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Methodology for Financial Physical Control of Inventories – MFPCI

Metodología para Control Físico Financiero de Inventarios MCFFI

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Abstract

As a result of the observation and the different problems for inventory control in perishable items, arising in different companies dedicated to the export of agricultural products, is that this article proposes the use of a method of organization and control of inventory that allows At any moment, physically know the existence and location of the same, so that this allows to exercise a control both physically and financially. In addition, it proposes the use of Information and Communication Technologies to make this a self-managed and auditable model at any time required.

Methodology, Inventory control, Organization

Resumen

Como resultado de la observación y de los distintos problemas para el control de inventarios en artículos perecederos, suscitados en distintas empresas dedicadas a la exportación de productos agrícolas, es que este articulo propone la utilización de un método de organización y control de inventario que permita en todo momento conocer físicamente la existencia y ubicación del mismo, de forma que esto permita ejercer un control tanto en lo físico como en lo financiero. Además de ello propone el uso de las Tecnologías de Información y Comunicación para hacer de esto un modelo autogestionable y auditable en cualquier momento requerido.

Metodología, Control de inventarios, Organización

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Introduction

Companies, regardless of the line of business, must clearly have a clear control over the management of their inventories, since these represent the asset that gives reason to their operational functioning.

Even companies dedicated to services, will have to maintain a control over this, since to a large extent on it will depend its correct functioning, cases such as restaurants or hotels, should have precise control.

The present methodology proposes, of course, the difficulty in controlling inventories of finished products, which have the main characteristic of being perishable. Since this represents a latent risk of loss due to poor inventory management.

The model that this document suggests, has been analyzed and simulated according to the data collected in different companies dedicated to the commercialization of agricultural products with a short shelf life that do not have a methodology that allows them to have physical - financial control of its products within the inventories of finished products.

Physically, an inventory exit system based on immediacy is used in this type of products, that is, First Entries, First Exits (FEFE), not only in accounting terms as the method suggests, but also in the physical handling of the product.

The First-to-Enter, First-to-Exit method is used for in-process production of products with a high level of expiration over time, that is, for perishable products.

This control is carried out in reality, with control and accounting documents. Due control, in these products, avoids losses due to products that are damaged by undue stagnation, in the production process or in the warehouses of finished products. (Villareal-Rincon, 2009)

Given the above, it is important to design a method that physically allows the proper and efficient management of the inventory management process in question.

Method Structure

The inventory control model suggests a problem for stores (inventories) with products that have the characteristic of being perishable, that is to say that their level of rotation requires to be fast and precise in aspects of immediacy of output of products according to their frequency of arrival, for this, the methodology suggests the following steps: detailed classification, stroke and mapping; auditable control and self-management.

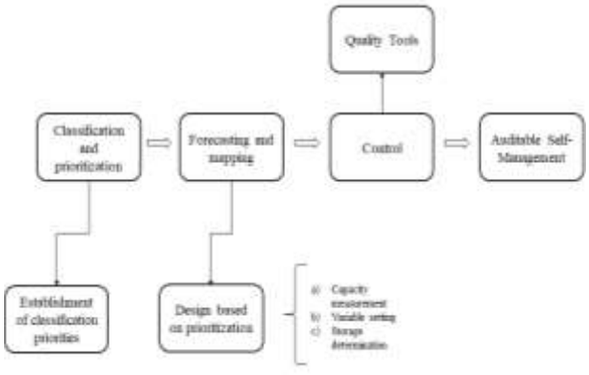

Figure 1 Structure of the Methodology
Source: Own elaboration

The aforementioned steps are the result of a series of techniques already established adapted to the needs of this type of inventory, this methodology takes up statistical tools, simple cost analysis, as well as basic quality tools, which allow real-time control of the costs, rotation, location and supply of products.

Case Study: Agricultural Products Baler

Agricultural products, have as their main characteristic their shelf life, since due to their nature, that is to say, a product that has not been processed, once ready for sale, has a certain time of life before being sold otherwise, the product goes into decay losing all commercial value.

