



Analysis and Design Models for Supply Chain improvement of Vista Alegre

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Abstract

Logistics can be appointed as a significant channel of the supply chain and is without a doubt at the core of the organizational effectiveness, efficiency and sustainability. An effective Logistics doesn't only contribute to a better structure of costs but also to a better performance and client service. Vista Alegre as an Holding with operations in the production, distribution, export and sale of porcelain recently decided to invest in its Logistic Department and modernize it. Our research was inscribed in this movement to redefine some of the logistical operation procedures of Vista Alegre.

The main objective of this research was to analyze and define the operational procedures in practice at the Logistic Department of the Ilhavo plant of Vista Alegre. The stocking in the different plant stores is also of the responsibility of the Logistic Department, so it was also within our scope. In this real life context our goal was to review procedures and to present to the administration a collection of proposals of improvement. A solution to the obsolete products was also in our research goal.

With this purpose in mind, we began by analyzing the operational procedures in practice, we then proceeded with the analysis of the store transactions (physical and virtual, that means operated in the information systems) and finalized with an ABC study to be able to more soundly support a collection of proposed improvements. We also reviewed the stock policies in practice, and engineered a new policy for the obsolete products.

Keywords: Logistics, supply chain, ABC analysis, operation procedure

1. Contextual Introduction

Logistics have been identified as an important tool in increasing competitiveness in enterprises of various sectors (Cordeiro, J., 2004).

Logistics management is the part of the supply chain management that plans, implements and controls the efficient direct and inverse flow and storage of goods and services between the point of origin and the point of consumption, in order to meet the needs of customers.

In short, logistics is the function responsible for movements of materials through the supply chain (Waters, 2007).

Logistics contributes to two key points in any company economy. The first is that logistics accounts for a significant share of the costs, affecting and being affected by other economic activities of the company. The second key point is that logistics supports the virtual and physical flows of any economic transaction; logistics is instrumental in improving the flexibility of the sales of all products and services (Douglas, et al., 1998).

Nowadays there are still many companies that only provide improvements in the supply chain when faced with serious problems, such as very high inventory levels, dissatisfied customers, low level of service, delays, among others. To think on implementing improvements only when there are problems is to have no perception of how valuable it can be for a business this source of competitive edge. In the current business scenario, however, improvements require a broader approach. Market leaders such as Wal-Mart and Dell, they realized that the supply chain can provide the development of differentiation strategies through the constant search for new ways to add value and extend their limits of performance (Cohen, et al., 2005).

2. Objectives

Addressing the research question of this dissertation, our objective was to prepare a set of operating procedures for all activities of the Vista Alegre logistics department. Previously the company did not have any kind

of operating procedures in any of the department activities; there was only one operating procedure for all activities.

So we intend to analyze the operations, reflect on them and anticipate trouble spots on the white crockery warehouse (crockery without any decoration), decal (special sheets that are printed with ink, which are applied over the blank crockery, sheets to decorate), packaging and finished products. The aim was the detection of processes or activities that contribute to inventory errors and propose a solution. Whenever possible a savings analysis on what was allocated to each of the proposed improvements was carried out.

The third and final stage consists on elaborating an "ABC" analysis for each warehouse, to be aware of the current scenario and support the solutions proposed. There was also an attempt to devise control mechanisms to regulate the disposal of discontinued products and its elimination from stock.

3. Methodology

For the development of operational procedures it was necessary to develop detailed knowledge about the various activities of the logistics department. This process was supplemented and accompanied through interviews with the responsible for each activity as well as operators. These interviews also aimed to collect all available documents relating to the implementation of this work (practices). These documents were compiled and with them a shortlist was drawn up with key questions to present to the management. This process was based on research inquiry (Graziano, et al., 2009) travelling through Exploring, Inquiring; Predicting Possibilities; Planning and Collecting, Deciding, Communicating, Evaluating, Applying, which guided us through our investigation. Following this process of inquiry several areas for improvement were identified in operating procedures due to actions that did not generate value in the process or which were even corrupting it.

To proceed with our research on trouble spots of the warehouses it was necessary to be present in each of them for several days, particularly in the white, decal, packaging and finished products warehouses. Not only the visualization of processes was important, but also speaking with operators trying to identify tasks that were more difficult to perform and even try to perform activities for a day, to understand the complexity and tricks of the process. The aim was to understand the functioning of each activity and observe restrictive aspects. After we worked on the arrangement and display of possible improvements, trying to validate its feasibility and, when possible, calculating the improvement cost.

