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Inventory optimization/control through an MRP SYSTEM in artisanal bakeries geographically located in Huauchinango Puebla

Optimización/control de inventarios mediante un SISTEMA MRP en panificadoras artesanales situadas geográficamente en Huauchinango Puebla

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Abstract

Mexico has more than 40 thousand baking companies where 92.5% are artisanal, these businesses employ 1.5 million inhabitants, specifically in Huauchinango, Puebla there are more than 150 businesses corresponding to this productive sector, which daily face new competitors, Therefore, they seek to maintain 100% functionality of inventories and production planning so that customer service is satisfactory. Inventories represent the stocks of raw materials (PM) and inputs that are transformed to meet the production objectives for the star products (White bread/French bread), which accounts for 48% of total sales. This article describes the preparation of an MRP, as a PM planning manager, fully covering 48% of sales policies, reducing inventory by 22.10%, through a quantitative methodology based on: The batch x batch technique or disposal, effective inventory management and development of an MPS model (14-day acquisition period). The economic contribution is observed through the effective MRP system for bakeries, which will reduce obsolete or expired inventories, and allow timely purchasing. and form of the MP and inputs.

Inventories, Artisan bakeries, MRP System

Resumen

México cuenta con más de 40 mil empresas panificadoras donde el 92.5% son artesanales, estos negocios emplean a 1.5 millones de habitantes, específicamente en Huauchinango, Puebla existen más de 150 negocios correspondientes a este sector productivo, los cuales diariamente se enfrentan a nuevos competidores, por lo cual buscan mantener al 100% la funcionalidad de los inventarios y la planeación de la producción para que el servicio al cliente sea satisfactorio. Los inventarios representan las existencias de materia prima (M.P) e insumos que son transformados para cumplir con los objetivos de producción para los productos estrellas (Pan blanco/pan francés) el cual expone el 48% de las ventas totales. El presente artículo describe la elaboración de un MRP, como gestor de planificación de M.P, cubriendo en su totalidad el 48% de políticas de venta, disminuyendo en un 22.10% el inventario, mediante una metodología cuantitativa basada en: La técnica de lote x lote o disposición, manejo efectivo de inventarios y desarrollo de un modelo MPS (Periodo de adquisición de 14 días)., la contribución económica se observa mediante el sistema MRP efectivo para las panificadoras, que disminuirá inventarios obsoletos o caducos, y permitirá la compra en tiempo y forma de la M.P e insumos.

Inventarios, Panificadoras artesanales, Sistema MRP

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Introduction

In the experience of Enríquez (2010) in Mexico and the world, bread consumption is a variable of flavor and nutrition that is found in each of the homes, specifically in Huauchinango, Puebla, artisanal bread-making companies are relevant to supply food needs, which is why they must meet customer expectations 100%, taking into account that the commercial market is becoming more competitive every day. This competitive environment requires the development of quantitative methodologies that contribute to delivering the main sales products in a timely manner, which in more than 70% of artisan bread businesses are exposed through high sales of white bread/French bread due to due to its low cost and permissibility for different consumption modalities (Bassett , Gimenez , Pinho , and Sammán , N, 2013).

As described above, it is relevant to apply operations management techniques that effectively manage the acquisition of PM and inputs, and do not generate inventories that bring with them economic and space waste (Nery De La Cruz, 2022), in response to this The need arises for this research article based on the design and implementation of an MRP system for artisanal bakeries geographically located in Huauchinango Puebla to optimize/control inventories and production levels (Poma, Pernia and Quiroz, 2014). The designed MRP model aims to: Implement a system based on a Material Requirements Plan (MRP) through the use of Excel 2016 software in artisanal bread producing companies located in Mexican territory, to improve productivity, reduce 22.10% of expired inventories and guarantee the existence of 98% of raw materials and inputs for future production of white bread/French bread.

