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IMPLEMENTATION OF MRP SYSTEM IN A BAKERY TO IMPROVE THE PURCHASING PROCESS AND OF BASE MATERIAL

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Resume: This article is going to introduce the study a case of the implantation of MRP system, for improvement of the process of purchase of base materials, from one bakery. The philosophy of MRP system have like base the reduction of stocks, this way, the company those use this system can reduce their costs and maximize the earnings. The methodology is going to be apply in a familiar bakery in Pindamonhangaba, through the needs assessment of brutal material for each one of the products and like this stablished one programming of receiving base materials, based on demand, considering the historical data for the period May to October 2015.

Key words: MRP, Bakery, Reduction of stocks

1. INTRODUCTION

The stock is defined as the accumulation of material resources in a system of transformation. Sometimes, stock and also used to describe any rhythm or rate between supply and demand. "(SLACK & et al, 1997).

The advances in manufacturing technologies, showing the global options of suppliers, the rise purchasing power and the facility of the people moving, competition in all business segments, particularly in the food, suffered a rise marked. In old days had a few options of bakery or restaurants in the towns, nowadays it is common that each neighborhood has their own establishment, this way, remains competitive only the establishment those have better benefits cost.

Approximately 63,200 establishments, the bakery sector generated R $ 49 billion (approximately 2.2% of gross national product) in 2009 (FIESP, 2009).

The numbers are so expressive, the search for cost savings, maximizing gains and excellence in production and service intensified. The philosophy of reducing costs comes to eliminating waste in production processes, through standardization, and the extinction of large stocks of base materials and other inputs.

A modern view treats the stock as money stopped or immobilized money that could be invested in machinery modernization, visual aspects of the establishment and exposure of larger amount of products to customers. For this, the application of MRP system may represent an improvement in the management of purchasing and storage of base materials and supplies, as well as the financial resources of the bakery.

1. MRP - PLANNING RESOURCE MATERIALS

The MRP software is a computerized information system, developed specifically to assist businesses in inventory management based on their demand dependent and schedule replenishment orders. (FRAZIER & GAITHER, 2005).

It businesses that purchase certain type of component through a schedule (priority plan) that shows the components required for each assembly level and based on their lead times, calculating how much, and when these components are needed. (FRAZIER & GAITHER, 2005).

Originally the MRP concept used in the 60s, referred to the planning of materials for manufacturing needs. Currently the MRP concept is focused on operations management as a corporate system that supports the planning of all business assets needs. Usually the MRP is used in manufacturing companies, and their role is to support the

decision on the amount and timing of the flow of materials in demand conditions and services (FRAZIER & GAITHER, 2005).

2.WHAT IS MRP?

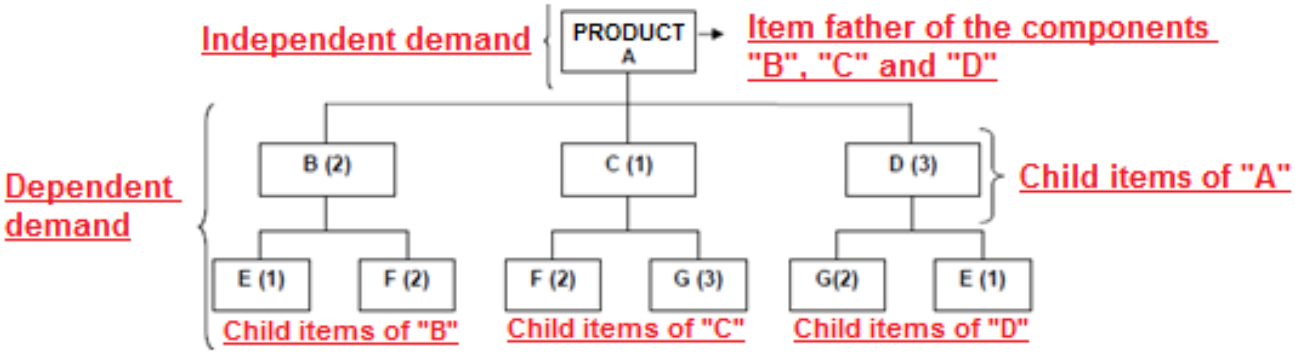
It is the activity through which is made the complete lifting of the material requirements for implementing the production plan. From the coming needs from the bill of material the requirements imposed by the production master plan and the information from the inventory control (in-stock items and items in the manufacturing process), try to determine when, how much and what materials are to be manufactured and purchased. (JÚNIOR, 1996).

