareto analysis was conducted, identifying the two main reasons why the disengagement process was not effective in the year 2022 (Figure 2).

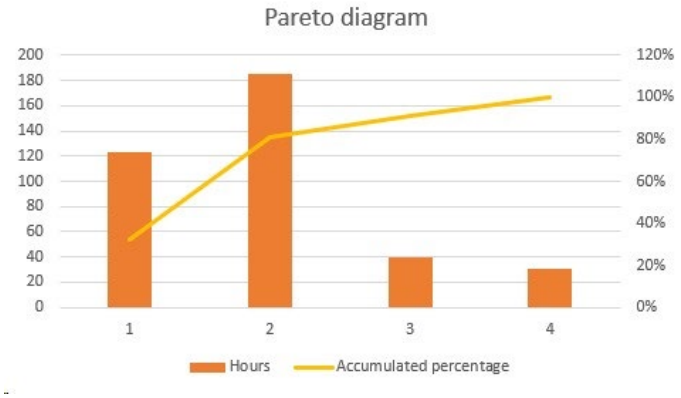


Figure 2. Pareto diagram

After analyzing the results obtained from the DAP and Pareto diagram, it was determined that the two main reasons for the current inefficiency in the termination process are errors in requesting approval from sector specialists and errors in requesting and receiving information from clients.

After concluding the diagnosis and identifying the root causes of order fulfillment failures related to time and availability, Figure 3 displays the problem tree. This diagram summarizes the diagnostic process and will serve as a foundation for identifying specific engineering solution tools for each cause.

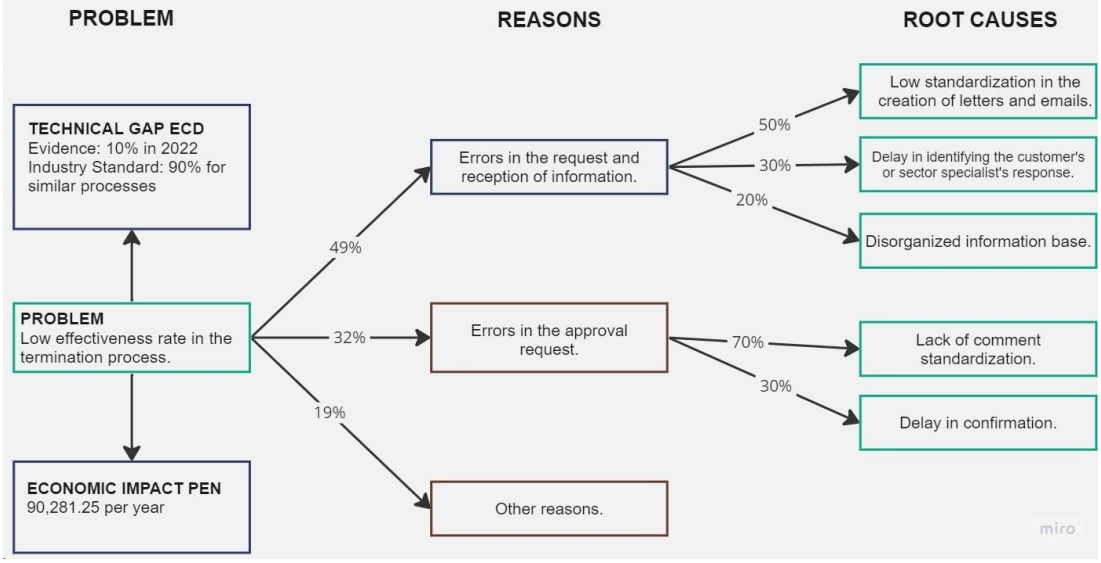


Figure 3. Problem tree

Thanks to the analysis and confirmation of the identified root causes, as shown in Figure 4, a specific objectives tree has been developed for each cause. This tree details the techniques and tools used to propose a solution to the identified problem.