In order to devise control mechanisms to regulate the disposal of discontinued product and its elimination from the stock, we proceeded to the elaboration of "ABC" analysis to see what was the extent of the problem and made a *Brainstorm* to define the best way to solve this problem.

4. Case Study

4.1 Operational procedures

It was in a perspective of communications and interconnections enhancement between various logistics activities in order to improve some identified processes that that we decided to draw up operational procedures for the relevant activities of the Vista Alegre logistics department.

These procedures were designed and developed based on grabbing information from documents, talk with people (managers and operators), observation of the labor activity in locus and interviews with process managers. The operating procedures were developed within the following structure, the same structure used to describe them:

- 1. Purpose** - Describes the purpose of the operating procedure in question.
- 2. Ambit** –Describes the type of products to which it applies and the channel that belongs to.
- 3. Role** - Identifies who is the responsible: Process Manager, Quality Manager, Executive Director, Executive Board Coordinator.
- 4. Mode to Proceed** – A Presentation of the flow chart activity and brief explanation of the various steps that the operator should follow. The flowchart numbering corresponds to the table numbering that explains the process.
- 5. Description** - In this chapter we define rules or theoretical explanations.
- 6. Documentation / Related Information** - References to documents that can be used throughout the process.
- 7. Previous reviews** - Document control Reviews, which includes the number, date of review and changes made.

4.2 Improving proposal for operational procedures

If during execution of operating procedures possible points of improvement were found, they should be stated.

3.1.1 PO.02 –External market customer support Services

During the development of this operating procedure there was a perception that the activity was very complex because each customer has different specifications that must be strictly followed or otherwise the customer returns the merchandise.

Our proposed suggestion was that the responsible for this activity should register all the clients' requirements in the SAP R3 system, in the customer data fields, so that the information can be accessed by anyone at any given time.

3.1.2 PO.03 – Customer service of their own decorated - hotel market

The improvement in this procedure depends on the elimination of one step, "Monitoring of proof or test", in the process.

On this step the responsible for this task needs to visit the production to watch and record the test. This is, when the decorated is applied on the crockery that the responsible must verify that the decal produced in the Vista Alegre graphic, covers all the crockery as previously provided by the designer.

In this operation the suggested procedure is to eliminate this activity, the monitoring throughout the test should be performed by the designer who made the decal (error registration and design changes when necessary).

This would lead to a decrease of tracking changes errors in the tests, the lead time would decrease due to the designer performing the test himself.

3.1.3 PO.09 – Decorated launch

In this procedure the point of improvement is related to the system SAP R3 and with the no quantity discount of decal in the warehouse.

The deposit where the information about the actual amount of stock decals is allocated is defined in SAP as "Stk1007". The problem is that the amount of tracing that is posted through the SAP on the kanban, in order to make the warehouse picking, is not automatically deducted.

The responsible over the Kanban transfer batches, when in need to launch several kanban of the same decoration, due to the fact that the quantity is not automatically discounted, must subtract the quantity registered on the system with the quantity already transferred from the respective decal.

This process is subjected to a very high probability of human error, which can lead to a bottleneck in the production process of applying decals.

To solve this problem it is proposed a small change in SAP R3. By adding a column that shows the amount of the decoration that can still be transferred, the process becomes clear and not critical.

This solution would eliminate the release of decorations and the operator would no longer require using a calculator, having to remember how many decorations had already been released.

3.1.4 PO.08 – Production planning

Currently in Vista Alegre the responsible for white crockery planning knows how many pieces one specific machine can produce, this information was acquired by many years of experience, because in fact there aren't any kind of tools able to tell each machine how many pieces it can produce, depending on the type of pieces to be manufactured. Thus the possibility of making an Excel tool was created in order to help obtain that information by machine and shift.

This operating procedure doesn't show any improvement, we only built a tool that can now be used to support the procedure. A table in Excel was made, which, by entering the type of pieces to be manufactured and all the variables features, provides the number of pieces per machine per shift.

3.2 Warehouse logistics analysis

It was necessary to make a critical analysis of the warehouses in order to identify all the critical multifunction's and propose improvements.

At the Vista Alegre factory there are four warehouses, all managed by the logistics department. They are white crockery, decals, packaging and finished product warehouses.

