Service Management Model Based on BPM and MRP to Increase Customer Satisfaction in SME in the Fast Food Sector

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***Abstract*—The foodservice industry has grown rapidly in recent years. It has been one of the most affected ones in the current situation. This sector faces various problems and/or challenges related to cost, waiting time, quality of products, and recurring charges in the purchase decision by customers, who are more demanding and expect not only a good product but a good service. The objective of this work is to improve customer satisfaction. The proposed model, based on the tool Business Process Management (BPM) and Material Requirement Planning (MRP), is to achieve an improvement in the Net Promoter Score (NPS) indicator. The company under evaluation has a score of −2 in that indicator due to a poor service provided to a significant group of customers. After the implementation of both tools, the indicator improved, and the new value was 6, approaching the average NPS metric for restaurants, which is 37.**

***Index Terms*—BPM, MRP, inventory management, service level, customer satisfaction**

I. Introduction

In Peru, the gastronomic sector represents 2.8% of GDP and generates more than 900 thousand direct and indirect - INEI. In middle of January, the second wave of Covid-19 negatively impacted restaurants (−36.13%) due to reduced capacity and restrictions (James and Cecil *et al*., 2016). According to scientific research conducted by National Restaurant Association (NRA) to customers who frequent restaurants, 49% return for service, and only 12% for food quality. According to CleverTap, acquiring a new customer is 25 times more expensive than retaining a customer (Bejarano, 2019). In addition, according to JL Consultores, the quality of service is an essential factor that influences 60% of purchase decisions. A bad experience would generate 71% of people not returning (BPM LLP, 2021). Thus, to offer good quality service is essential for any company.

Customer satisfaction is not always achieved due to various reasons such as poor hygiene, poor attention, inattentive staff, among others. This problem is not specific to the Peruvian case. It is frequently identified in other countries' investigations (Zani and Borges *et al*., 2021).

In this context, it is crucial to the quality of the service to achieve customer satisfaction. The company chosen has the very common problem of the sector: inappropriate customer satisfaction due to different factors such as delays in delivery and problems to meet the demand (Barbosa and Silva *et al*., 2015).

In order to solve the problem exposed, a model based on BPM and MRP was developed. This model will improve customer satisfaction (Dadic and Maskarin *et al*., 2020). It is relevant to highlight that this model based on success stories satisfies the need to improve the quality of service and contributes to the scientific community.

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II. State of Art

It is possible to find many studies and investigations on process improvements implementations in different organizations through the use of BPM or MRP (Diaz and Mula *et al*., 2016).

A. Coordination and Inventary Control

The literature on this topic defines that both tools have very favorable results such as an increase in sales and profits due to the improvement of their final products, reduction of excess materials, optimization in the efficiency of process or customer satisfaction (Diaz and Mula *et al*., 2016). In this context, the Sousa and Claudino *et al*. (2017) highlight the great value that companies in this sector would obtain if they had greater efficiency in coordinating and planning their inventory to avoid cost overruns. Likewise, Indrawati and Miranda *et al.* (2018) emphasizes that an appropriate inventory control would not only benefit the company in providing a better service, but also in optimizing the supply chain and an improvement in delivery times; that is, it would increase the level of service in general. Sittisom and Srimarut (2020) continually investigate BPM and MRP because mature organizations could implement the tools BPM and MRP.

B. Process Management Gestión de Procesos

The focus of García and Realyvasquez *et al.* (2019) is mainly on a process management design to eliminate some stage or activity that is not generating value to the process or the final product and to reduce the excess of materials to achieve the value of the process and the maximum customer satisfaction. Sokil and Ubrežiová *et al.* (2020) emphasize that the majority of the workers in each area are not clear about the integral objective of the organization; for that reason, they do not have a good understanding of how the business works. In this part, Zhong and Moon (2020) mentioned that many organizations focus in an inadequate way in each unique process and it is proposed that a global vision of the processes should be had; that is, to cover each stage of the value chain process. Likewise, Sittisom and Srimarut (2020) proposals

they attribute is the implementation of a BPM to achieve efficient and effective processes that go through the organization without departmental obstacles. García and Realyvasquez *et al.* (2019) mention that many organizations focus inadequately on each unique process and propose a global vision focus, meaning the focus on the chain process instead of a step or specific activity.

