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OPERATIONS OPTIMIZATION MODEL UNDER THE PDCA APPROACH TO INCREASE THE NUMBER OF VISITORS IN A SHOPPING MALL: AN EMPIRICAL RESEARCH IN PERU

Tesis para optar el Título Profesional de Ingeniero Industrial

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Noviembre de 2022

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***Abstract*—The number of visitors of a shopping center has a critical impact on its annual turnover, so a small number of such visitors is a major problem for participants in this industry. In the present study, a specific shopping center in Peru that presents this problem was chosen and a model was proposed to improve this indicator. For this, the PDCA cycle is used together with tools such as CRM, Digital Marketing and the SCRUM methodology. After its application, the results of using the Arena Program show a 7% increase in the number of visits and an increase in billing of 13.4%. Therefore, this model can be applied to other companies within the industry which seek to improve said indicators and, with that, their performance.**

Keywords—CRM, deming cycle, PDCA, shopping centre, increased number of visitors

I. Introduction

Contemporary large-area shopping malls began to emerge in the mid-1950s in the United States [1] and, soon after, this trend quickly gained traction, thus becoming a phenomenon of the 20th century [2]. The mentioned growth and development of the sector is due in part to the fact that visiting a shopping mall has become a form of entertainment, leisure, and even a particular type of social event [1]. In Peru, sales of shopping malls belonging to the Association of Shopping Centres of Peru (ACCEP) reached 29 277 million PEN during 2019, contributing to the national GDP by 3.86%. Likewise, during the same year, this industry generated more than 180,000 jobs, both direct and indirect [3].

The studied company interviewed a sample of 206 clients in order to identify different causes that negatively affected its performance. These included the lack of entertainment events, few discounts, high prices and insufficient customer service. These factors resulted in a decrease in the number of annual visits, which generate an economic impact of 610,588,001 PEN, an amount that represents 19.98% of the company's annual billing.

To improve the aforementioned indicator, a case that reflects the problem of reduced customer attraction caused by the previously discussed factors was chosen. In this context, an improvement model was developed from the PDCA cycle, together with the CRM, SCRUM, and Digital Marketing tools. Two scenarios were carried out through the Arena program to determine the impact of the model implementation.

It is worth mentioning that, even though there are several investigations about the implementation of CRM within shopping malls, few are focused on increasing the number of visitors. Likewise, the case studies reviewed have little information on the use of the Deming Cycle and the SCRUM methodology in companies in the sector, which is why it was necessary to combine these tools in the present study.

II. Literature Review

The PDCA cycle is a broad management model that offers a generic approach to continuous improvement of business processes, and it is a main component of quality management's continuous improvement aspects [4]. The tool is divided into four phases: Plan, Do, Check, and Act; and its performance implies that the entire management system is in a four-stage cycle [5]. The benefit provided by this tool, as mentioned [6], allows a company's processes to be structured in the different PDCA phases.

Regarding the CRM tool, it is traditionally seen as a set of concepts, methods, systems, and technology that assist businesses in managing their transactions and relationships with clients [7]. Certain authors [8], have a purely technical definition and define CRM as a combination of hardware and software applications based on a customer-oriented strategy, which is

supported by various applications and technologies. However, others consider it as a business philosophy and define it as a marketing science focused on customer relationships [9]. Among the latter are [10] who identified 3 types of CRM: strategic, operational and analytical; the latter being responsible for understanding customers through data collection and analysis [11].

Although the analytical CRM tool allows obtaining customer data, a tool is still necessary to help the company promote its products based on the information obtained. Digital marketing is a component of marketing that capitalizes on the use of digital technologies to direct commercial messages to specific audiences [12]. It is characterized by the interactivity and personalization of the messages, as well as by its capacity to disseminate product information [13]. An important component of this tool is email marketing, which has been widely used for several years now due to its effectiveness and low costs [14].

Finally, for the improvements to be implemented, a tool that allows a rapid reaction to changes in the market and consumer needs is necessary. The SCRUM methodology is a framework for the organization and management of teamwork [15] and is used to manage and monitor complex projects. [16] defines it as an iterative and systematic approach to project management that offers a basic "check and change" structure. Although this methodology is commonly used in software development projects, it is also relevant to other industries due to its positive results in terms of teamwork effectiveness and quality results [17]. It provides an overview, systematically induces feedback and dialogue, and keeps employees on the right track to achieve the end goals of the project [18].

