

Improve The Effectiveness And Efficiency Of Organizational Processes At Challenge Fitness Studio

*Jorge O. Colón Andino
Manufacturing Engineering
Rafael Nieves Castro, Ph.D.
Industrial Engineering and Systems
Polytechnic University of Puerto Rico*

Abstract — *This project focuses on the implementation of company improvements using engineering tools. The Challenge Fitness Studio organization's based improvement process was analyzed. The main focus of the project focuses on the effectiveness and updating of the organizational system in an automated manner with methodologies and tools learned through graduate studies. The PDCA Cycle methodology was used to develop this project and successfully eliminate the outstanding problems determined in the analysis to implement improvements.*

Our goal was to provide Challenge Fitness Studio staff with the necessary tools in order to develop an organized structural strategy with a continuity of daily processes. We focus on demonstrating the staff that the organization and technological tools will help with the efficiency and facilitation of the process. We conclude the final project by presenting the customer's structured documents and enhanced processing that will help you through your journey to a thriving business.

Key Terms — *Act Cycle (PDCA Cycle), Cause and Effect Five Why and Two How Tools Analysis (5W2H), Challenge Fitness Studio (CFS, Plan, Do, Check, Process Flow Diagram (PFD).*

PROBLEM STATEMENT

Challenge Fitness Studio is a small business primarily dedicated to physical health. According to the initial interview with the consumer has an organizational problem based on deficiencies of standardized methods that provide continuity and consistency in the work functions of the staff and administrative which prevent the growth and stability.

Research Description

The objective of this project is to improve the effectiveness and efficiency of organizational processes for CFS. As part of the business improvements, it is to evaluate the labor productivity opportunities and the deficiency on the method standardizations to provide better tools to the staff and the administration.

Research Objectives

- Improve the inventory management system and automatize the administrative methods with technological means.
- Lean Process Improvement to reduce waste time cost.
- Increase effectiveness and efficiency with Engineering Tools in a PDCA Cycle methodology.
- Perform improvement, effectiveness, and continuity deployments without incurring additional costs.

RESEARCH CONTRIBUTIONS

This research focuses on the organizational structure framework to lead the company to better operation management skills. CFS focuses on force and multifunctional fitness training to transform people's life. The project scope consists in bringing the organization and structure that the company requires to fulfill their customer needs. This company contains lack of inventory management, staff designation and role definition and the application of technological means. Our goal is to provide the CFS staff the PDCA Cycle methodology tools in order to develop a consistent organizational structural strategy.

LITERATURE REVIEW

The quality control management systems are a very common implementation of the regular manufacturing industries. These applications can also be very helpful for small businesses like CFS. The overall implementation for the strategy development can be driven by the lean manufacturing principles. Focusing on these fundamentals our guide was to eliminate processes that aren't valuable. Following the root cause, we identified do-not-make control in order to rehabilitate the management decisions to assure the quality of the organization.

High-quality control is a combination of following established procedures by developing the appropriate training to the workforce for meeting customer's needs. Therefore, the first purpose for implementing lean manufacturing applications is to highlight nonconformance procedures. Six Sigma is quality tool, used in many organizations, strive for near perfection. In other words, Six Sigma is a data driven, disciplined approach and methodology. It is based on eliminating the defects in any process. It is can be used in manufacturing product or service industries.[1] Additional training management will fall as part of the requirements for the process development. Therefore, it is critical to understand the requirements to fulfil the proper training to assure that the organization responds to process specifications and procedures.

In order to accomplish the process improvement project and assure the nonconformance identification opportunities, the PDCA Methodology (Figure 1) should be used.

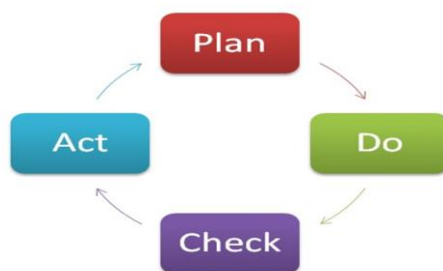


Figure 1
PDCA Phase Diagram[3]

PDCA is an acronym that stands for the four (4) major phases the project should have: Plan, Do, Check and Act.