C. Customer Focus Management

Customer satisfaction is an important element that, currently, is not considered in organizations. The majority of the companies focus more on the products than other factors that clients take into consideration in their purchasing decisions (Garcia and Gisbert, 2015). Indrawati and Miranda *et al.* (2018) have found that most organizations plan to reduce costs regardless of whether the product arrives in good conditions, or the experience of the service is not that good. However, if in parallel they focus on the client and the product, they will obtain not only greater efficiency in the process, but also a highly satisfied customer (Sokil and Ubrežiová *et al.*, 2020).

Through the review of the literature, it can be observed that there are different approaches in which BPM and MRP are used (Sittisom and Srimarut, 2020).

D. Resource Management

A very common problem in the organizations is the bad A widespread problem in organizations is the lousy implementation of an MRP since it produces many over-costs because of overruns and a lack of inventory control. Therefore, this resource management is fundamental to achieving customer satisfaction (BPM LLP, 2021). Likewise, it can be observed that Zhong and Moon (2020) emphasize the importance of resource management and the evolution made to adapt to globalization and the need to satisfy.

An appropriate allocation of resources would achieve certain benefits and a more significant order to plan demand. For example, according to the study of Zhong and Moon (2020), the foodservice industry has grown rapidly and has provocated a growing interest in knowing how to retain clients (Namdar and Naghizadeh *et al*., 2021). In addition, to understand the fundamental factors that influence the quality of the products, attention, and delivery time (Sousa and Claudino *et al*., 2017).

It can be observed that both tools have been worked under different study criteria to solve problems in organizations. However, it can be shown that both could be linked to eliminating time offs and thus reducing times in the process and accomplishing the objective: improving customer satisfaction (Psomas and Kafetzopoulos *et al*., 2012).

III. Contribution

A. Base Model

The food industry presents poor management of the supply of inputs that affects the entire production chain generating orders delivered out of time, non-compliant orders or noncompliance with demand. Through a search for various methodologies, tools and models that allow implementing improvements, BPM and MRP tools were found as the main solutions.

B. Proposed Model

For the proposed model, it is necessary to have historical data that allow us to understand the current situation and the problems and literature of success stories. The next step is the identification and implementation of the tools: BPM and MRPs that are part of the proposed model.

In this case, the information used to evaluate the company was:

- Organizational chart
- Diagram of the processes of the company
- Sales information from de last twelve months
- List of suppliers
- Average time of each step of process
- Customer satisfaction survey from the frequently customers

C. Model Components

For the development of the model, four components were proposed, which are shown below, each one in more detail.

TABLE I: Components Comparison Matrix

CAUSES / ARTICLES	Component 1: Inadequate coordination in the warehouse	Component 2: Poor staff attention	Component 3: Problems meeting the demand	Component 4: Lack of customer focus
Lau, H., Nakandala, D., Samaranayake, P., & Shum, P. K. (2016)		BPM		BPM
Cruz, J., & lÉvano, D. (2016)			IT integration	
Sokil, O., Ubrežiová, I., Eugenio, T., & Marques, T. (2020)		Policy definition		
Zani, C. M., Borges, M. M., Severo, a. J. B., Garcia, E. R., & Müller, C. J. (2021)				BPM
García-Alcaraz, J., Realyvasquez-Vargas, A., García-Alcaraz, P., Pérez de la Parte, M., Blanco FernÁndez, J., & JimÉnez Macias, E. (2019)	MRP		MRP	
Proposal	MRP	Policy definition	IT integration	BPM

1) Component 1

To perform the MRP process of Table I, small interviews are conducted taken into consideration the information already shared by the company. These sessions allowed us to know the estimated average time that each part of the process takes such as production, storage and sale.