The methodology carried out is based on the following phases:

- Phase 1) Situational analysis of baking organizations in Huauchinango Puebla (SWOT).
- Phase 2) Data collection and information analysis: Development of a forecast model (Linear Regression).
- Phase 3) Development of MRP system: The MRP system was developed in Excel technological software and has two main functionalities: 1) Capacity planning, 2) Inventory control, taking into account correct production management to meet the requirements of the raw material that is requested for the production of the final product. This MRP model is characterized by calculating the optimal quantities of PM ensuring receipt within the requested time (14 days), likewise it includes the quantitative assessment of the total products to be produced, it is convenient to mention that to prepare the MRP, the following stages of operations management:
    - Stage 1) Development of the bill of materials (BOM): According to Urbano, García, de la Mora, Vargas and Cruz, (2021), when carrying out this management technique, the parts, PM or supplies essential for manufacture the final product (white bread/French bread), this list of materials is classified according to the level of depth of the elements.
    - Stage 2) Inventory registration (MPS Master Production Plan Development): This technique allows accounting for the MP or inputs available within temporary, fixed or semi-fixed warehouses/warehouses, taking into account that an effective inventory registration will avoid making purchases of unnecessary raw materials (Mendoza and Vera, 2022). When carrying out this technique, the current amount of raw material is known quantitatively, as well as the missing or near-scarce inputs. However, the development of the MPS exposes the number of units to be produced (Nazate , 2023), in the same way the time in which the order must be ready (Improvement in the level of customer service) contemplating the administrative cycle from the moment the MP is acquired, manufacturing, sale.

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- Stage 3) Development of the template for the adaptation of the MRP system model for baking companies.

Finally, the results obtained validate the improvement obtained with the implementation of the MRP system.

Methodology to be developed

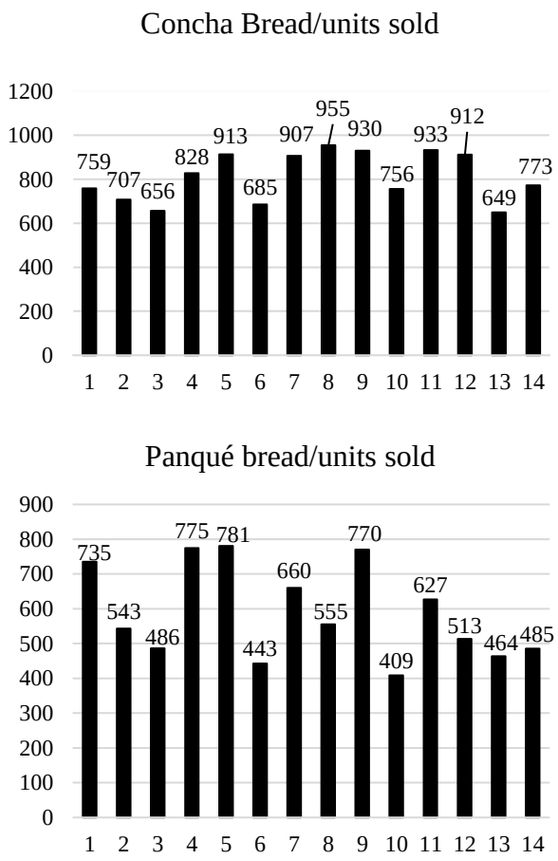
The methodology to be developed is shown below: Phase 1) Situational analysis of the baking organizations in Huauchinango Puebla (SWOT): With the preparation and analysis of the SWOT matrix (Figure 1 FODA analysis of artisanal baking companies in Huauchinango Puebla), the Strengths are listed, which characterize the artisanal baking companies located in the city of Huauchinango Puebla and area of influence, which are considered for the development of the implementation of the MRP, in the same way the existing Opportunities are shown to execute the suitable methods and techniques, related to supply, production and the level of service when the MRP system is implemented, in the same way They describe and analyze the weaknesses of bakeries taking into account that they must be eliminated and/or minimized to face the local and regional market. Finally, the Threats that significantly affect bakeries by not complying with the work plan, established strategies and methods are shown.

Strengths	Weaknesses
F_1) It has a large market of consumers of various ages.	**D_1)** Size of the company.
F_2) Variety in product lines.	**D_2)** Size (Infrastructure) of the warehouse.
F_3) Affordable product prices.	**D_3)** Demand Planning.
F_4) Product quality.	**D_4)** Safety inventory in small quantities
F_5) Product with unique flavor and texture.	**D_5)** Irregularity in the request of raw materials.
F_6) Trained staff.	
Chance	**Threats**
O_1) Expansion of facilities.	**A_1)** Emergence of new competitors in the region.
O_2) Greater production capacity	**A_2)** Local, regional, state and national contingencies.
O_3) Launch of new products	**A_3)** Economic crisis.
O_4) Demand growth.	**A_4)** Resistance to the adaptation of new methods and/or strategies.
O_5) Possibility of financing.	**A_5)** Continuous and temporary loss of clients.
O_6) Open new sales points in the region.	