For our research analysis we made several visits to the warehouses in order to view each operator activities and understand how each warehouse worked. Subsequently each operator was followed in order to understand if a person without any formal training in the area was able to perform the work or if any training was needed in order to reduce stock errors and become more efficient. The activities of workers should not be restricted to a single worker, they must be flexibly allocated to ensure that when a worker shortage occurs there is other operator able to replace him.

3.2.1 Warehouse decal

3.2.1.1 Process of decal reception

The reception contains a critical point originated on the consignment notes. In over 80% of the cases these guides do not follow the decals, which can take up to two weeks to get to the warehouse.

This delay prevents the administration, responsible for confirming the amounts approved upon, to launch the decal in SAP system. However, these decals are cut, prepared in batches and placed in the warehouse for picking. In order to cover the missing decal need, the operator responsible for the decorated launch makes the release of kanbans, getting a negative amount of decorated stock in SAP system.

In order to circumvent this constraint, it is necessary to train the responsible for the packing list, showing them how important their work and what are the consequences of any delay in their work

3.2.1.2 Decals preparation for storage

This process can be improved in order to decrease errors and number of employees in the picking process.

At Vista Alegre a master data department exists which is responsible for timing the operations of placing decals. That is, when you perform a new overlay this department is responsible for timing the operation of

applying the decal in pieces, in order to record the time applied, thereby setting the number of decals that must be sent to the cells application of decals. The cells of decal applying tool receive decorated every 20 minutes, and the number of decorations that they receive must be in exact amount for that period.

This information is available on the SAP system so you can know the amount of picking preset for each decal.

Currently the decal batches are performed in batches of 30 units and the suggestion is to perform the batch in accordance with the preset picking quantity, which is shown in the SAP system.

3.2.1.3 Disposal process

The stocking of the decals on the shelves currently does not follow any pattern. The new decals are arranged where there is space and the existing ones are placed where they were. There is no proper identification of locations on the shelves, which makes the picking process very time consuming and not efficient.

The improvement proposed for this point is to start by making a correct identification of both the shelves and the aisles. A good identification enables better and faster storage and picking of items. The identification of aisles must be alphabetic, and alphanumeric for shelves. Example, aisle "A", shelf A.1.1.1.

For the shelves, the identification of each cell must be displayed between 0,5 and 2 meters, for the identification the viewing distance should range between 2 and 6 meters.

This provides a more efficient storage and picking errors will certainly begin to decrease.

Another point of improvement would be making the arrangement of the items on the shelves according to its rotation; this is, depending on their classification based on the ABC movement.

3.2.1.4 Picking process

When the operator performs the decal picking, he has to paste on a white sheet the decoration etiquette that accompanies the kanban, and record in writing the amount of decal in the system

Thereafter from time to time the responsible for the administrative record in the SAP system shall collect the white sheets, to clear the stock in the system.

This process should be closer to real time so that the SAP system will always be as up to date as possible. This purpose would only require a small change to the layout of the warehouse, at no additional cost. This change would involve the administrative secretary relocation to the picking zone.

3.2.1.5 Calculation of savings in the warehouse of decals

Of all the above improvements proposals two of them have been possible to account.

Data was collected by timing and observation of the operation.

These changes led to picking process time savings of about 10 minutes.

To be able to account for the enhancements proposed, the following calculations made will be presented below.

We considered three operators with an average monthly salary of 700 €. Knowing that, on average, per day 41 pickings are made, which amounts to a monthly average of 688 pickings.

We obtained a cost per picking of 3.05€ .

The number of hours per day that could be reduced by eliminating the activity of counting, which is inserted in the picking operation, and by improving identification of locations - 6.80 h.

The number of picking may be done in this period - 35 days for picking.

Savings by eliminating the daily activity and time reduced for picking - € 105.74 per day.

Savings - € 2,326.27 monthly..

The cost savings would be approximately € 27,915 per annum.

3.2.2 White Crockery Warehouse

The Vista Alegre warehouse is divided in two spaces, the automated warehouse, Efacec, for all types of crockery in white and the conventional warehouse with racks for white crockery with high turnover.

3.2.2.1 Registration Process

In the registration process there is an upstream process that is crucial to understand the point of improvement that will be presented

Crockery identification

The upstream process is related to the identification of pieces. When the white pieces finish production they undergo through a selection and storage in boxes process. At this moment the identification of the pieces is placed on the boxes.