Following these steps to guide the organization to structure at the Plan phase, what is important objectives; at the Do phase, how are we doing to execute; at the Check phase, what is wrong; at the Check phase, what needs to be done with analyze and corrective actions, how do we guarantee performance.[2]

At the moment the process is analyzed and measured the most important part of this assessment is to identify: which activities are value-added, that are part of the actual transformation process to the service/product the customer is paying for; which activities are non-value-added, or tasks that can be shortcut to reduce the process time; also recap the activities that are non-value-added, but required, that are required under today's conditions even though it does not add value from the customer perspective, such as inspections and control systems.[2]

METHODOLOGY

The methodology used as mentioned above is the PDCA Cycle tool; for which a scheme was made highlighting the most important points to be observed and analyzed during the project.

1. Plan Phase:
 - Interview customers explore the daily task and process assigned to staff.
 - Confirm Scope and Problem Statement with project champion.
 - Project Charter from the Customer Interview.
 - Study the elements of the organization by means a PFD.
2. Do Phase:
 - Measure current process effectiveness.
 - Complete root cause analysis though prioritizing causes on a Cause and Effect Five Why and Two How Tools Analysis.
 - Demonstrate effect on the problem of every potential cause prioritized.

- Design implementation plan.
3. Check Phase:
- Analyze each element of the CFS operation.
 - Generate solution ideas and implementation requirements.
 - Forecast benefits.
 - Discuss solutions with customers.
4. Act Phase:
- Execute the recommendation of implementation plan.
 - Analyze and verify improvement with the targeted cause on the project goal.
 - Document and train personnel on new standard work.
 - Share lessons learned and the repeat the cycle for continuity improvement.

RESULTS AND DISCUSSION

When the operational needs of CFS are defined, they are based on the practical use of up-to-date technological means in a way that significantly facilitates the monitoring process. Due to past trading strategy, management processes were limited in rudimentary methods. To put the situation in a better view, a table was created that defines the customer's existential problems.

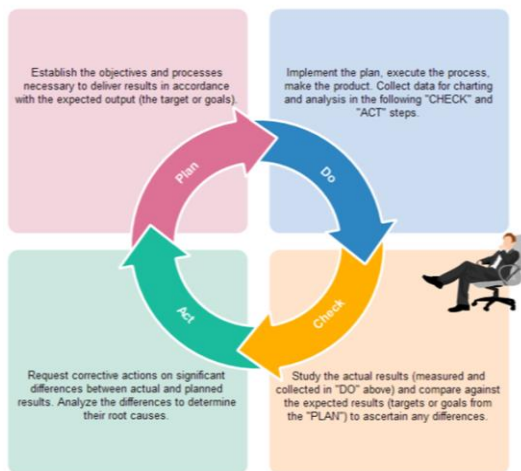


Figure 2
PDCA Cycle Template Developments[7]

PDCA cycle is an iterative process for continually improving products, people, and services. It became an integral part of what is known today as Lean Management. [8] Figure 2 show basically PDCA Cycle Developments.

This methodology describes the four essential phase or steps that must be carried out systematically to achieve continuous improvement. [5] The Plan-Do-Check-Act model includes solutions testing, analyzing results, and improving the process. The application of this methodology is primarily focused to be used in companies and organizations.

Plan

The first phase of the cycle is subdivided into four (4) subparts. Table 1 shows the Subpart Identify.

Table 1
PDCA Cycle Plan Subpart Identify[6]

IDENTIFY
- Identify and define problem clearly. <ul style="list-style-type: none"> • The primary organizational problem is based on deficiencies of standardized methods that provide continuity and consistency in the work functions of the staff and administrative which prevent the growth and stability.
- Evaluate the importance of the problem. <ul style="list-style-type: none"> • The importance of these is that they affect the continuity and growth process of the company, since they overlook specific tasks: daily, weekly, fortnightly and monthly. It is very important to develop an inventory system that the supervisor can access at all times.
- Identify the current standard methods, procedures. <ul style="list-style-type: none"> • The establishment don't have any current standard methods and procedures for employee.