As part of this exercise, we are going to assume that we have 3 products that are packaged within this hypothetical company that will be a packer of agricultural products, which exports them and after a cleaning and selection process, arrives at the warehouse where it would be invented for their respective sales.

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The 3 products in question will be avocados, mangoes and bananas, which have different classifications, that is, for Avocado they have type A and B, mango type A and B and Banana type A, B and C, of which there is a history of sales, which leads us to the first step of the methodology.

It should be noted that the company's storage capacity is 4800 boxes, stowed in 10 storage racks with capacity for 8 pallets per rack; Each pallet has a capacity of 60 stowed boxes.

Methodology

a) Classification and prioritization

Continuing with the example of the research indicated, there are three products, which in turn have a classification. As a first case, it is necessary to prioritize which are the products with the greatest turnover in the inventory, regardless of the sale price as indicated by the ABC methodology, since what this method seeks is the detailed classification in rotation time to later move on to the Financial impact analysis.

For this, it is illustrated in the following Table in which there are hypothetically demanded amounts:

Agricultural Products Baler
Monthly sales

Product	Boxes sold	% of participation
Type A Avocado	678	16.10%
Type B Avocado	578	13.73%
Type A Mango	645	15.32%
Type B Mango	566	13.44%
Type A Banana	610	14.49%
Type B Banana	546	12.97%
Type C Banana	587	13.94%
Total sales (Units)	4,210	

Table 1 Monthly sales
Source: Own elaboration

The participation of monthly sales of each product is important, since this will help us establish a prioritization of storage, since this will be based on demand, in order to ensure the supply of the product with the highest market share.

b) Forecast and Mapping

Subsequently, the demand for each of the products must be analyzed in order to be able to prepare a production forecast (demand calculation), since this should serve as a parameter for storage within the warehouse, so that this speeds up both terms of physical transfer of the product as control and accounting.

The method for calculating the demand should be the one that is most convenient for the company, however the exponential smoothing method is recommended, for which the following formula is used:

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1}) \quad (1)$$

It is suggested to use this method, since it is possible through it to make adjustments in α so that the ideal forecast is found in the mix of products to be stored.

It is important to note that for this exercise an α of 0.30 has been taken deliberately, however, as indicated in previous lines, there is the possibility of adjusting α and thus specifying the maximum storage capacity.

Type A Avocado Sales

Month	Real	Forecast
January	678	678
February	669	675
March	701	683
April	656	675
May	634	663
June	656	661
July	712	676
August	654	669
Septiember	666	668
October	654	664
November	645	658
Dicember	657	658

Table 2 Sales Forecast Type A Avocado
Source: Own elaboration

Once this procedure is done for each of the products, a storage clearance should be established, which will be the difference in the highest quantity demanded minus the average amount of the forecast year.

$$hA = Q_{max} - Q_x \quad (2)$$

Once the storage clearance is established, it is added to the forecast month to establish the monthly storage forecast for each product.

Average Monthly Sales Forecast

Product	Volume	Slack	Total storage	% storage	% acum
Type A Avocado	669	40	709	15.87%	15.87%
Type A Mango	636	38	675	15.10%	30.97%
Type A Banana	618	37	655	14.66%	45.64%
Type B Avocado	586	35	621	13.89%	59.53%
Type C Banana	579	35	614	13.74%	73.27%
Type B Mango	573	35	608	13.60%	86.88%
Type B Banana	553	33	587	13.12%	100.00%
Total Forecast	**4,215**	**254**	**4,469**		

Table 3 Priority Storage Forecast
Source: Own elaboration

As we can see with this table, the maximum forecast storage is 4,469 units for the month in question, thus defining 93% of the storage capacity, leaving 7% of unused storage space, considering that. If for any eventuality there is an excess in the production of a particular product or else, it is used for some other storage task that is required, such as storing the same boxes used for storage.

Once delimited the quantities of products that must be stored following the logic of prioritization of sales (from the most demanded to the least demanded), they should be stowed in a linear manner, allowing the continuous flow of the product, as well as the stowage so that not only accountingly but also physically, a system of first entries first exits is used, in order to avoid losses in the inventory of finished products.