Using this information, the bill of materials is made and then the inventory registration with the Master Production Schedule (MPS).

The MRP is carried out by associating the materials identified in demand, lead time, initial stock, planned receptions and quantities of purchase orders.

A seasonal forecast is also being worked on the determination of the projected demand. Finally, the entire implementation of the tool is evaluated and opportunities for improvement are proposed.

2) Component 2

The methodology should be used in each process as in Table I since most of the objectives are established solely by each area that causes an insufficient global perspective of the entire organization. This aims to increase customer focus and highlight the comprehensive management of the entire business. To obtain a customer focus, process management must be implemented horizontally because organizations work more efficiently and effectively when their activities and

resources are linked and thus have a more significant number of satisfied customers. It is essential to identify the strategic objectives of the company. As the company's global policy, the approach towards the client must be defined so that each area considers it within its processes. One of the most effective ways to prioritize it would be to consider this pillar within the performance evaluation of all employees.

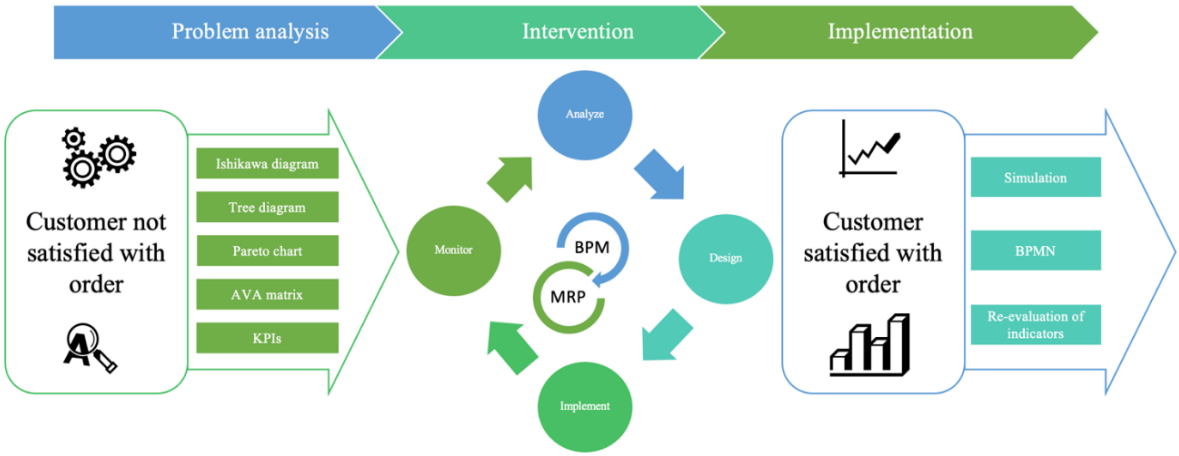

Fig. 1. General view of the proposed model.

3) Component 3

Based on the literature review, sequential phases are described independently of each other to achieve the implementation of service management processes. The development of new procedures according to the phases of implementation implies access to the necessary documents to analyze the current situation and delimit the scope of the project.

A good projection of demand based on historical information of the company, as well as the macroeconomic environment, will allow the company to adequately plan the purchase of its supplies and personnel requirements. In this way, it would be achieved that each client who requires the product and / or service is attended to.

4) Component 4

A map of processes and subprocesses is made to know the current process and propose a diagram. One of the objectives is to graphically represent the stages of processes and interactions and identify if any steps in the process add value to the customers. If there are not no steps, the process should change.

Then, with the tools of Fig. 1 as Balance Score Card (BSC), the strategic objectives of the four perspectives are shown; with the Added Value Analysis (AVA) matrix, examine each proposal and follow-up each one to verify the correct implementation that allows continually improvement.