The project charter (Table 2) provides all the necessary specifications to define the scope of the project. It drives the manager to the goals, and it can be developed through the chosen methodology which in this case is the PDCA Cycle. The project charter is identified as the proposal between the client and the manager and is important because it considers all the strategies and suggestions to achieve the proposed goals.

With the set of observations provided in Table 3 make an adapting the PFD (Figure 3) to the finding solutions it is analyzed the customer requisitions to develop the strategy.

Table 2
Project Charter from the Customer Interview

Project Charter		
Project Name: Improve the effectiveness and efficiency of organizational processes at Challenge Fitness Studio		
Problem Statement: Challenge Fitness Studio is a small business primarily dedicated to physical health. According to the initial interview with the consumer has an organizational problem based on deficiencies of standardized methods that provide continuity and consistency in the work functions of the staff and administrative which prevent the growth and stability.		
Problem/Opportunity:		Scope, Constraints, and Assumptions:
<ul style="list-style-type: none"> ◆ Specific and assigned tasks for each position (receptionist, coach and maintenance) ◆ Manual inventory method ◆ Quantitative sales method ◆ Scheduled alerts system from physical reviews to customers 	<ul style="list-style-type: none"> ◆ Development Employee Manual, Inventory, and schedule alert Program ◆ Low or no economic budget ◆ Resistance to changing work personnel ◆ Improvements through the use of technology 	
Goal:		Team Members:
<ul style="list-style-type: none"> ◆ Employee manual ◆ Increasing efficiency by improving monitoring processes ◆ Gradual implementation of improvements with technological means 		<ul style="list-style-type: none"> ◆ Jorge O. Colon Andino – Process Owner ◆ Dr. Rafael Nieves – Project Lead or Project Champion ◆ Michael Chevere – Process Customer
Preliminary Project Plan:	Target Date:	Actual Date:
Prepared by:	Approved by:	

Table 3
PDCA Cycle Plan Subpart Observe[6]

OBSERVE
<ul style="list-style-type: none"> - Investigate the characteristics and details of the problem. <ul style="list-style-type: none"> • The characteristics of continuous problems are human errors due to oversight, forgetfulness or lack of communication. On the other hand, goods posting failures occur as the method currently used is carried out manually. - Define the relevance of the problem. <ul style="list-style-type: none"> • The relevance is that they result in unforeseen cleaning situations, accidents, wasd working time which result in extra recurring payroll expenses and excessive time usage when manually inventorying. Failures in periodic monitoring of customers' physical conditions. - Broaden your vision. Assess the situation from various points of view, and talk to people who will act directly on the execution and broaden your perception of the actual present situation. <ul style="list-style-type: none"> • After brainstorming all participants have an impact on the same causes.

One of the major problems of CFS is activities of the staff and who encounters makes these activities. CFS has the three staff members that required an employee manual distribution and activities assignation.

Other problems highlighted from the root cause was the lack of inventory and how the administration is managing it. In this case it was determinate to adjudicate a technological tool to track inventory making the decision making easier.

A schedule was contemplated as part of the re distribution of the studio and this tool will also be automated with a technological program that can allowed the customer to see a better overview of the organization.

In the subpart of Analyze (Table 4) the root cause analysis is one of the common tools to use for

continuous improvement. The main objective of the problem is to understand a problem and its cause.

Figure 3
Process Flow Diagram

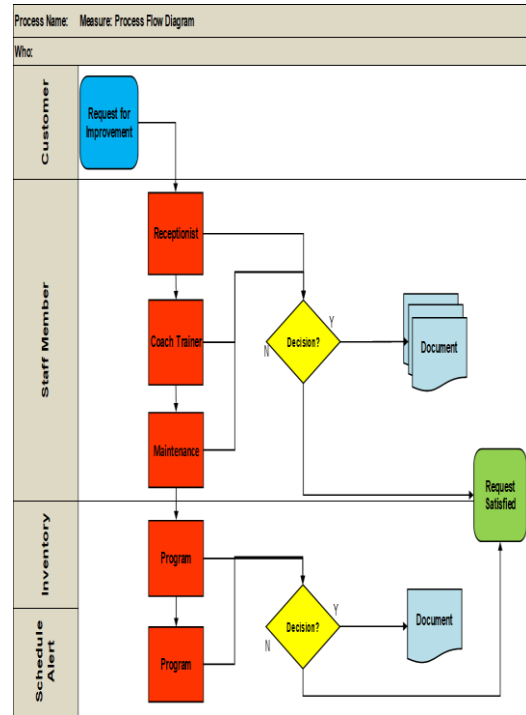


Table 4
PDCA Cycle Plan Subpart Analyze[6]