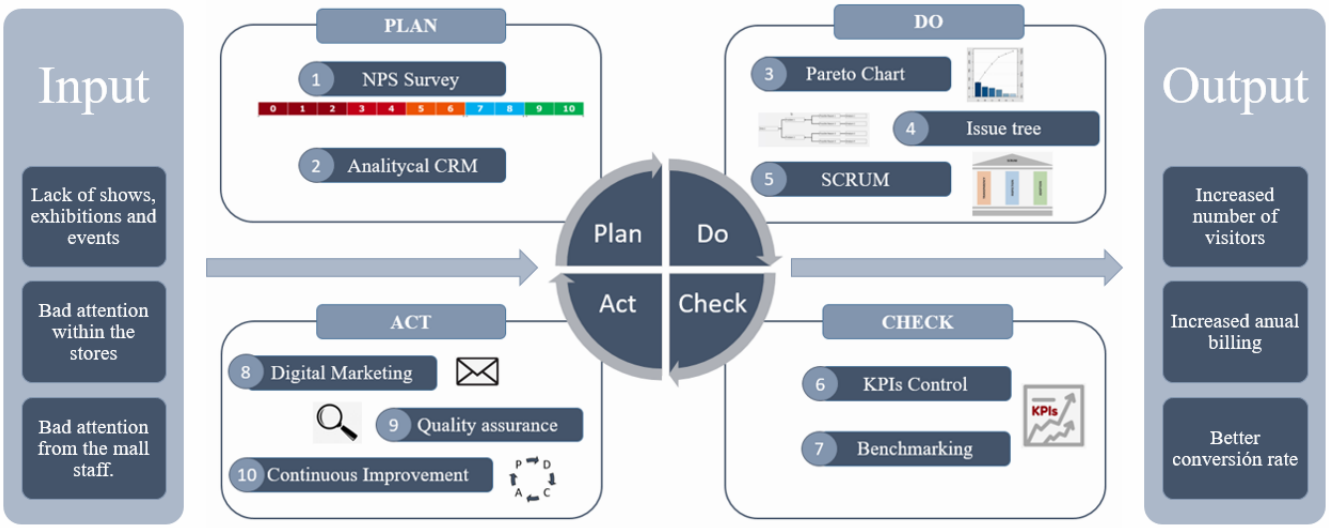

Fig 1. Proposed model.

III. PROPOSED MODEL

The proposed model consists of 4 phases, which are defined as follows:

A. *Phase 1: Plan*

This stage makes use of the analytical CRM to capture, store, interpret and report data related to the client [10]. For this, the studied company conducted a survey based on the Net Promoter Score (NPS) model, which measures the willingness of customers to recommend the company by asking them: “On a scale of 1–10, how likely is it that you will recommend this shopping center to your acquaintances?” [19]. Based on their answers, the NPS divides customers into three distinct groups:

- Promoters: customers who have had a highly satisfactory experience. They are loyal to the company and recommend it to their acquaintances.
- Neutral: customers who have had a positive experience, but not satisfactory enough for them to recommend it.
- Detractors: customers who had a negative experience. They are dissatisfied and unlikely to recommend the company.

The NPS is calculated as the difference between the percentage of promoters and detractors. Once the results were analyzed, an NPS of 33 points was obtained.

In the same survey, customers were asked about the perceived problems of the shopping mall, and the data collected was stored in a database for further analysis in the next phase.

Also, a fundamental part of the survey is to collect personal information from customers, such as name, surname, age, address, email, among others; in order to increase the amount of data within the CRM tool.

B. *Phase 2: Do*

From the answers obtained in the survey, and through the use of a Pareto Diagram, an analysis of the causes of the problem was carried out to determine the most significant ones. The information obtained was organized in an issue tree, where poor entertainment and poor customer service are determined as the main causes.