To make the correct identification of boxes the operator should use the white ware showcase, which has a sample of all white pieces available produced in Vista Alegre.

The problem found here is that the operator doesn't use the showcase and sometimes performs a wrong identification of the pieces.

The mistaken identification of the pieces affects the process of receiving items in this warehouse because when the identification is wrong the product will be stored in the warehouse with wrong registration into the SAP

system. The consequence of this is that a given log entry on pieces quantity that does not correspond to what is being stored causes errors in stock.

The suggestion to decrease these errors is to produce and use identification cards of the pieces in the SAP system, where the photograph of the pieces is available.

Entry registration in automatic warehouse white

One improvement point is in the actual registration process, this process currently is given to two systems, SAP and Efacec.

This sometimes can lead to differences between the two systems, errors on inclusion of articles or codes, and wrong amounts.

The integration of the two systems, using interfaces, eventually will solve this problem, since it would only be required to register once. Time spend would also be reduced to half of the current time.

Quantification of lower costs in the process of entry registration in automatic warehouse white

The optimization described earlier suggests that the insertion of registration data should only be made on one computer, through a specific interface, which would lead to the registration time to take half the current time, which is a reduction in process time of about 30 seconds.

We considered the two operators with average salaries of € 700. Knowing that per day on average 477 records of entry are made into the warehouse, which amounts to a per month average of 9,486 receptions per shift.

With this data we obtained the following results:

- Average cost of warehouse registration - 0.15 €.
- Number of hours caused by the optimization is reduced to 3.98 hours.
- Number of input records that made this period - 237.
- Savings every day - 35 €.
- Savings Monthly - 770.49€.
- € 9,245 annual savings.

Knowing the value of the interface that is needed will not exceed € 5,000, even with this amount of investment required for the process be optimized, it appears that there is a still decreasing cost of around € 4,000

3.2.2.2 Recount process

If there is a counting error in the selection process or any breakage during expedition, the amount introduced in the warehouse will be incorrect.

As a way to minimize errors the suggestion is to create a counting pieces work position, in which no piece is introduced in SAP, without a prior count.

3.2.2.3 Storage and picking process

Conventional racks warehouse -Location Identification

The weak and non-visible identification of corridors and shelves in the white conventional racks warehouse is noticeable. Proper identification of shelves allows for better and faster storage and picking of goods.

To solve this problem, as proposed for the decals warehouse, is the placing of alphabetic identification in corridor and alphanumeric on the shelves.

Savings Quantification

By optimizing the process of picking and putting away what was described earlier, you can reduce the time of picking. This time decrease makes it possible to reduce the cost allocated to the department store, once the process has become more efficient.

The difference between the time of picking is 20 seconds, this is the operator performs the picking 20 seconds faster with a good identification of locations.

Data collected by timing the process

To be able to account for the cost reduction the four operators with a monthly salary of 700 € were considered. Knowing that per day on average 426 pickings are made, which amounts that per month on average 8,660 pickings are made.

With these data were obtained the following results:

- Average cost of picking is 0.32 €.
- The number of reduced hours 2.42 hours.
- Number of pickings achievable in that period 132.
- Savings every day € 42.62 per day.
- Savings Monthly € 937.85
- € 11,254 Annual Savings

Having a cost reduction of this magnitude without any kind of investment could be an asset to a company.

Automatic warehouse – warehouse organization

This warehouse is designed so that each storage box has only one reference, currently there are boxes with more than eight references.

What happens now is that there are many locations of the same article stored with other references. This happens because there isn't a good management control over the articles entrance in the warehouse. When an

item arrives and doesn't fill a box, but that reference exists in the warehouse, it is stored with other items that also need to be arranged, instead of being stored with the same reference articles that are already there.

As an improvement, the warehouse should be reorganized and operators should be trained to know that whenever he gets an article for storing, if it already exists in the warehouse, the pieces should be placed in this box where they are until it is full, and when you need more space another box should be used for the other piece types.

Automatic warehouse – Picking process

Operators responsible for the picking operation make it through the "verification" system. This action will eventually cause a problem because its not designed for picking, but to check whether the product and how many pallets exist.

Through the verification process the warehouse is not able to self manage, thus more and more boxes with lesser amounts will occupy space that was not supposed to.