Figure 1 FODA analysis of artisanal baking companies in Huauchinango Puebla
Source: Own elaboration

Phase 2) Data collection and information analysis: Development of a forecast model (Linear Regression).

The collection of information was carried out, which allowed us to know the product with the greatest demand in the bakeries, through a random sampling of sales, the types of bread that provide sales support to the bakeries during 14 sales periods (Days) were recorded. (Figure 2 Sampling of sales recorded in bakeries in the region).



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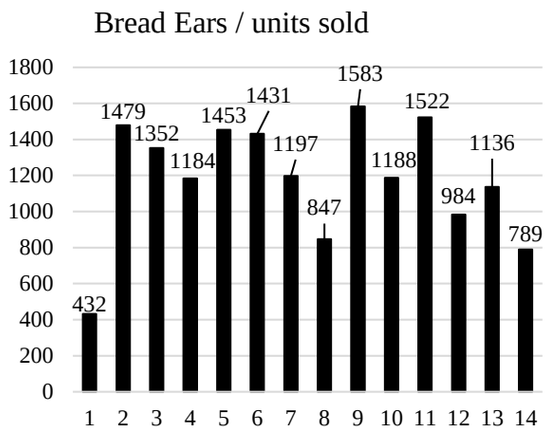

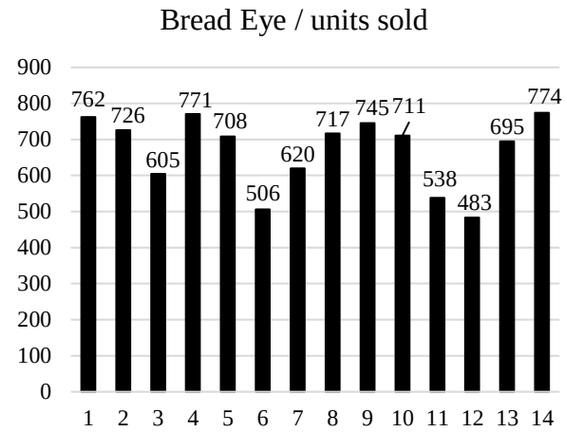

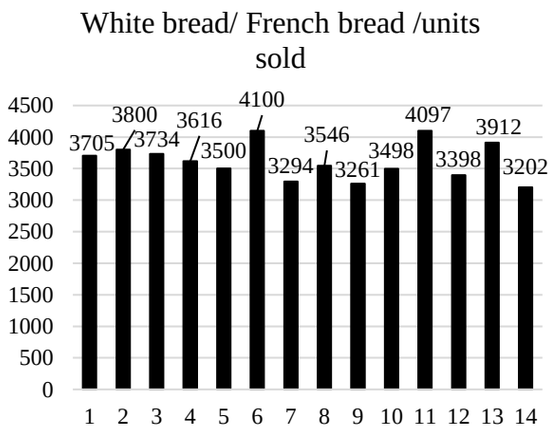

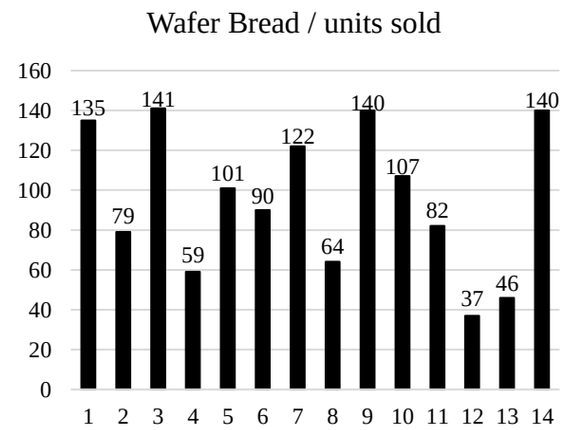

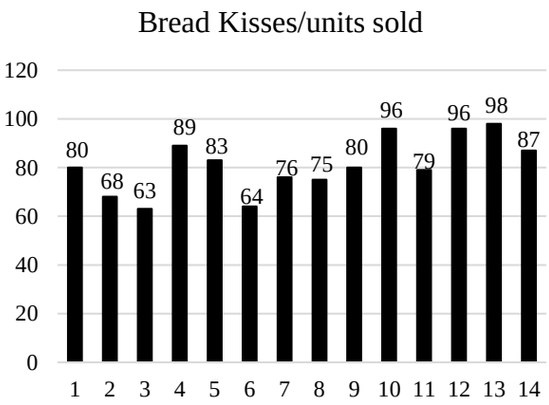

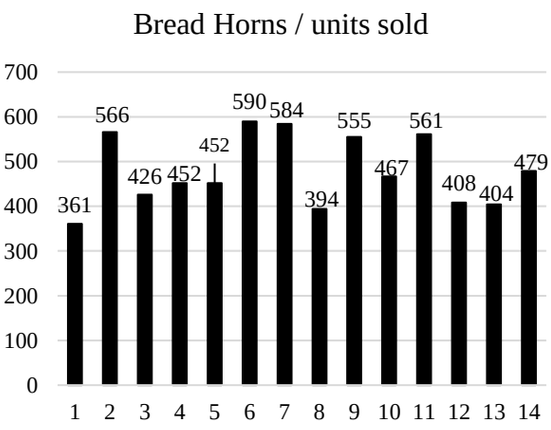

Figure 2 Sampling of sales recorded in bakeries in the region
Source: Own elaboration

Sales were subsequently analyzed through a descriptive statistics study, showing that white bread/French bread accounts for 48% of total sales (Figure 3% of sales in baking companies in Huauchinango Puebla).