2.1PRODUCT STRUCTURE

When it is analyzed the flow of materials, each production order has specified a set of components for the forming and assembly operations are performed. These base materials can be classified into materials, components and semi-finished products. Of these materials are obtained from external suppliers, while others are results of operations inside the factory. The record of the materials making up the product structure is called bill of material. (LAURINDO & MESQUITA, 2000*).*

In the bill of material, beyond the description of the items making up the product, set up the required quantities of each item "children" for the manufacture / assembly of a unit of the item "father", located in other level above in structure product. Figure 1 illustrates the analytical product structure. (LAURINDO & MESQUITA, 2000*).*

Figure 1 – Analysis product structure



Possession of product structure and lead-time (time to buy or manufacture) of component items, beyond the needs (quantities and dates) of end products is possible to calculate the needs of all component items.

2.2 CASE STUDY

The application of MRP system was made in a bakery located in Moreira Cesar district of Pindamonhangaba - São Paulo. After 25 years of family ownership, it was acquired by a person with business management vision which is ahead of the administration since 1 May 2015.

The bakery is open to the public every day from 06:00 to 20:00 and has 6 employees to serving the public, as well as three employees restricted to the baking and confectionery.

Purchases are made with suppliers already established due to the price, product quality and commitment to service, however, the quantity purchased were established by the former administration and was realized in this way are generated large quantity of stock and the objective is to reduce them the maximum possible.

The application was based on the historical survey of consumer demand for the products manufactured by baking and the quantity of base materials used to manufacture each product, values are expressed in Tables 1 and 2 respectively.

Table 1 - Demand for sale the products.

Products	May	June	July	August	September	October
French bread	93000	90600	95263	95263	87900	91450
Nazareth bread	7750	7500	7874	7874	7350	7533
Sweet bread (sugar)	1860	1800	1891	1891	1770	1798
Bread type Samanta	806	780	837	837	768	775
Sweet bread	310	300	341	341	300	279
Corn cake	465	450	496	496	450	434
Cornmeal cake	434	420	465	465	420	403
Orange cake	465	450	496	496	450	434
Manioc cake	465	450	496	496	450	434
Chocolate cake	403	390	434	434	390	372

Table 2 – Quantity of base material per product.

Products	Oil (mL)	Wheat flour (g)	Yeast (g)	Mix ready (g)	Sugar (g)	Egg (un)	Salt (g)
French bread	-	2,0	0,1	-	0,3	-	0,2
Nazareth bread	0,2	0,8	0,3	-	0,2	0,2	0,1
Sweet bread (sugar)	0,1	0,9	0,2	-	0,5	-	0,1
Bread type Samanta	0,1	0,7	0,2	-	0,5	-	0,1
Sweet bread	0,1	0,8	0,3	-	0,4	-	0,1
Corn cake	0,5	-	-	500	-	-	-
Cornmeal cake	0,5	-	-	500	-	-	-
Orange cake	0,5	-	-	500	-	-	-
Manioc cake	0,5	-	-	500	-	-	-
Chocolate cake	0,5	-	-	500	-	-	-

Considering the data in Table 1 shows that sales are higher in the colder months and school recession as June, July and August.

In a general context, demand remains stable. This is due to the fact of being the only establishment of its kind in the neighborhood and regularity in purchases. This regularity can be clearly noted in customers with books (about 15% of all clients), where we see that every day the same goods are acquired, in the same quantity and in the same periods (morning, afternoon and evening).

Table 3 shows the routine purchasing of raw material with regard to quantity, average cost of the product and the purchase period.

Table 3 – Acquisition of products.