Sometimes when an operation is faster that does not mean it is more efficient.

To solve this problem we propose that training should be given to workers

Throughout the store optimization process described, which can be used to make the store more efficient and effective, and whenever possible quantification of improvements was presented, this improvement on the white warehouse only, by reducing the operating time, would cause savings of € 20,499 per year.

3.2.3 Packaging warehouse

This warehouse is dedicated to store the cartons packages used to encase all the products from Vista Alegre.

3.2.3.1 Transfers between 1009 to 1018 packaging's warehouses

The current process involves the operator having to make the passage of the articles in the SAP warehouse in 1009 (packaging stocks warehouse) to 1018 (packaging warehouse) and the corresponding physical passage.

In the current scenario the problem is related to the outflow from the warehouse in 1018, the packaging line is faster than the inflow of packages in the warehouse, causing disruption in the warehouse 1018.

The way to avoid possible errors is placing an administrative and a warehouse operator in 1009 instead of the current only one operator responsible for operations of transaction record in the SAP system and the physical transfer. This change alone is not enough. The 1018 warehouse operators must also be instructed about when they shouldn't proceed with the picking at warehouse 1009

Savings quantification

The previous improvement is accountable in terms of cost savings.

We timed all the activities that are part of the transfer process and which provide no value, as turning off the forklift truck, move to the secretary, sit, stand, move to where the truck is stopped and turn on the forklift, together were timed about 20 seconds. This reduction in operating time leads to a decrease in the time of picking.

For this it was considered an operator with a monthly average wage of 700 €. Knowing that per day on average 556 picking are made, which amounts that per month on average 11,180 pickings are made.

With these data we obtained the following results:

- Average cost of picking is 0.31 €.
- Number of hours reduced by the optimization were 3.09 hours.
- Number of input records that were made in this period is 214.
- Savings € 67.09 per day.
- Savings of € 1,275 monthly
- Savings € 17,711 annually.

The amount saved per month considers the admission of an operator is equal to € 775. Still with the acquisition of a warehouse operator the gains are very positive, around € 9,000. The optimization is not only an improvement in the reduction of breakage and inventory errors but also economically viable.

3.2.3.2 Stock outputs

When the kanban is printed there is a record on which type and amount of packaging are required. When the operator receives the kanban he executes the picking of the packaging that needs to be registered and places at the kanban cart. The packaging stock clearing is only given when the packaged item arrives to the registration zone of the finished product warehouse. Between the picking and packaging time to the warehouse registry entry, it can take 1-5 days. This implies a mismatch of the actual quantities and those in the system from 1 to 5 days.

The way to reduce stock-outs is to make the consumption of packaging system automatically when the kanban is printed, so even if the picking is done only one day after, the probability of no stock in connection with this problem is now nonexistent.

3.2.4 Warehouse finished product

3.2.4.1 Picking process

Picking is the warehouse process that requires more resources and time, in this specific case it is the source of errors related with stock-outs of the packaging warehouse.

Currently on the packing line if there is rupture of a given reference box that is necessary, they replace it with another similar box. The problem is that the replacement box may take more or less quantities than the default

box. More, the pieces are being stored in the boxes and the label remains unchanged and there isn't any distinctive sign on the packaging. When the picking is made by the operator he doesn't know that there was a change on the packaging and because the etiquette has original the quantity of pieces per package he will act as if picking "x" units when he is really picking "y" units. This causes customer complaints and a decreased level of service.

One way of diminishing or even cease the mistakes is by improving the planning and stock control process in the store packaging and follow the already suggested enhancements described in the previous section.

3.2.4.2 Inventory process

In this warehouse the global inventory is prepared in the last three days of the year. In those days the warehouse remains in activity which means that while you're doing the inventory there will still be an active picking function. This causes that at the end of the day, when the inventory sheets are delivered to the administrative, due to the picking made during the day, the inventory will already be wrong. Right or wrong it is going to be entered into the system.

To solve this problem there are two possible solutions. Closing the warehouse for expedition on these three days, or buying a warehouse management system (WMS). With a WMS all movements of the warehouses can be monitored. Operations such as reception, conference, picking, expedition, among others, become faster and more efficient. It also helps reducing minor stock errors and the inventory process itself and makes it simpler and more accurate because it is done online and can be made to the article, meaning that an article is blocked for picking while it is being inventoried.