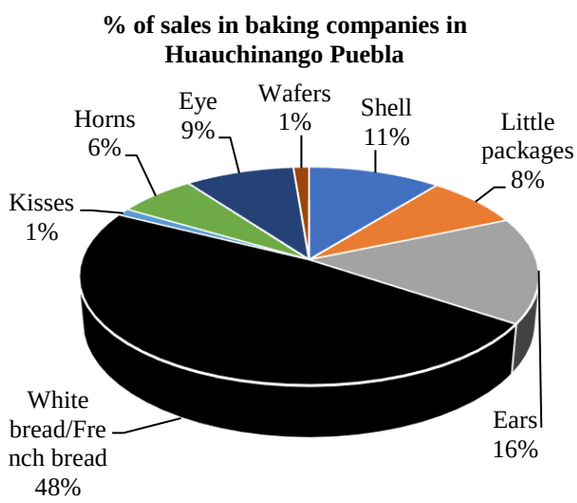

Figure 3 % of sales in baking companies in Huauchinango Puebla
Source: Own elaboration

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Once the star product has been determined (White bread/French bread 48% of general sales), the linear regression analysis is carried out in which the statistical equation is obtained to predict the average demand for the product -15.91x + 3738.1 (Figure 4 White bread/French bread sales forecast (Linear Regression)), using the resulting regression equation, a minimum forecasted demand for period (Day) 15 of 3499.45≈3500 units is obtained.

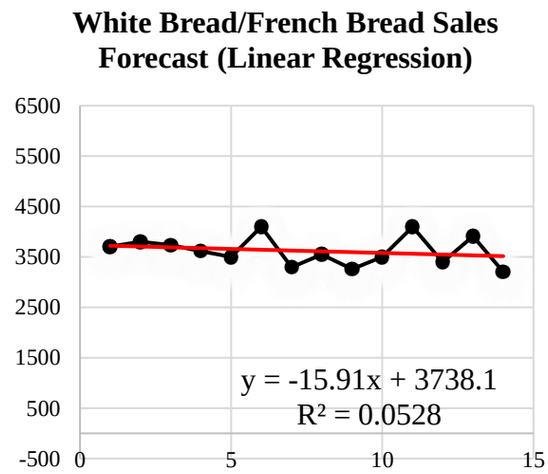


Figure 4 White bread/French bread sales forecast (linear regression).
Source: Own elaboration

Phase 3) MRP system development

To develop the MRP system, the intervention of the following variables was considered:

I. The product to be produced: According to the level of sales, it is deduced that the product selected is white bread or French bread (Figure 5 White bread/French bread).