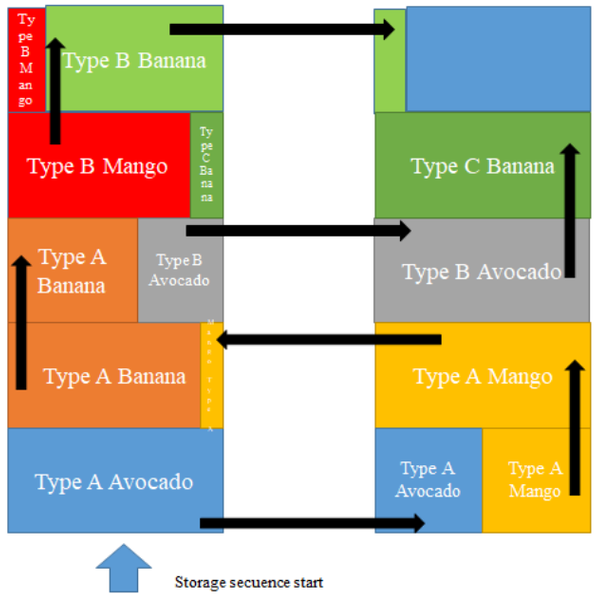

Figure 2 Storage Diagram
Source: Own elaboration

As we can see in Figure 2, this diagram allows a storage sequence to be established in such a way that it is known at which physical point of the store the product in question is located.

The route is followed in a continuous way, this with the purpose of storing in the position closest to the exit, since these products such as in this case the Type A Avocado and Type A Mango, are the ones that have the greatest demand, therefore a higher inventory turnover.

The inventory rotation represents a basic criterion for physical accommodation, as this will determine the proximity to the exit of the finished products warehouse.

It is important to note that not all 100% physical spaces are necessarily being used as indicated on the map, since simultaneously the probability of sales reaching the maximum is low, as indicated in the forecasts.

c) Control

The mapping by itself will not represent a control mechanism, although it is true, it will serve as another tool in the planning of the inventory, it does not guarantee its proper functioning, therefore it is necessary to apply certain existing basic controls that conform a control system, using tools such as:

- *Kanban*: That allows to know the quantity, the physical flow that the merchandise will carry, the product in question, the clients (internal and external), collaborators and general data that allow to identify both the product and the process in which they are immersed, which serves as a supporting document of the Balance Score Card

- *Balance Score Card*: In which the most important indicators are detailed in relation to the processes related to production and storage.

- *Information and Communication Technologies*: That provide support through different electronic devices, both portable and fixed, and in turn serve as a source of consultation for process control.

- *ABC Costing sheets*: Given that the inventory management is to be efficient, both in terms of time and costs, it is necessary to use a system such as ABC Costing, which allows us to establish operational - financial efficiency parameters, in order to have a continuous and real-time evaluation of the cost or cost overrun of an inventory, as the case may be.

d) Auditable Self-Management

The added value of the proposed model lies in the ability to be a system that, with the support of information and communication technologies, can have real-time information that, when compared to the Balance Score Card, results in an audit process effective, not only in terms of carrying out the processes, but also in relation to the established budgets, both in terms of operating costs and in terms of expected demand.

Conclusions

The use of this methodology, in which different inventory control and inventory techniques converge, allows us to conclude that by classifying the demanded products, it allows us to have a planning with a lower degree of uncertainty in relation to what is expected to be sold and in turn It allows us to plan the storage needs of the product.

At any given time, if our installed capacity could not be enough with what the forecast shows, it will allow us to look for alternatives that do not impact in terms of costs or efficiency, since the management of storage clearances, as well as the programmed rotation of the inventory gives as a result a flexible system to the storage needs of companies.

In addition, the use of information and communication technologies, as well as quality management techniques already known, will allow this inventory management model to give us a real-time reading of the information and be a self-managed methodology.

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