ANALYZE
<ul style="list-style-type: none"> - Evaluate possible solutions and alternatives.
Possible solutions would be as follows:
<ul style="list-style-type: none"> • Create employee manual • Develop a digital list of daily tasks for each area. • Create a digital alert program. • Monthly tasks as they are scarce can be included in the fortnightly ones to reduce possible neglect of them. • Computerized inventory program.

In Table 5 presented detail the reasons for the specific continuous failures with the key questions that lead us to whom we will impact, why, when, where and how we will solve it without delving sufficiently but providing clear ideas for the solution and how to achieve the satisfaction of our client.

Should keep in mind that root cause analysis, when successful, is an iterative process to help with continuous improvement in the organization in which it is impacting.

Table 6 describes what the implementation plan and determine areas to impact in the execution.

information to collect to establish upcoming corrections in the cycle.

Table 5
Cause and Effect Five Why and Two How Tools Analysis

	Questions	Improvement Questions
Who?	Who's doing this? Operator owner Who should be involved, but isn't? Employees without specific tasks assigned. Who's involved, but shouldn't be? Operator Owner How do you have to approve? Supervision	Should anyone else do it? No. Could fewer people do it? Yes If approvals could be eliminated? Approvals result in improved oversight
What?	What do you do? Physical training, administrative work, finance, maintenance, etc. What is essential? Improving the overall organization	Do we have to do all the steps? Yes, for good results. Are the steps skipped? Regularly, yes.
When?	When does this activity start? Entry to work When does it end? Out of labor When is it repeated? Daily, weekly, fortnightly and monthly	Can it be done at a different time? No Can you shorten the cycle time? Yes, it's one of the proposed goals. Can it be done less often? It is one of the possibilities with the implementation of improvement.
Where?	Where is this activity or activity good for this place or activity? Challenge Fitness Studio Facilities	Can it be done elsewhere? At the moment, no.
Why?	Why are we doing this? Provide continuity and agility of processes to meet the required objectives.	Can it be deleted? No Can it be outsourced? Yes, by identifying the variables involved in the process.
How?	How do you do this? Assign daily, weekly and monthly tasks to employees according to their respective roles. Developing inventory program reducing lost time. Creating alert program for continuity in customer reviews.	Is there a better way? Drafting of manual of duties and obligations for each employee. Digital task lists to improve and facilitate monitoring processes. Facilitate training for inventory tasks that in turn would facilitate processes of purchase and sale of products offered.
How Much?	How much does it cost? Non-significant cost	How much less could it cost? Free of charge

Do

In the Do phase we use a tool commonly used in organizational structures where at the same time we can continue to self-evaluate the system to add corrections to prevent deviations that produce our errors such as adapting them to face future changes without affecting the continuity of the company's processes. On the other hand, we assimilate the staff to feel part of it, increasing the expectations of group work by achieving cohesion among the members of the organization, and therefore building a business culture. In the Table 7 show the description of the design execute.

Check

Table 8 contains a summary of the subpart Verify would look like and the important

Table 6
PDCA Cycle Plan Subpart Action Plan[6]