D. Key Performance Indicators (KPI)

In this section, the four indicators used to evaluate the model improvements will be presented. The NPS was considered as the main indicator because with our model we seek to improve customer satisfaction and this indicator will allow us to measure it. On the other hand, the implementation of MRP will reduce times and improve the number of correct deliveries; for that reason, the average cycle time indicator and percentage of non-conforming will allow us to measure the improvements. Finally, it is important to measure sales, which is the most important objective of the company.

- **Net Promoter Score (NPS):** It allows to calculate the customer satisfaction classifying them into three groups: Promoters, Passives and Detractors. The goal is to increase the current value by at least 10 points.

$$\text{NPS} = \frac{\text{Promoters}}{\text{Total}} - \frac{\text{Detractors}}{\text{Total}} \times 100$$

- **On-time delivery:** It allows to know if the decrease in time obtained is enough to reduce the delay in deliveries.

$$\text{On} - \text{time delivery} = \frac{Orders\ delivered\ on\ time}{Orders\ delivered} \times 100$$

- **Average cycle time:** It allows to know the time taken for the cycle and to compare it with the time taken before and evaluate the improvements with the tools.

$$\text{Average cycle time} = \frac{\text{Work in process}}{\text{Completion rate}} \times 100$$

- **Percentage of non-conforming:** It allows to measure the percentage that represents the non-conforming products respect to the total of orders.

$$\text{P} = \frac{\text{Non} - \text{conforming orders}}{\text{Orders}} \times 100$$

- **Sales target:** It allows to measure the income of the current sales and to be able to compare with a past or current goal of sales against targets.

$$\text{Sales target} = \frac{\text{Current period sales}}{\text{Sales target}} \times 100$$

IV. Validation

The method of validation was based on two simulations: one with the actual process and the other with the proposed model. The time taken to evaluate was the time incurred in staff interviews.

A. Initial Diagnosis

When analyzing the current situation of the company, the main problem is the non-conformity of the order. Now, this negative impact represents an annual loss of 23,105 PEN,

equivalent to 19.25% of annual sales. The main causes of this problem are the delayed deliveries (41%), followed by the problem meeting the demand (38%) and finally, poor staff attention (21%). When analyzing the root cause of the problem, the following root causes were identified: (i) Inadequate warehouse coordination, (ii) Inefficient distribution, (iii) Bad demand planning, (iv) Inadequate inventory control and (v) Lack of Staff training.

The results of the implementation of the proposed model will then be shown in addition to the evaluation of the indicators.

B. Validation Design and Comparison with the Initial Diagnosis

The simulation was carried out internally after an explanation of each of the processes by the company's employees. It was very important to perform the simulation in order to validate if the proposal is really effective through the KPIs.

On component 1, it is decided to implement due to inaccurate demand planning causing delays in the delivery of products. For this reason, an Ishikawa diagram was made to find the main factors of this problem and propose solutions that can improve these points. One of the solutions proposed is the use of MRP that allows a better management of inventories and avoids waste of inputs and a better planning.

On component 2, the success story of a customer approach was taken into account to identify the process to follow and, in this way, achieve customer satisfaction. One of the main reasons why the organization do not focus on customers is the lack of consideration of other parties as partners into the process. Then an update on strategic, operational and support processes was made considering the proposed improvements.

On component 3, the seven phases described by Ocampo allow defining a strategy for the project. The current method is analyzed to develop a large-scale design and gradually begin to be more detailed. Then, charges are made in parallel with the implementation and the proposal is analyzed through the indicators.

On component 4, different company policies were proposed, as well as a restructuring of the ordering request making it omnichannel. Also, the purchase process was standardized aiming to reduce time and generate more efficiency.

C. Simulation of the Proposal

The process was shown to the employees of the company to validate the impact of the improvements. In addition, other proposals such as a new way of storing supplies, omnichannel customer service, outsourcing the delivery service was implemented in the company. To evaluate these impacts, surveys were done.