Figure 5 White bread/French bread
Source: Own elaboration

II. The predicted demand: According to the linear regression model, a predicted demand of 3499 ≈ 3500 units is established.

III. Order delivery dates: 14-day intervals for each order issuance in accordance with the production policies of artisanal baking companies.

IV. List of necessary materials (flour, sugar, salt, yeast, water) to carry out the production of each unit of product and the total production.

Phase 3 is made up of 3 stages which are described below:

Stage 1) Development of the bill of materials (BOM): The bill of materials (BOM) is a prerequisite for the development of the MRP system (Acosta, 2020), this list of materials allows knowing the raw material and the quantity involved. For the preparation of white bread/French bread, for the case presented it was classified into two levels: The first level is made up of the final product (White bread/French bread), while the second level contains the following elements: Flour , sugar, salt, yeast and water, likewise at this level the quantities essential for the production process are delimited (Figure 6 List of materials (BOM) for the production of white bread/French bread).

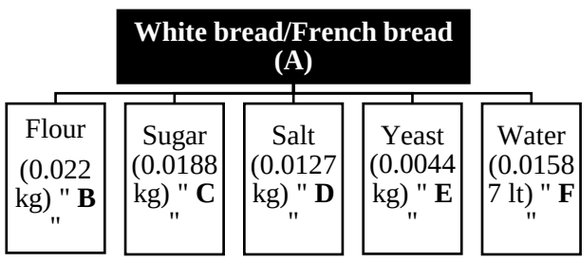


Figure 6 List of materials (BOM) for the production of white bread/French bread. *Source: Own elaboration*

ISSN: 2410-342X

Stage 2) Inventory registration (MPS Master Production Plan Development): For correct compliance with stage 2, a record was made of the current status of the average inventories in the baking companies analyzed, through a detailed record of materials available for immediate use (already in stock) and materials that are on order from suppliers, the available raw materials, the Lead Time, the batch size LxL (Lot x Batch), the scheduled receptions are exposed (Table 1. Record of necessary elements of the MPS Master Production Plan).

Variable	MP Available	Lead Time	Lot size	Scheduled receptions
White bread/French bread (Units) "A"	3499	1	3800 units	0
Flour (kg) "B"	156	2	45 kg	0
Sugar (kg) "C"	7	2	LxL	0
Salt (kg) "D"	9	1	LxL	0
Yeast (kg) "E"	3	2	15 kg	0
Water (L) "F"	112	1	LxL	0

Table 1 Record of necessary elements of the MPS Master Production Plan
Source: Own elaboration

Once the current inventory has been established, the MPS is calculated, taking into account that the baking companies have ovens that must be used 100%, which is why they have a capacity of 3800 units, it is important to do so. mention that the operational policy for the use of the oven may vary according to the sales seasons, once the previous variables have been determined, the MPS model is carried out in the Excel technological software (Table 2. MPS for baking companies).

3800	Days						
	fifteen	16	17	18	19	twenty	twenty-one
Initial inventory	101	101	417	102	152	202	102
Forecast	3499	3484	3468	3452	3436	3420	3404
Orders	3800	3400	4115	3750	3750	3900	3800
MPS	3800	3800	3800	3800	3800	3800	3800
Final inventory	101.00	417	102	152	202	102	102

Table 2 MPS for baking companies
Source: Own elaboration

Stage 3) Development of the template for the adaptation of the MRP system model for baking companies: With the information obtained in the previous stages, the MRP system model is created, this model is located in the Excel technological software, by developing the following scheduling template (Table 3 MRP template for baking companies:

Element: A		Lot size :				Component: Father	
Availability			Lead Time:				
	Days						
Day	fifteen	16	17	18	19	twenty	twenty-one
MPS Requirement							
Scheduled receptions							
Availability projection							
Net requirements							
Net order							
ORDER PLANNED RELEASE							