ACTION PLAN
<ul style="list-style-type: none"> - Define an action plan to prevent (or minimize) the causes of the problem. <ul style="list-style-type: none"> • The employee manual will identify the duties and responsibilities, as well as a training of the specific tasks of each particular area that implement the improvements. • Using the to-do list, the employee himself can review and submit it when he or she has finished them, which would help the supervisor constantly monitor the progress and continuity of the company. • The alert system will be used for periodic reviews of customer's physical conditions, and to alert to the weekly and fortnightly tasks of employees by facilitating the monitoring process. • The inventory program would make it easier for the operating owner to remotely verify the goods needed within the establishment, as well as the square of daily sales by substantially reducing the time in performing these tasks currently.
<ul style="list-style-type: none"> - Set goals to achieve and a schedule to follow. <ul style="list-style-type: none"> • The implementation of the past action plan would complete the proposed goals to address the recurring situations that impede the continuity of the company .
<ul style="list-style-type: none"> - Define the methods to use. <ul style="list-style-type: none"> • The methods to be used would be training and training both in the tasks to be carried out and in the computerized programs that were implemented. Tutorial videos can be designed as complementary tools in learning.
<ul style="list-style-type: none"> - Be clear what the results achieved will mean and define the responsible for each step / goal. <ul style="list-style-type: none"> • The results obtained would clearly and concisely indicate where the faults are occurring which can be corrected with proper supervision .
<ul style="list-style-type: none"> - Record this plan in a document. <ul style="list-style-type: none"> • Documents and programs must be completed before the start of implementation of improvements.

Table 7
PDCA Cycle Do Subpart Execute[6]

EXECUTE
<ul style="list-style-type: none"> - Train people to interpret the plan and work with focus. <ul style="list-style-type: none"> • Provide practical training focused on the group work goal to facilitate scopes of the proposed goals.
<ul style="list-style-type: none"> - Get feedback from each person involved in understanding the plan. <ul style="list-style-type: none"> • Main problems are resistance to change and adaptations of new daily processes.
<ul style="list-style-type: none"> - Perform the steps defined in the action plan. <ul style="list-style-type: none"> • Done.
<ul style="list-style-type: none"> - Observe and compare the predicted and accomplished schedule. <ul style="list-style-type: none"> • In carrying out implementation practices, significant improvements can be seen in routine processes, such as decreased time in performing various tasks.
<ul style="list-style-type: none"> - Compare also qualitative aspects. Make sure that the people involved have a clear understanding of the plan. <ul style="list-style-type: none"> • Correction in redacted documents, inventory programs, and alert programs. Additional meetings to clarify doubts regarding the functions, duties and implementation of the programs.

Act

An example of an issue that could occur because of this is that the employee has not performed proper equipment maintenance and an accident might occur. the main cause could be that the maintenance procedure is unclear and the training did not cover how to perform equipment area maintenance correctly. to solve the problem

correctly, you need to improve the overall documentation and training process.

Table 8
PDCA Cycle Check Subpart Verify[6]

VERIFY	
- Monitor results and create indicators.	<ul style="list-style-type: none"> The results of the implementation of improvements in practice exercise were excellent.
- Check results and check for cause prevention.	<ul style="list-style-type: none"> Proper oversight is the prevention of recurring problems within the organization.
- If there is no effect on the cause.	<ul style="list-style-type: none"> The improvements had a positive impact on the continuity of processes and minimized time in some areas corresponding to the administration of the organization.
- Identify and make the necessary corrections.	<ul style="list-style-type: none"> Some points related to the employee manual should be clarified, and as suggestions for regular meetings to collect opinions and suggestions from customers and employees to further improve the company.
- Evaluate the learning and review goals and results.	<ul style="list-style-type: none"> With this improvement and control implementation tool, goals were achieved and a regular self-assessment tool provided.

Table 9 describes the importance of customer-submitted implementations of recommended improvements.

The Figure 4 demonstrates the fully cost-free digitized inventory system, the operator owner will be able to carry out inventories remotely, speeding up the inventory replenishment purchasing process while accounting for the volume of purchases in an

automated manner. Maximizing the monitoring task.

Table 9
PDCA Cycle Act Subpart Standardize[6]

STANDARDIZE	
- Use the standard adopted to prevent the recurrence of the problem.	<ul style="list-style-type: none"> As mentioned above in the Check Step, the main recommendation to the client is to follow the steps of continuous improvement creating recurring habit of corrective self-assessment where the company will not only achieve the objectives already achieved, but will create a culture of job satisfaction, as well as a global satisfaction towards customers. It is recommended that as the company's gradual growth can be suggested the change of a better inventory program and alerts of customer reviews a little more sophisticated, in which the additional expense incurred in it is justified.