Once all the possible improvement options have been analyzed, a specific action plan is designed for each of them. These plans will be implemented under the SCRUM methodology and carried out as agile projects, as this type of

approach promotes frequent inspection, continuous adaptation, and frequent feedback between parties [17]. The tasks that make up each project are distributed in short execution cycles called "Sprints" (normally iterations of 3 to 6 weeks) [20]. At the end of each sprint, an inspection and review is carried out in which it is decided whether or not the work done is accepted as valid. Thus, the team in charge reflects on what went wrong and makes changes to improve the next Sprint.

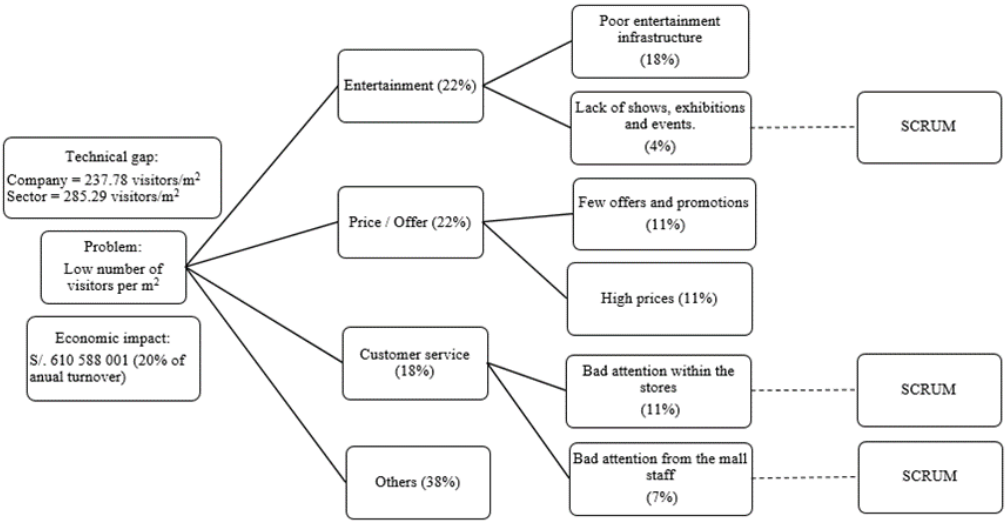

Fig 2. Issue tree.

C. *Phase 3: Verify*

In this phase, the aim is to review the impact of the proposed model through the analysis of different indicators. Likewise, this stage allows the comparison between the obtained results and the general averages of the sector, which were obtained from the study carried out by the Association of Shopping Centers of Peru.

After the implementation of the model, a 7% increase in the number of monthly visitors is expected. Likewise, it seeks to bring the conversion rate and the percentage of claims closer to the level of the sector average, with values of 8.5% and 1.5% respectively. Regarding monthly billing per m2, an increase of 13.7% is expected.

TABLE I. INDICATORS

Indicators	Real	Expected	Variation %
Monthly visitors per m^2	19.82	21.21	7.0%
Monthly billing per m^2	801.00 PEN	910.64 PEN	13.7%
Conversion rate	8.0%	8.5%	6.3 %
Percentage of claims	2.0%	1.5%	-25.0%

D. *Phase 4: Act*

It consists of proposing corrective measures to possible mistakes that occurred in the previous phases to adjust the model and improve its performance. These improvements should be designed based on feedback from customers. The digital marketing tool is used to notify customers about the changes implemented through personalized emails according to the stored data. Special emphasis will be placed on those identified as detractors to reduce negative experience.

In addition, these emails seek to collect new information about preferences and complaints that may arise through small surveys attached to them. This allows to further increase the data that feeds the CRM tool, as well as to check if the expectations of the clients were met and thus calculate a new NPS.

This completes all four phases of the PDCA cycle and, if necessary, returns to the planning phase for the continuos review.

IV. VALIDATION

Two scenarios were carried out through the Arena program to determine the impact of the improvement.

The inputs introduced were the number of daily visitors, the conversion rate of the shopping mall and the average billing. The results were based on a monthly basis since the indicators found in the verification phase are calculated in this way. For both scenarios, the simulation model was presented as follows:

Fig 3. Simulation model.