Product	Quantity	Acquisition frequency
Oil (L)	5	monthly
Wheat flour (Kg)	200	
Yeast (Kg)	15	
Mix ready – Corn cake (Kg)	255	
Mix ready – Cornmeal cake (Kg)	230	
Mix ready – Orange cake (Kg)	255	
Mix ready – Manioc cake (Kg)	255	
Mix ready – chocolate cake (Kg)	225	
Sugar (Kg)	40	
Egg (un)	790	every two weeks
Salt (Kg)	25	Monthly

Considering the data in tables 1 and 2, it was made a survey of the actual quantities needed to manufacture the products.

The projections sales for the period from November / 2015 to April / 2016, Table 4, were performed the calculations for purchase of raw materials, as Table 5.

Table 4 – Demand of sale per period November/2015 to April/2016

Product	November	December	January	February	March	April
French bread	87900	92190	92190	79110	88500	87900
Nazareth bread	7350	7620	7620	6615	7290	7350
Sweet bread (sugar)	1770	1830	1830	1620	1740	1770
Bread type Samanta	768	810	810	660	750	768
Sweet bread	300	330	330	270	270	300
Corn cake	450	480	480	360	420	450
Cornmeal cake	420	450	450	360	390	420
Orange cake	450	480	480	360	420	450
Manioc cake	450	480	480	360	420	450
Chocolate cake	390	420	420	330	360	390

Table 5 – New programmation to buy base material

Product	Quantity / Month					
	Nov	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**
Oil	3	3	3	3	3	3
Wheat flour	185	200	200	166	192	185
Yeast	12	13	13	11	12	12
Mix ready – Corn cake	233	248	248	186	217	233
Mix ready – Cornmeal cake	217	233	233	186	202	217
Mix ready – Orange cake	233	248	248	186	217	233
Mix ready – Manioc cake	233	248	248	186	217	233
Mix ready – chocolate cake	202	217	217	171	186	202
Sugar	30	32	32	27	31	30
Egg	1470	1581	1581	1470	1519	1470
Salt	19	21	21	17	20	19

2. RESULTS AND DISCUSSIONS

The implementation of MRP, beyond the knowledge of the structure and demands of the products, the improvement of staff for standardization of production.

Routine purchases was changed and requests are delivered to the weekly production of products, so the space for the stock has been reduced, with that it is possible a better physical arrangement of equipment in the area of manufacturing and service.

With the new lay out will be possible to implement the coffee service for customers, which will maximize the earnings of the establishment.

There was a mean reduction of approximately 14% per year of the value spent on the purchase of base materials, as shown in Table 6.

Table 6 - Percentage reduction in the purchase of base materials

Product	Purchasing of base material –Total per year		
	Before the implementation of MRP	After the implementation of MRP	% Redution
Oil	60	36	40,0%
Wheat flour	2400	2298	4,3%
Yeast	180	148	17,8%
Mix ready – Corn cake	3060	2769	9,5%
Mix ready – Cornmeal cake	2760	2600	5,8%
Mix ready – Orange cake	3060	2769	9,5%
Mix ready – Manioc cake	3060	2769	9,5%
Mix ready – chocolate cake	2700	2414	10,6%
Sugar	480	372	22,5%
Egg	18816	18341	2,5%
Salt	300	240	20,0%
		Average	**13,8%**

The impact of this reduction in the bakery spending is very positive. The monthly income of the establishment is divided as shown in the table 7.

Table 7 - monthly division income of the bakery

Item	% Costs
Base material	40
Employees costs	15
Gas, electricity and firewood	10
Machines maintenance and others	10
Profit	25

3. CONCLUSION

Using the MRP can reduce spending on material purchases to keep them in stock which results in a gain space, so the company can invest in new products and services, using the optimized financial resource.

Considering that the case study was based on the food sector, the reduced inventory also have loss of base material by expiration date exceeded and other deviations which can also be noticed in the storage of food products for long periods, besides observing better the income of the products, like yeast and wheat flour, which have changed their chemical properties over time, affecting the production and quality of the final product.

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