On the other hand, in Figure 5 we observed an alert system for periodic physical reviews, in which it provides a notice seven (7) days in advance of the expiration date to have one week of preparation for the appointment of periodic reviews of customers.

In the following Figure 6 you can see the digitized daily task list, where each employee daily will submit it to the system, so that the employee himself will have with him a reminder of the tasks to be performed minimizing errors or oversights in their respective workspaces.

Articulos	Inventario			Ventas Totales			Tipo de Pago por Articulo			
	Cantidad	Vendido	Disponibile	Precio	Ventas	IVU	Precio + IVU	Cash	Tarjeta	ATH Movil
Batidas Vainilla	20	7	13	3.5	24.5	2.8175	27.3175	2	3	2
Powerade Uva	20	10	10	1.5	15	1.725	16.725	3	5	2
Powerade China	20	6	14	1.5	9	1.035	10.035	1	3	2
Batidas Chocolate	20	9	11	3.5	31.5	3.6225	35.1225	5	1	3
Batidas Fresa	20	6	14	3.5	21	2.415	23.415	3	2	1
Batidas Chocolate	20	7	13	3.5	24.5	2.8175	27.3175	3	2	2
Barras de Proteina	20	10	10	2	20	2.3	22.3	5	2	3
Agua	20	6	14	1	6	0.69	6.69	3	2	1
Suplementos	20	9	11	7	63	7.245	70.245	1	3	5
Fajas	20	6	14	12	72	8.28	80.28	2	1	3
Agua de Coco	20	7	13	2	14	1.61	15.61	2	2	3
Aminoacidos	20	10	10	10	100	11.5	111.5	2	3	5
Toallas	20	6	14	2	12	1.38	13.38	2	1	3
Mascarillas	20	9	11	1	9	1.035	10.035	3	5	1
Sanitizer	20	6	14	2	12	1.38	13.38	1	3	2
				Total =	433.5	49.8525	483.3525	38	38	38

Figure 4
Inventory Program Sample

In this task list there will be a space to write any observations or situations that occurred in the working hours. Only the owner operator of the establishment will have access to the answers. As an additional recommendation, an employee

manual was drafted, to establish a standard protocol for each workspace, specifying duties and obligations of each employee, among other things (See lavish manual).

Sistema de alertas de revisiones fisicas					Hoy	Thursday, May 20, 2021
					Días de Alerta Por vencer	7
Num. Contrato	Nombre del Cliente	Fecha de Revision Fisica	Dias Faltantes para Revision	Estatus		
14431	Jorge Colon Andino	5/18/2021	-2	Vencido		
14432	Rafael Nieves	5/21/2021	1	Por vencer		
14433	Michael Chevere	5/23/2021	3	Por vencer		
14434	Jose Benitez	5/25/2021	5	Por vencer		
14435	Carlos Perez	5/26/2021	6	Por vencer		
14436	Angel Morales	5/27/2021	7	Por vencer		
14437	Keyla Santiago	6/5/2021	16	Con tiempo		
					Posibles Estatus	
					Vencido	
					Por vencer	
					Con tiempo	

Figure 5
System Alert Program Sample

Challenge Fitness Studio
Task List

Hola, Jorge: al enviar este formulario, el propietario podrá ver su nombre y dirección de correo electrónico.

* Obligatorio

1. Nombre del empleado *

2. Fecha *

3. Lista de tareas

- Actualización de inventario
- Limpieza area de recepcion
- Limpieza area de ventas
- Cuadre de ventas diarias
- Evaluación de seguimiento a clientes
- Limpieza area de maquinas
- Limpieza area de ejercicios libres
- Actualización de pizarra
- Otras

Enviar

Figure 6
Daily Task List

CONCLUSIONS

The project carried out at Challenge Fitness Studio was mainly based in recommendation on automation of the administrative processes of the organization. From the outset, the root cause highlighted issues about how management was handling with rudimentary tools for process execution. In the interview journey, structural deficiencies could be identified which would be our variables for correcting, improving and controlling.

These variables were improved and controlled through the implementation of the PDCA Cycle methodology, which provided guidance for charting a firm path to a better process, and at the reach of

customer-agreed objectives, and at the same time correct the faults systematically.