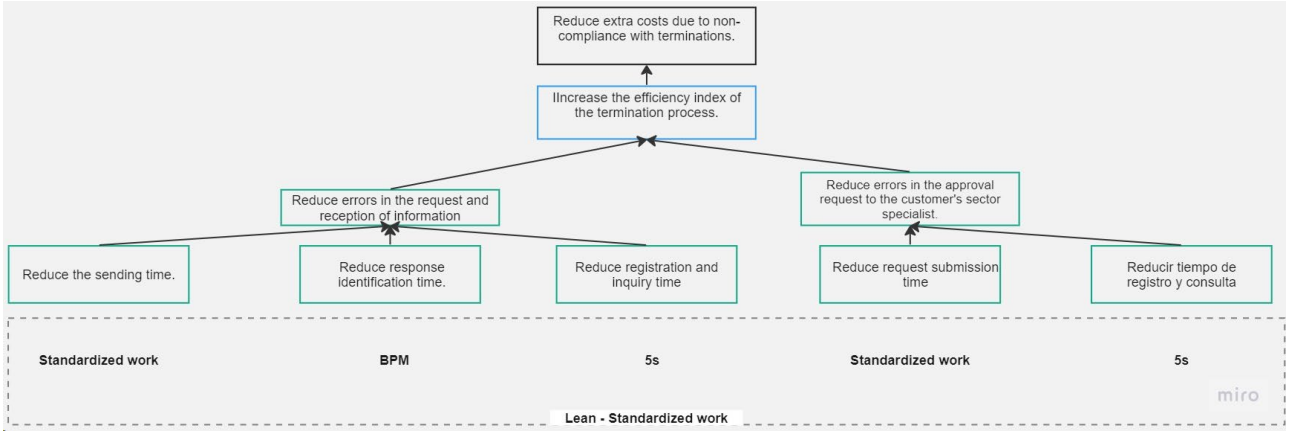


Figure 4. Objective tree

5. Results and Discussion

In terms of designing the pilot plan, we consider that the most important elements or factors to take into account were the following.

- Define the geographic, temporal, and functional scope of the pilot plan:

The project will be carried out at the main headquarters of the institution, located in the city of Lima, Peru, and will have a duration of no more than 6 months.

- Define the specific objectives intended to be achieved with the pilot plan:

These objectives must be measurable and aligned with the general improvement project objectives presented in Table 3.

- Likewise, it is crucial to determine what equipment, personnel, and resources will be necessary to carry out the pilot plan effectively. It is also necessary to identify who will be the participants or those involved in the pilot, whether they are employees, clients, or other relevant stakeholders.

In this case, the pilot involved 25 members from the Ethics and Compliance department.

5.1 Numerical Results

Table 3. Project indicators before and after the pilot test

Project Indicators		**Before**	**After**	**Improvement**
Main indicator	Process Efficiency	10%	74%	64%
Standardized Work	Shipping time to customer	13 min	1 min	92%
BPM	Identification time	5 min	0.5 min	95%
5s	Customer registration and inquiry time	9 min	0.5 min	94%
Standardized Work	Shipping time to manager	30 min	10 min	66%
5s	Manager registration and inquiry time	11 min	1 min	91%

In the Table 4, we can see that regarding the economic results, an annual reduction of 79447.5 (PEN) in extra costs was achieved, which proved to be a significant economic benefit resulting from the implementation of the improvements. Next, a detailed breakdown of the month-to-month cost reduction is shown.

Table 4. Before and after extra expenses incurred yearly.

Extra expenses incurred yearly				
Month	Before improvement		After improvement	
Jan	S/	8,437.50	S/	1,012.50
Feb	S/	7,931.25	S/	951.75
Mar	S/	5,400.00	S/	648.00
Apr	S/	5,231.25	S/	627.75
May	S/	10,968.75	S/	13,16.25
Jun	S/	8,775.00	S/	10,53.00
Jul	S/	256.25	S/	870.75
Aug	S/	6,412.50	S/	769.50
Sep	S/	9,112.50	S/	10,93.50
Oct	S/	5,568.75	S/	668.25
Nov	S/	7,762.50	S/	931.50
Dec	S/	7,425.00	S/	891.00
Year-round total expenses	S/	90,281.25	S/	10,833.75

As shown in the Table 4, we can see that the total investment of the project will be 156,288.00 (PEN) and the yearly extra expenses corresponding to acquiring licenses and programs necessary to maintain the implemented system, costs a total of 6000 (PEN) per year.

5.2 Graphical Results

Graphical results are shown in Figure 5.