3.3 ABC analysis of the warehouse

In this chapter an ABC analysis will be elaborated for each of the warehouses which were referred before. To perform this analysis is necessary to know the movements of the four Vista Alegre warehouses during the past 12 months, but we only managed to obtain the movements of the last 8 months. The four warehouses that were analyzed are white, the packaging, the decals and the finished product.

It was then made an analysis on the movements, to try to realize the effort allocated to each of the warehouses, the number of references that were moved, if the policy of stock is being properly implemented and to identify products that are obsolete or almost obsolete.

3.3.1 Conclusions of the analysis

Next it will be presented for each warehouse two graphic summaries of the analysis and the respective conclusions. A brief explanation of how the graphics can be studied is made. The y-axis's (ABC) gives the classification as "A", "B" and "C" according to the number of movements which took over the time period analyzed. The x axis's presents the segmentation of the amounts according to what was defined for each of the warehouses.

The colors, red, yellow and green mean are products with low rotation, average rotation, and product very importance for Vista Alegre with high rotation.

3.3.1.1 Packaging warehouse

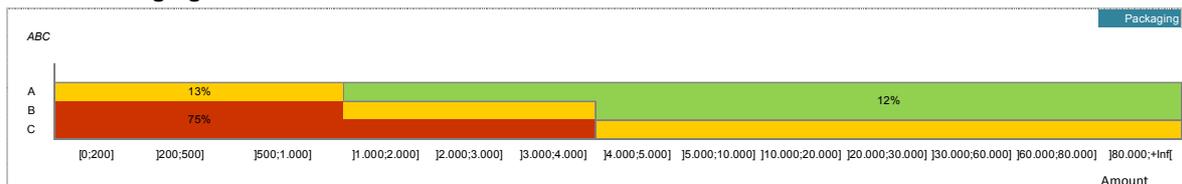


Figure 1 Relationship between the number of movements and the amount of output in the packaging warehouse

Analyzing the graph by colors, in the Figure 1, the green, which account for 12% of the total number of SKU, let us know that there is a low percentage of references to packages that are crucial for the packaging lines. These references must have a daily monitoring of replenishment, so that no stock-outs occur, since the stock-outs in the warehouse cause the problems that were described in the previous section. They are undoubtedly important items to the company due to the outputs being high and significant movements within the warehouse being generated by many of these articles.

Items that are yellow account for 13% of all products moved. The products within this classification should no longer be stocked items, since their rotation is average and they are not needed every day. Therefore the monitoring of these items should be weekly, because they have no large amounts of output as well as no movements that require a daily monitoring. The actual level of service that is defined for such items is lower, around 95%.

Concentrating on the SKU that are seen in red, 75% of the products, they have low movements and go in and out in small amounts. This value undoubtedly has a very negative impact on the warehouse because having a high percentage of items that generate little movement in low quantities of output is a serious problem. These products should no longer be stocked items since they occupy a large percentage of the warehouse and do not generate any value for the company. Since packages are an additional product to the pieces, that is, pieces do

not go out without boxes of Vista Alegre, many of these packages contained in this classification lists should be eliminated from the portfolio and efforts should be made to use a default box type for various kinds of pieces.

3.3.1.2 Decals warehouse

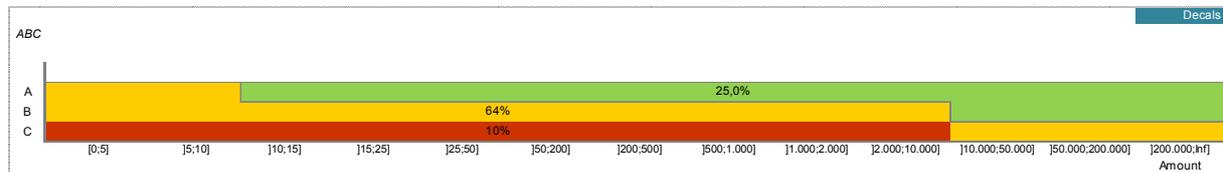


Figure 2 Relationship between the number of movements and the amount of output in the decals warehouse

In this warehouse the layout of colors segmentation is different from others, as shown in the Figure 2, due to the type of picking that goes with it. As you can see many references are found in quantities less than or equal to 200, this fact is justified because most of the decals go to the productive process and, as the quantities of picking decals are related to the decal application, which takes 20 minutes, this makes the picking quantities small.