Table 3 MRP template for baking companies
Source: Own elaboration

To calculate the availability projection in the Excel technological software, the following formula was used.

$$\text{Availability projection} = \text{Previous availability projection} - \text{Gross inventory} + \text{Scheduled withdrawals} + \text{Net order} \quad (1)$$

Results

The results obtained for each section are:

Phase 1) Situational analysis of the baking organizations in Huauchinango Puebla (SWOT): This phase brought with it the detection of areas for improvement in the baking organizations, highlighting the resistance to change on the part of the staff, which was the guideline for taking the decision to make the proposal in Excel technological software, to automate the MRP and solve the resistance to the adaptation of new methods and/or strategies. Likewise, considering that they are artisanal companies, using an easily accessible technological means allows the 100% compliance with the use of the MRP.

Phase 2) Data collection and information analysis: Development of a forecast model (Linear Regression): With the use of different tools we effectively forecast specific sales for subsequent periods, in the same way a standard equation was determined, whose function The main thing will be the forecast of future sales, to make an assertive calculation for the acquisition of MP and inputs that feed the programmed MRP templates.

Phase 3) MRP system development: The resulting MRP system model is set out below:

MRP for the production of white bread/French bread (Table 4 MRP White bread/French bread):

Element: A		Lot size:			3800		Component: White bread/French bread	
Availability		3499	Lead Time		1 day			
					Days			
Day		fifteen	16	17	18	19	twenty	twenty-one
MPS Requirement		3800	3484	4115	3750	3750	3900	3800
Scheduled receptions		0	0	0	0	0	0	0
Availability projection	3499	3499	15	3500	3550	3600	3500	3500
Net requirements		3800		7600	3800	3800	3800	3800
Net order		3800		7600	3800	3800	3800	3800
PLANNED ORDER RELEASE	*3800*		7600	3800	3800	3800	3800	

Table 4 MRP White bread/French bread
Source: Own elaboration

ISSN: 2410-342X

MRP For the acquisition of MP Flour "Element B" (Table 5 MRP Flour "Element B"):

Element: B		Lot size:		Four. Five		Component: "Flour"		
Availability	156	Lead Time		2 days	Amount	0.022		
				Days				
Day		**fifteen**	**16**	**17**	**18**	**19**	**twenty**	**twenty-one**
MPS Requirement		0	167	84	84	84	84	0
Scheduled receptions								
Availability projection	156	156	3. 4	40	2	8	14	14
Net requirements			11	50	43	82	76	
Net order			45	90	45	90	90	
ORDER PLANNED RELEASE	45	90	45	90	90			

Table 5 MRP Flour "Element B"
Source: Own elaboration

MRP for the acquisition of MP Sugar "Element C" (Table 6 MRP Sugar "Element C"):

Element: C		Lot size:		LxL		Component: "Sugar"		
Availability	7	Lead Time		2 days	Amount	0.0188		
				Days				
Day		**fifteen**	**16**	**17**	**18**	**19**	**twenty**	**twenty-one**
MPS Requirement		0	143	71	71	71	71	0
Scheduled receptions		0	0	0	0	0	0	0
Availability projection	7	7	0	0	0	0	0	0
Net requirements			136	71	72	71	72	
Net order			136	71	72	71	72	
ORDER PLANNED RELEASE	136	71	72	71	72			

Table 6 MRP Sugar "Element C"
Source: Own elaboration

MRP for the acquisition of MP Sal "Element D" (Table 7 MRP Sal "Element D"):

Element: D		Lot size:		LxL		Component: "Salt"		
Availability	9	Lead Time		2 days	Amount	0.0127		
				Days				
Day		**fifteen**	**16**	**17**	**18**	**19**	**twenty**	**twenty-one**
MPS Requirement		0	97	48	48	48	48	0
Scheduled receptions		0	0	0	0	0	0	0
Availability projection	9	9	0	0	0	0	0	0
Net requirements			88	48	48	48	49	
Net order			88	48	48	48	49	
ORDER PLANNED RELEASE		88	48	48	48	49		

Table 7 MRP Salt "Element D"
Source: Own elaboration

MRP for the acquisition of MP Yeast "Element E" (Table 8 MRP Yeast "Element E"):