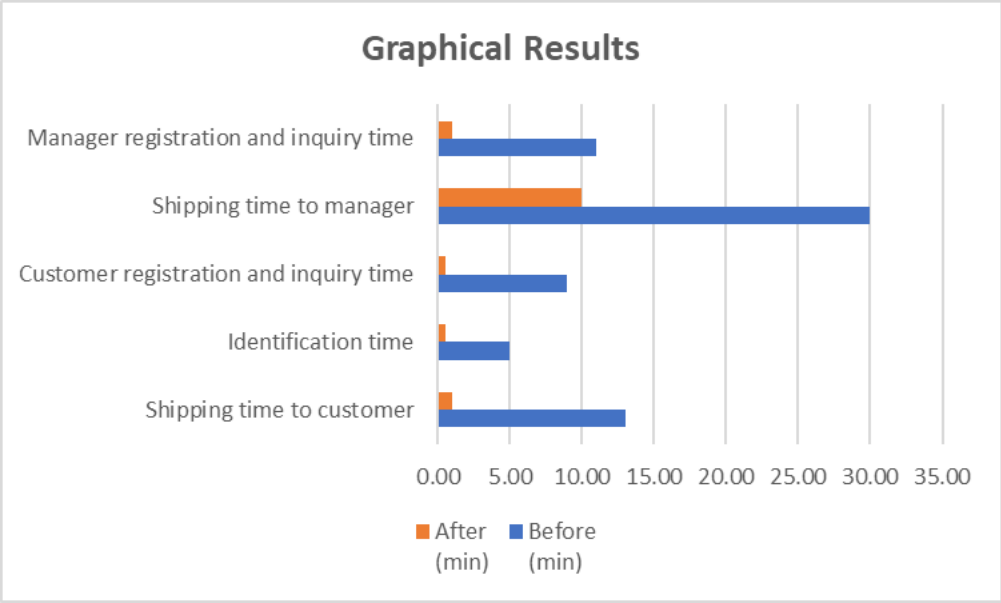


Figure 5. Graphical results

5.3 Proposed Improvements

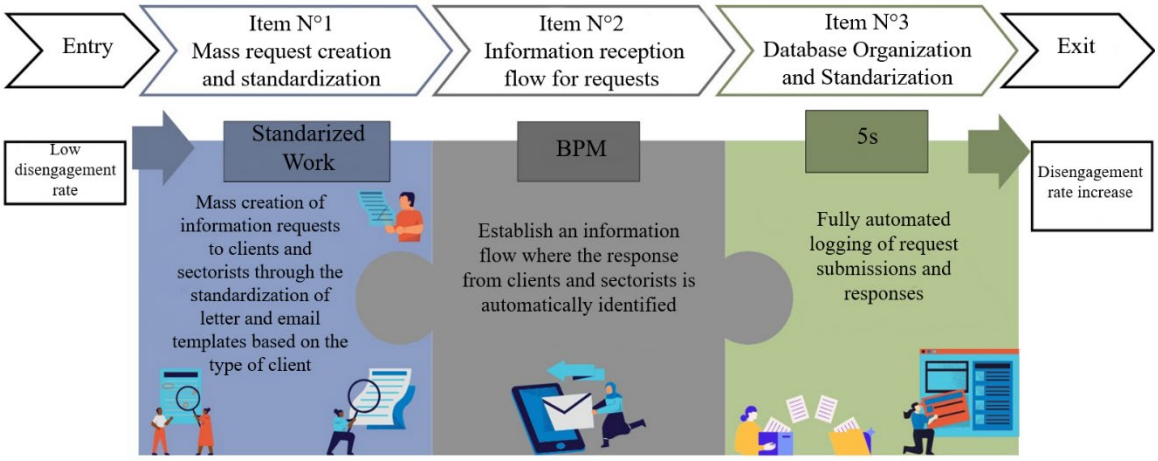
As shown in the Figure 6, The proposed model is divided into three components. These components resulted from the grouping of tools based on typologies that will be used to address the multiple identified root causes.

The first component is named 'Massive Creation and Standardization of Requests.' Through the implementation of work standardization tools, we can standardize the various bodies of letters and emails according to the type of client in the termination process, facilitating request creation, reducing operational errors, and decreasing the overall sending time.

The second component is 'Flow of Request Reception Information.' By implementing BPM tools that combine practices, policies, and technologies, we can design an information flow that effectively receives and identifies responses sent by clients, aiming to achieve greater operational efficiency, improve product and service quality, and enhance customer satisfaction.

The third component is 'Organize and Standardize Information Bases.' Through the application of 5S tools, the records of shipments and responses will be classified, organized, and normalized, reducing the time for analysts to consult and register information.

Figure 6. Proposed Model



The value proposition of this project is based on the implementation of the engineering tools presented earlier and the impact each of them will have on the ethics and compliance area in the specific process of client termination.

The procedure for implementing automation and continuous improvement in the after mentioned process is detailed below. The goal of this proposal is to optimize and streamline the termination procedures, ensuring efficiency and quality in the service provided to clients. To achieve this, the following action plan will be used. Additionally, an implementation plan will be presented to guide the adoption of these tools in the organization.

Firstly, the component of massive creation and standardization of requests aims to reduce the time for sending information requests to clients and seeking approval from assigned sector specialists. To achieve this result, we will apply work standardization tools.