Therefore the approach to this storage must be different. The products in red should remain part of the portfolio of items, but should become non-stocked items, due to the low number of movements over the year.

Items that are in yellow account for around 64% of the references, but should still be carried out. Quantities less or equal to 500 go to the productive process and should therefore continue to be stocked items, since they are critical, on the other hand 500 or above are decals that were sold to the partners of Vista Alegre, therefore they can be no-stocked items.

Items that are within the green quadrant, which is about 25% of the references, must be stocked because they are classified as "A" which means that they are of great rotation speed and are always needed, the customer expects a high level of service in the order of 98%. These items should be monitored every day for the number of disruptions to be minimal or nonexistent, which requires a good stock management process in the background.

3.3.1.3 White crockery warehouse

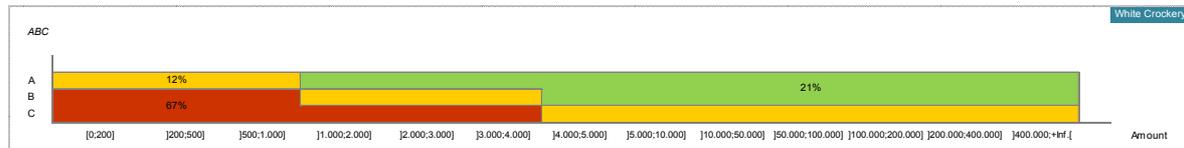


Figure 3 Relationship between the number of movements and the amount of output in the white crockery warehouse

Analyzing the graph in Figure 3, it appears that a large percentage of referrals is inside the red color, 67%. Without a doubt this is a reminder and explanation to why the white warehouse is one of the most problematic warehouse from Vista Alegre. At the white warehouse the type of picking no longer has the same impact as in decoration or tableware since the white crockery has three types of output: for customers, production and partners. Here the percentage of items that goes into production is better distributed. Although this is a plausible justification it is not the only one. These items should be examined more closely by Vista Alegre to understand why they have such a high value. It is true that many of these items are probably in the decline phase of the product lifecycle, but there were also others to which the justification for the picking quantity being so small is inherent to the fact that pickings are for production. On this basis, Vista Alegre should analyze with precision these items and then try to lower the percentage of red.

Items that are in the yellow color, make up for 12% of total items handled in the last eight months, these are items that have an average turnover. As shown in the chart, the highest amount of items are in allocated amounts in excess of 1000, which means that the majority of items are to sale to customers or partners and not for production. Therefore these items should be kept in the portfolio of items, despite its stock policy needing to be changed from make-to-stock to make-to-order. Although some amount of output being high it doesn't justify its existence in the warehouse because of the low number of movements associated with them. The level of service expected by the customer is not high and so that may allow for greater lead time in delivery.

There are 21% of the references in green. These are items that add value to the company and its in them that the company should bet, guaranteeing an excellent level of service in the order of 98%. These items have a great importance in the company's portfolio. To achieve the high level of service that is expected by customers of Vista Alegre its imperative to have a daily replenishment monitoring, the stock policy that is being applied is correct as it is make-to-stock. Being articles with a large amount of turnover it is essential that there exists sufficient stock to cover the needs of the client and ensure that there are no stock-outs.

3.3.1.4 Finished product warehouse

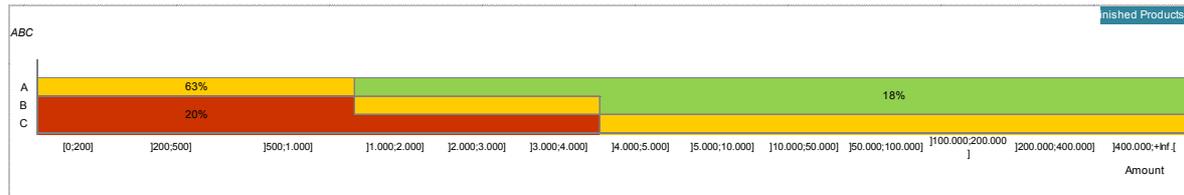


Figure 4 Relationship between the number of movements and the amount of output in the finished product warehouse

In the warehouse represented in Figure 4 the analysis is similar the just presented.