The problem was defined from the customer's interview. Our observations contained in the root cause influenced the strategic modification of the design. The process was analyzed and evaluated in order to develop continuity and improvement for the organization. The improvement design was discussed with all stakeholders in the organization in order to keep them up to date, creating the necessary feeling that to achieve the objectives we have to work in the same direction.

As the check phase arrived, corrective decision-making was verified and structured. To summarize the automation of the project the most important part of the project. Since they result in economic benefits for the operator owner without incurring any extra expense reduced working time with higher results, facilitating the monitoring processes and at the same time reducing customer unrest due to lack of maintenance in frequently used areas. In all these recommendations no expense has been incurred of the company, in addition, they substantially improve the monitoring process without having to interact with the staff continuously.

Faced with the global situation by the Covid-19 pandemic, the company had to update its rudimentary processes. And we understand that meeting the implementation of the execution plan is sufficient to meet the customer's established goals.

With the inventory and sales posting programs reduces losses generated by oversight or other reasons such as expiration dates due to excessive accumulation of unused inventory due to unknown's and thus facilitates remote

communication with the company system where the operating owner would save time, gasoline, among other things; so that you can make the purchase of the items that the company really needs; reducing the excessive cost of inventory and thus the company's operational cost.

With the alert system we give continuity in the monitoring phase to customers fulfilling the objective of continuity of the organization and at the same time we increase customer satisfaction providing the feeling of how much we are pending to their physical health. On the other hand, this same alert system serves as a reminder of supervision of the weekly and fortnightly tasks of the company.

It should be mentioned that both the to-do list and inventory are converted to digital systems which reduces operational expense in terms of prints, paper, ink, pen, etc... And at the same time we take care of our natural environment by reducing the unmeasured production of solid waste, thus contributing even more to the health vision of the company.

Routine repetition recommendations of the cycle are established, as it is a system of continuous improvement in which, once the final stage is finished, the first phase must be returned to the first and repeat the cycle, so that the activities are periodically reassessed to incorporate new improvements if necessary. By fully complying with the development and fulfillment of the cycle is beneficial to the customer. As well as create a suggestion box for both employees and customers demonstrating the ability and willingness to improve day after day.

In conclusion, it has been demonstrated through past recommendations, satisfaction and correction of the main needs of the client; without incurring additional costs and also causing savings from inventory reduction and material expenses among others; which reduces operating costs that become profits for the company.

REFERENCES

- [1] Kumar, K. (2018, May 5). *Datascience. From asic Statistics in R Six Sigma DMAIC Series in R – Part 1: <https://datascienceplus.com/six-sigma-dmaic-series-in-r-part-1/>*
- [2] McCarty, T., Daniels, L., Bremer, M., & Gupta., P. (2005). *Six Sigma Operational Methods, Chapter: Introduction to the DMAIC Process Improvement Methodology. McGraw-Hill, 2005.*
- [3] Michael L. George, J. M. (August 1, 2004). *The Lean Six Sigma Pocket Toolbook: A Quick Reference Guide to 100 Tools for Improving Quality and Speed. McGraw-Hill.*
- [4] Mr. Ganesh P. Jadhav, M. S. (December-2015). *Six Sigma DMAIC Literature Review. International Journal of Scientific & Engineering Research, Volume 6, Issue 12.*
- [5] PDCA Cycle (Plan, D. V. (2013, August 23). *PDCA Home. From PDCA Cycle (Plan, Do, Verify and Act): The Deming Circle of Continuous Improvement : <https://www.pdcahome.com/5202/ciclo-pdca/>*
- [6] *Professional Templates for Excel. (n.d.). (2021, February 1). From PDCA Excel Template: <https://topexceltemplates.com/>*
- [7] *PDCA Diagram Template. (n.d.). (2021, February 3). FromWondershare:<https://www.edrawsoft.com/template-pdca-diagram.html>*
- [8] *What is Plan-Do-Check-Act (PDCA) Cycle? (n.d.). (2021, April 16). Retrieved from Kanbanize: <https://kanbanize.com/leanmanagement/improvement/what-is-pdca-cycle>*