Element: E		Lot size:		fifteen		Component: "Yeast"		
Availability	3	Lead Time		2 days	Amount	0.0044		
				Days				
Day		**fifteen**	**16**	**17**	**18**	**19**	**twenty**	**twenty-one**
MPS Requirement		0	33	17	17	17	17	0
Scheduled receptions		0	0	0	0	0	0	0
Availability projection	3	3	0	13	eleven	9	8	8
Net requirements			30	17	4	6	7	
Net order			30	30	fifteen	fifteen	fifteen	
ORDER PLANNED RELEASE	30	30	fifteen	fifteen	fifteen			

Table 8 MRP Yeast "Element E"
Source: Own elaboration

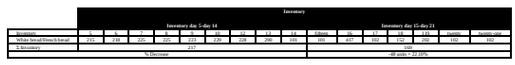
MRP for the acquisition of Water inputs "Element F" (Table 9 Water input "Element F"):

Element: F		Lot size:		fifteen		Component: "Water"		
Availability	112	Lead Time		1 day	Amount	0.0158		
				Days				
DAY		**fifteen**	**16**	**17**	**18**	**19**	**twenty**	**twenty-one**
MPS Requirement		0	120	60	60	60	60	0
Scheduled receptions		0	0	0	0	0	0	0
Availability projection	112	112	0	0	0	0	0	0
Net requirements			8	60	60	60	60	
Net order			8	60	60	60	60	
ORDER PLANNED RELEASE		8	60	60	60	60		

Table 9 Water Input "Element F"
Source: Own elaboration

It is worth mentioning that the validation of the effectiveness of the MRP system, in artisanal baking companies located in Huauchinango Puebla, obtained a level of acceptance of the MRP of 100% and a significant improvement that is described below:

- 22.10% improvement in the inventory level with respect to the initial status "Decrease in obsolete/expired inventories" (White bread/French bread) (Figure 7 White bread/French bread inventory control).



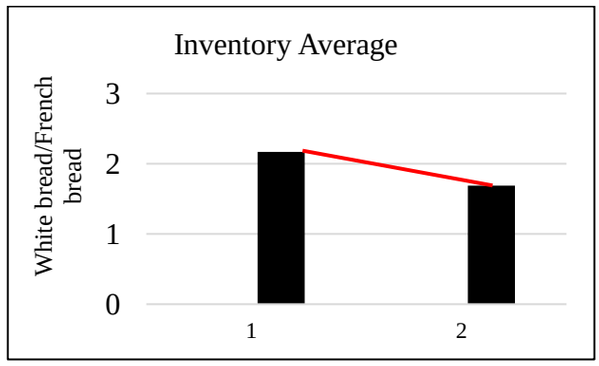


Figure 7 White bread/French bread inventory control.
Source: Own elaboration

Now, from an economic perspective, inventory control of white bread/French bread through an MRP system represents an annual saving of $53,222.40, considering that currently a piece of white bread/French bread has a cost of $3.30, by reducing inventories.

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By 22.10% the optimal amount of demand will be produced, ceasing to produce 48 pieces of white bread/French bread, which are not sold the next day, which is why they have to make an expired inventory, generating economic losses for the artisanal bakeries of Huauchinango. Puebla. It is important to mention that by establishing adequate inventory levels for baking companies (perishable products) it will be possible to satisfy 48% of potential customers who buy white bread/French bread, in the same way the loss of customers will be reduced, and the acquisition of MP and inputs in quantities not necessary.

Gratitude

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Conclusions

Planning turns out to be a valuable tool that allows generating significant savings in transformation organizations, this tool corresponding to Operations Management, makes use of different quantitative methodologies within which is the MRP System, the MRP brings with it the optimal calculation to acquire raw materials and inputs, and reduce the generation of high inventory levels, which represent economic losses for organizations, such is the case of artisanal bread-producing companies geographically located in Huauchinango Puebla.

These transformation organizations seek to reduce economic losses and improve the Planning of Material Requirements, because they are companies that do not generate high profits, they find in this type of techniques the appropriate means to significantly improve the economic environment and the level of customer service.