We conclude that in the four warehouses the red is in no doubt the biggest highlight, due to its relevant percentage and because these items behave like “poison” to the company. These products instill the company into an added cost but do not generate value for it. In all three warehouses the percentage of this “reds” varies between 10% and 75% showing that a more careful analysis of articles must be done in order to decrease the cost of storage.

In a sense if it was made an cross analysis between the number of references in warehouses and their movements we will discover many articles that had no movement for over one year, which would show that there are additional obsolete products.

The "ABC" analysis applied to each of the warehouses can also be, and should be, for a reorganization of the warehouses. These should be reorganized according to their "ABC" classification. The articles "A" which are responsible for grater movements in the warehouse should be located as close as possible to the shipping zone in order to be able to reduce the times of the movements on the warehouses. Articles classified as "B" should be stored in locations further back than the "A". The articles "C", due to the low number of movements that cause in the store, don't have a critical location, so they should be stored in the further zone from the expedition

3.4 Obsolete Products

As can be seen in the "ABC" analysis made there is a large percentage of articles that exhibited a small amounts of movement during the eight months, these items can be considered obsolete. They have the feature of being in the final stage of their product lifecycle. The Vista Alegre only states that an item is obsolete when there are no movements for more than 12 months. However Vista Alegre also considers as obsolete items items with stock over 24 months of coverage of sales.

After defining all the items that can be considered as obsolete, it is necessary to design a strategy to try to eliminate them.

The first step that must be done is to identify all the references that are within the parameters outlined above. To be able to do this identification it is necessary to have a weekly listing of stocks, this list should include more than 12 months, to be able to identify items that have no movement for at least 12 months, name of the decoration, the number of items decoration, the total quantity in stock (stores and warehouse), the total value of the stock, total value of the stock warehouse and its consumption.

Finally 50 decorations should be selected based on the highest coverage rate exceeding 24 months or which don't have any movements for more than 12 months

Once selected the decorations should select target stores, the period of promotion, discount, and outcome after promotion. The promotion period should not exceed three weeks, unless they have any success. The discount to be applied to these decorations should never be less than 50%, to ensure customer visibility. The fate of the product after promotion should be the outlet stores where the price applied should be equal to average cost.

On this basis, Vista Alegre should work to obtain a disposal of obsolete products, reducing the stock and the references level that is currently very high.

3.5 Conclusion

During the design and development of operational procedures some points for improvement were identified in four operational procedures that can make processes more fluid, reduce errors, better execute stock and provide a less complex operation.

In relation to the analysis made in the decals, packaging, white and finished product warehouses, all coordinated by logistics department, we conclude that there are some processes running that need to be improved.

Improvements was suggested in order the process can be more "clean", reducing the number of errors and stock picking, and consequently increase the level of service and sometimes reduce the lead time.

Not only were suggested improvements but sometimes they were quantified financially. By improving the execution procedures some improvements would allow a reduction in costs of an estimated sum around € 57,725 per year, which per month averages € 4,810. Only this would be sufficient to support wages for seven operators. This cost reduction is positive for a company that is struggling financially. In the future Vista Alegre should focus on applying a continuous improvement of procedures for these warehouses with a view on cost reducing and another on increasing performance. A best performance, beyond the savings indicated, also contributes to a better service.

Regarding the ABC analysis, this was done only for the last eight months. It is good practice to work with data from the last 12 months, but due to the lack of data it was not possible. The tests performed under ABC analysis show that this company has many obsolete products and some other products about to become as such. There are also many items that are stocked with a wrong policy. The company should spend more time examining each article to be able to reduce storage costs while increasing the performance of the warehouse. For obsolete products it should define a disposal policy in order to be able to identify those items with the same characteristics, and define a selling strategy for these in the distribution channels. This matter is of the utmost importance, due to the fact that the warehouses are overcrowded with such items, which are not a valuable asset to Vista Alegre.

We also prescribed some topics to address over the distribution of finished products to stores, supermarkets and partners. There is an inefficient transport management, sometimes the delivery cost is superior to the value of the delivered item. Another problem to study would be the pallets reverse logistic. These weren't described in this dissertation due to the page limit imposed, but we conducted some work on them.

For future investigations it would be interesting to make a viability analysis to the Vista Alegre and the Atlantis Stores. Many of the stores and even the shops are usually next to each other though in separate facilities, which could also relate this point to transportation, since the cost of transport is by store/shop.

5. References

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