Scenario 1: This scenario simulated the situation of the company before the implementation of the model. After entering the average billing data in the Input Analyzer, it was found that it follows a normal distribution with an average of 507 and a standard deviation of 186. In addition, the number of daily visits was 210,000, of which only 8% of customers left the shopping mall having made a purchase.

After running the program, it was obtained as a result that the daily billing is 8,652,614 PEN. By converting this amount to monthly billing and dividing it by the area of the shopping mall

(317,396 m2), it is obtained that the monthly billing per square meter is 816.45 PEN.

Scenario 2: This scenario simulated the situation of the company once the proposed model had been implemented. Based on the literature consulted, it is estimated that the improvement will cause a 7% increase in the number of visits, so the number of daily visitors increases from 210,000 to 224,700. Likewise, the percentage of purchase intention is expected to reach 8.5%. Average billing follows the same distribution as in the previous scenario.

After running the program, it was obtained as a result that the daily billing is 9,814,241 PEN. By converting this amount to monthly billing and dividing it by the area of the shopping mall it is obtained that the monthly billing per square meter is 926.06 PEN.

V. DISCUSSION

In the diagnosis phase, it was evidenced that the economic impact caused by the identified problem represents 19.98% of the company's turnover. The simulation results are summarized as follows:

TABLE II. RESULTS

Indicator	Scenario 1	Scenario 2	Variation %
Daily visitors	210,000	224,700	7.0%
Monthly billing per m^2	816.45 PEN	926.06 PEN	13.4%
Convertion rate	8.0%	8.5%	6.3 %

According to the consulted literature, once the model was implemented, a 13.7% increase in billing was expected. In scenario 2, the simulation got an improvement of 13.4% so, although the specified objective was not reached, there is evidence of a significant improvement. Given this, it can be confirmed that the model proposed in this research mitigates the problem of fewer visits to the shopping mall. In this way, the economic impact on the annual billing is reduced from 19.98% to 6.58%.

Among the main findings of the model, there is a certain harmony between the tools as they optimally complement each other, thus originating a novel model little mentioned in the published literature. CRM proves to be a tool that provides, analyzes, and summarizes customer data, ensuring that it is up to date at all times. On the other hand, the Deming Cycle tool allows total quality assurance by covering all possible weak points of the implementation.

The search for entertainment available within the shopping mall appears repeatedly in the surveys, which is why it is considered an important factor in the present problem. This confirms what is mentioned by [21], who says that customers are more satisfied with the general atmosphere of the shopping center when it has entertainment facilities that contribute to a more pleasant shopping experience.

On the other hand, email marketing has been used extensively, especially to strengthen customer loyalty and take advantage of sales opportunities [14]. For this reason, communication with the client is considered a key factor that contributes to a successful B2C relationship. [2]. However, this is complex and, to maintain it in the best way, it is important to promote the attributes that the shopping center offers [22]. This is evidenced in the Act phase, where sending emails is important to keep customers informed about the latest changes implemented in the shopping center.

Also, as mentioned by [23], after the model implementation, it is evident that the SCRUM methodology is an agile and effective development method that provides rapid completion of tasks and rapid feedback from customers.

VI. CONCLUSION

The difficulties encountered in the shopping center chosen as a case study were the motivation to carry out this research. The lack of entertainment events and poor customer service negatively affected the performance of the shopping center, causing a decrease in the number of annual visits and generating an economic impact that represents 19.98% of the company's annual turnover.

The main contribution of this work is the development of an optimization model using CRM and SCRUM tools under the PDCA approach to mitigate the identified problems. As the results suggest, the proposed model is successful since it increased the company billing by 13.4%.

A successful shopping mall management cannot ignore the continuous search to increase the number of visitors since this indicator has a critical impact on this type of business. By developing distinctive strategies and creating a competitive advantage, companies can effectively maintain customer satisfaction and achieve a higher conversion rate.

Finally, this work has some limitations. First, the study focuses on a single company and is limited to a single country. This means that it is context specific, so the results can be influenced by different cultural factors. Future studies may consider expanding to other mall operators and other countries before generalizing the results.

Furthermore, in the simulation of the proposed model, the number of visitors was considered as a constant value. Future studies may consider such input as a variable that follows a certain distribution to better capture consumer behavior.

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