The following graph illustrates the process to be followed in Figure 7.

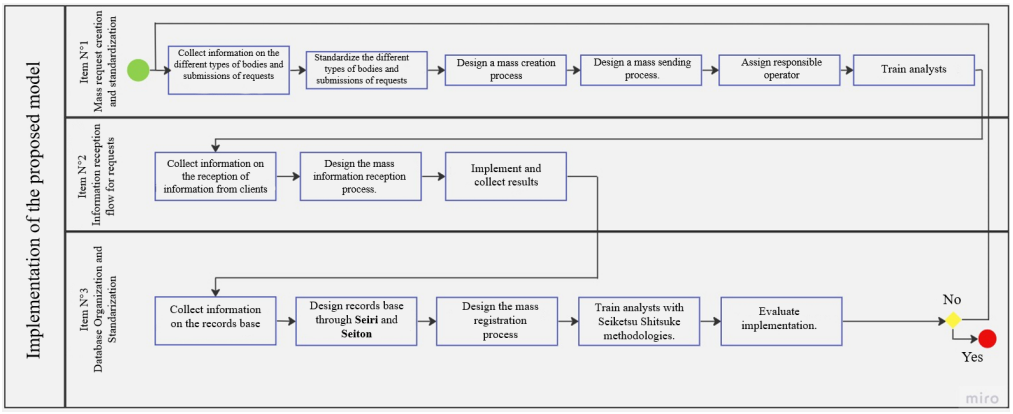


Figure 7. Diagram Proposed Model

5.4 Validation

To assess the results in depth and the evolution of the economic benefits contributed by the applied improvements, the projected cash flow for the next 5 years is presented below in Table 5.

Table 5. Cash flow Chart

Year	0	1	2	3	4	5
Investment	-S/ 156,288.00					
Fixed costs		S/ 6,000.00	S/ 6,000.00	S/ 6,000.00	S/ 6,000.00	S/ 6,000.00
Benefits		S/ 79,477.00	S/ 79,477.00	S/ 79,477.00	S/ 79,477.00	S/ 79,477.00
Cash Flow	-S/ 156,288.00	-S/ 82,811.00	-S/ 9,334.00	S/ 64,143.00	S/ 137,620.00	S/ 211,097.00

6. Conclusion

After conducting extensive research and planning for this improvement model, we can conclude that the application of work standardization, process automation, and the implementation of 5S in the client disengagement process within a banking and finance sector company achieved a significant improvement in productivity and efficiency in said process.

Through the use of other diagnostic tools such as the Systematic Interrogation Technique, Pareto diagram, Time study, and a series of matrices like the As-Is and To-Be matrix, a better understanding and structuring of the collected data and research objectives were achieved.

Regarding the improvement of the established indicators for the disengagement process objectives, the pilot test evidenced a significant increase in each of them. The time for sending information requests to clients was reduced by 92%. The time taken to identify responses to requests decreased by 95%. The time for recording and consulting responses to requests from clients decreased by 94%. In the case of the time required for sending requests for approval from the sectorist, there was a reduction of 66%. Finally, the time for recording and consulting approval requests by sectorists decreased by 91%. Overall, there was an improvement in the overall disengagement effectiveness indicator by 64%.

Acknowledgements

Tomas Ferreyros-Sylvester: To my family, to Dani, and to Charly García.
Jose Antonio Cornejo-Linares: To my family, my friends and everyone who supported me during my studies.

References

Tamtam. F and Tourabi. A, "Lean Service Practices in the Moroccan Banking Sector (Agadir agencies)," *International Colloquium on Logistics and Supply Chain Management (LOGISTIQUA)*, Tangier, Morocco, pp. 93-98, 2018, doi: 10.1109/LOGISTIQUA.2018.8428298.

Gupta, S., Sharma, M. and Sunder M., V., "Lean services: a systematic review", *International Journal of Productivity and Performance Management*, Vol. 65 No. 8, pp. 1025-1056, 2016. https://doi.org/10.1108/IJPPM-02-2015-0032

Gong, Y. and Janssen, M., "Demystifying the benefits and risks of Lean service innovation: a banking case study", *Journal of Systems and Information Technology*, Vol. 17 No. 4, pp. 364-380, 2015. https://doi.org/10.1108/JSIT-03-2015-0019

Manuel F. Suárez-Barraza , Tricia Smith & Su Mi Dahlgaard-Park, Lean Service: A literature analysis and classification, Total Quality Management & Business Excellence, 23:3-4, 359-380, 2012, DOI: 10.1080/14783363.2011.637777

Arfmann, D. and Topolansky, F. G., The Value of Lean in the Service Sector: A Critique of Theory & Practice. International Journal of Business and Social Science, 5(2), pp. 18-24, 2014.