Specifically, by developing the MRP model in the Excel technological software, we provide baking organizations with an economical and adaptable programmable means to control the requisitions of raw materials and inputs, adopting an economic benefit that annually amounts to $53,222.40, maintaining a population of white bread/French bread consumers of 48% captive, and generating the acquisition of flour, sugar, salt, yeast and water in a timely manner, avoiding the unnecessary purchase of these products, bringing with it that within the warehouses /warehouses there are the correct and necessary supplies, reducing the use of spaces and the generation of obsolete or expired inventories.

The implementation of this application allows us to verify that an administrative operations management tool combined with the good use of Excel technological software, provides optimal and portable solutions to common problems that cause a lack of inventory control and economic losses to artisanal companies producing bread in Huauchinango Puebla.

References

I. Acosta F, J. A. (2020). Prototipo de sistema simulador en paralelo con un sistema de Planificación de Requerimientos de Materiales MRP. Instituto de Ingeniería y Tecnología. Universidad Autónoma de Ciudad Juarez-Investigación. Coordinación General de Investigación y Posgrado. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: http://cathi.uacj.mx/bitstream/handle/20.500.11961/16614/rep%20tec%20Desarrollo%20e%20Implementaci%C3%B3n%20de%20un%20prototipo%20MRP..pdf?sequence=3&isAllowed=y

ISSN: 2410-342X

II. Bassett, M. N., Gimenez, A., Pinho, O., y Sammán, N. (2013). Importancia del pan blanco como fuente de nutrientes: reducción de sodio y fortificación con calcio. Diaeta, 31(145), 07-14. Revista Scielo. ISSN 1852-7337. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: http://www.scielo.org.ar/scielo.php?pid=S1852-73372013000400002&script=sci_arttext&tlng=pt

III. Enríquez P, I. (2010). Economía del pan: Consumo y configuración territorial en México. Problemas del desarrollo, 41(162), 177-179. Revista Scielo. ISSN 0301-7036. Facultad de Ciencias Políticas y Sociales, UNAM. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0301-70362010000300009

IV. Mendoza, M. S., y Vera, C. M. (2022). El control de inventarios y su impacto en la liquidez de la distribuidora" Miguel Sebastián" Manabí-Ecuador 2019-2020. 593 Digital Publisher CEIT, 7(3), 158-169. Dialnet. Universidad Técnica de Manabí. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: https://dialnet.unirioja.es/servlet/articulo?codigo=8534724

V. Nazate L, D. A. (2023). Diseño del plan maestro de producción para la empresa alimenticia Kem Cía. Ltda (Bachelor's thesis). Universidad Técnica del Norte. Facultad de Ingeniería en Ciencias Aplicadas Carrera de Ingeniería Industrial. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: http://repositorio.utn.edu.ec/jspui/bitstream/123456789/13702/2/04%20IND%2040 4%20TRABAJO%20DE%20GRADO.pdf

VI. Nery De La Cruz, W. H. (2022). Implementación de la metodología de la planeación de requerimientos de materiales (MRP) para mejorar la gestión de compras en la empresa Southern Textile Network SAC 2021. Universidad Privada del Norte. Facultad de Ingeniería: Carrera Ingeniería Industrial. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: https://repositorio.upn.edu.pe/bitstream/handle/11537/30175/Nery%20De%20La%20Cruz,%20Wilber%20Hipolito.pdf?sequence=3

VII. Poma, J. M. R., Pernia, E. O., y Quiroz, J. P. (2014). Diseño e implementación del sistema MRP en las pymes. Revista de la Facultad de Ingeniería Industrial 17(2): 48-55 (2014) UNMSM. ISSN: 1560-9146 (Impreso) / ISSN: 1810-9993 (Electrónico). [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: https://www.redalyc.org/articulo.oa?id=81640856006

VIII. Urbano A, J., García S, L. E., de la Mora R, T., Vargas G, J., y Cruz G, V. (2021). Mejora de la Productividad en una Empresa Fabricante del Norte del Estado de Veracruz. Conciencia Tecnológica, (61). Revista Conciencia Tecnológica. ISSN: 1405-5597. Instituto Tecnológico de AguascalientesMéxico. [fecha de Consulta 19 de diciembre de 2023]. Disponible en URL: https://www.redalyc.org/journal/944/94467989005/94467989005.pdf

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