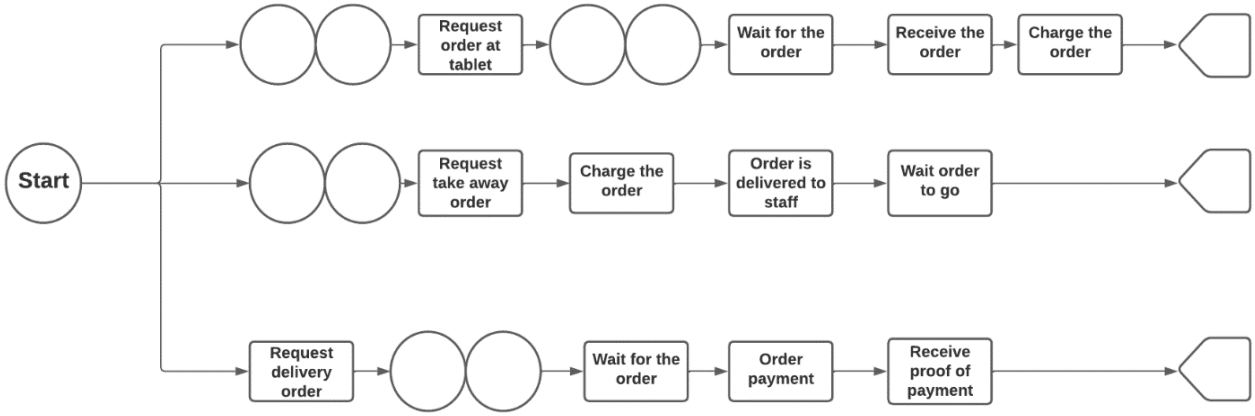

Fig. 2. Representation.

With the results obtained through the simulation of the Fig. 2, it can be observed that the situation of the company identified at the beginning of the research was improved. On the survey conducted, it can be evidenced that there was an improvement in our key indicator which is the NPS that rises eight points without having 100% of the proposed improvements.

In conclusion, it is defined that the research manages to significantly reduce the problem and considering a 10-hour attention there was an increase in daily customer service from 20 people a day to 110 being the greatest attention via delivery (93 people), followed by in the local (13 people) and to take away (four people). Moreover, the two proposed tools contributed value in improving service satisfaction.

Finally, it can be observed in the Table III that the NPS value indicates an improvement, obtaining a value of 6, but not as effective as the projected value of 10.

TABLE II: AS IS SITUATION VS TO BE SITUATION

	Initial situation	Projected value	Obtained values
Clients server daily	29 people	50 people	110 people
NPS	−2	10	6

V. CONCLUSIONS

The proposed model manages to reduce waiting time and to improve service satisfaction generating an increase in gross profit by 79%. However, our proposal requires certain requirements as (i) outsourced delivery, (ii) acquisition of a bigger warehouse and (iii) purchase of new packaging. Considering these incremental expenses, the increase in gross profit would be 26%.

In addition, using the BPM model would achieve a reduction of 44% of the time incurred in activities that do not generate value for the company or the customer. This decrease would generate savings in materials, inputs and

labor costs.

It can be concluded that the integration of BPM with the MRP tool can provide optimal results. This is basically because the BPM tool is perfectly complemented by the MRP by strengthening the weak points, unifying the general redesign of the processes and always ensuring a work cycle to always improve the process already carried out.

In the future, it is advisable to propose new tools to automate the MRP to provide a competitive and quality model. In addition to storing historical data to have better management of decision making oriented to better results.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Ricardo Fernandez-Rios conducted the research, analyzed the data. Sebastian Salas-Guillen developed the models and wrote the manuscript. Martin Collao-Diaz, Juan Carlos Quiroz-Flores y Alberto Flores-Perez, with their extensive experience, knowledge and professional career, served as a guide for the course of the investigation. All the authors had approved the final version.

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