Christodoulou, A., Factors of success for the effective implementation of lean manufacturing projects within the banking sector in South Africa, 2008.

Leyer, M. and Moormann, J., How lean are financial service companies really? Empirical evidence from a large scale study in Germany. International Journal of Operations & Production Management, 34(11), pp. 1366-1388, 2014.

Suárez-Barraza, M. F., Smith, T. & Dahlgaard-Park, S. M., Lean Service: A literature analysis and classification. Total Quality Management & Business Excellence, 23(4), pp. 359- 380, 2012.

Mathews, A. and Muguntharajan, A., Design with a Purpose: An International Bank Turns to Lean. Banker Middle East, Volume 146, p. 36, 2012.

Y. Yadav, G. Yadav, S. Chauhan, "Implementation of 5S in Banks," International Journal of Research in Commerce, Economics & Management, Volume No: 1, Issue No. 2 (June), 2011.

Villar, A.S. and Khan, N. Robotic process automation in banking industry: a case study on Deutsche Bank. J BANK FINANC TECHNOL 5, 71–86 , 2021. https://doi.org/10.1007/s42786-021-00030-9

Randhawa, J.S. and Ahuja, I.S., "5S – a quality improvement tool for sustainable performance: literature review and directions", International Journal of Quality & Reliability Management, Vol. 34 No. 3, pp. 334-361, 2017. https://doi.org/10.1108/IJQRM-03-2015-0045

Riva. A and Pilotti. L., Digital and lean trasformation in the bank and in the financial services: The experience of Unicredit Bank. International journal mannagement research and bussines strategy, 2-15, 2018.

Ravi Chourasia, D. A., Review on Implementation of 5S methodology in the Services Sector. International Research Journal of Engineering and Technology (IRJET) , 1245-1248, 2016.

Saleeshya, T. T., inderscienceonline. Obtenido de, 2019. https://doi.org/10.1504/IJBIR.2019.102713

TEMBELO, H., DIGITAL TRANSFORMATION IN FINANCIAL FIELD. International Journal of Commerce and Finance, 139-144, 2020.

Biographies

Tomas Ferreyros-Sylvester: Born in Lima, Peru, Tomas is currently in the final year of his university studies, pursuing a degree in Industrial Engineering. His academic journey began with two and a half years dedicated to architecture before making a decisive shift to focus on industrial engineering. His current research involves the development of a Risk Management Model based on 5S and Work Standardization, with the aim of enhancing efficiency in the disengagement process within the Banking and Finance Sector. As Tomas approaches the culmination of his university career, he looks forward to contributing his acquired skills and knowledge to the field of industrial engineering.

Jose Antonio Cornejo-Linares: Born in Arequipa, Perú, Jose Antonio Cornejo is a dedicated and inquisitive final-year student currently pursuing the bachelor in industrial engineering at Universidad de Lima. With a profound passion for process optimization, lean manufacturing and lean service. Throughout his undergraduate tenure, he has actively engaged in various academic projects and extracurricular activities that have broadened his knowledge and understanding of tools and methods related to project management and other lean engineering tools. Driven by a desire to explore and delve deeper into his chosen field, Jose Antonio Cornejo embarked on his investigative paper, titled "Risk Management Model Based on 5S and Work Standardization to Increase Efficiency in the process of disengagement in a Banking and Finance Sector Company" This research endeavor represents the culmination of his academic pursuits, encapsulating his dedication, analytical prowess, and expertise in Lean Service and Process Optimization tools and methods. He is looking forward to continue in enriching his knowladege and develope more experience in his chosen field.

Martín Collao-Diaz at ESAN University and Industrial Engineer from Universidad de Lima specialized in supply chain management and operations. A leader with more than 25 years of local and international experience in national and multinational companies in industrial, hydrocarbon, and mass consumption sectors. Broad experience in supply chain management (purchasing, inventory, suppliers and supply sources management, logistics: transport, distribution, andwarehouse management), operations (planning and control of production and maintenance), and integrated system management (ISO 9001, ISO 14001, and OHSAS 18001). Business alignment based on sales and operations planning (S&OP). Besides, continuous search for improvements in profitability based on process optimization and saving projects using tools such as Six Sigma methodology, among others, focused on being a High-performance Organization (HPO). Development of a high-performance team. Member of IEEE and CIP (College of Engineers of Peru).