

PRODUCTION PLANNING AND INVENTORY CONTROL A GREEK CASE STUDY

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Introduction

To reduce Inventories and to maintain figures at the lowest possible levels is the dream of all companies.

Last January, I was asked to reduce Inventories and, consequently, to decrease the relevant days on hand, within a period of 4-5 months, from 198 DOH to approximately 110 DOH. This has been accomplished with the help of LRP - MRP Systems, ABC procedures, IBM machine 36, PC's IBM, and mainly through daily follow up.

Due to low sales volumes and to extremely optimistic Sales Forecasts, Inventories, and as a result the DOH Index, had risen to the highest ever level of 198 days. DOH are evaluated considering the current inventories with respect to the actual sales of the last 90 days (both are measured in standard cost values).

We had therefore to look for a system effective and efficient to reduce these figures.

The tools we had were IBM 36, PC's and a "sudden decrease in the human strength at the planning department". Since company's results of the previous year were not the expected ones, the company decided to reduce the planning department personnel by 1, so we were left with 2.

Implementing Materials Management

Since materials management is the concept concerned with the management of the flow of materials into an organisation to the point where those materials are converted into the firm's end products, we had to implement this idea right to the end.

Having considered the circumstances within the department, the task was to assess problems in promoting and implementing the change in favour of our business.

So this analysis would then lead to select the best method to overcome particular problems. (Diagram 1 shows the main flow of our job).

The two fundamental questions posed to all inventory control systems are how many and when to order. To find the basic solution for that problem we use MRP system, which is based only on the Sales Forecasts, which are determined by the marketing department. Sales Forecasts are given monthly and they cover a twelve month period. But, and this is not the exception, we frequently have alterations during the month, even for, the same month, in case they notice an ongoing demand for a product. This causes a stream of problems. Something that happens quite often, as well, is that the marketing department decides to proceed with an extra promotion or a campaign without any prior information to the planning department. So there is an actual lack of feedback at the system. We have a "wizard" forecasting system but the marketing people prefer to do the job using their inspiration.

MRP system explodes gross requirements. It furnishes us with information on what we need, when we need it, and when we ought to order the fixed MOQ quantity, to produce the required units. But, because of the planned reduction of the inventories, we couldn't order usually the minimum order quantities or we couldn't even keep as much inventories as it was required. Though the programme itself asked for a stock which would have covered monthly productions, we planned for 2-3 deliveries in the same month, in order to cover 10-15 days of production. So, at least at the beginning, we had ignored even the factors "working, or safety stock".

We have to deal with the production of almost 150 finished products and the purchase of more than 2000 individual items.

Anyway, when we have the final sales forecasts we feed them to the computer and then we get the print-outs with the proposed production for the next 12 months.

The next step, is to finalise the proposed productions, according to other parameters and to give the final go ahead. Based on the final planned production, the computer comes up with the MRP print-out for the RM's and the pack materials.

Then we check all the proposed purchase orders with respect to their values. Based on PC's programmes, we are able to foresee the future inventories and we plan for the future DOH.

From statistical data, we know that the actual sales are just only 27% of the times in the range of 85-115% of the forecasted quantities. That gives rise to a lot of troubles, because I believe that 27% is a very low percentage. (Table 1).

Annually, the purchasing department (which is part of the Materials Management Department) negotiates in a contractual sense with the main suppliers for RM's and pack materials too.

The targets are :

- 1) Minimum prices for materials
- 2) Consistency of quality
- 3) Good relations with the suppliers
- 4) Continuity of supply

In these contracts, there are some MOQ's which must be ordered, otherwise we have an increase at the offered price. On the other hand, if ordering more, we have a price discount.

Table - 1 -

RANGE OF THE ACTUAL SALES SUCCESS WITH RESPECT TO THE FORECASTED SALES	1987-88	%
< 0	8	0.4
0 - 60	495	25.1
61 - 84	515	26.1
85 - 115	529	26.8
116 - 140	214	10.9
141 - 200	168	8.5
> 200	43	2.2

To explain the Table 1 : Take a Forecast for the product -x- for the month -y- and let's say that it is 10,000 units. If we sell 5000 units then this product falls in the range 0-60 of the Forecasted Sales (50% of the Forecast).

Most of the used RM's are imported either from the USA, or from European Countries. In both cases, some MOQ's, cover possibly a period of 3 years of production. Sometimes we don't even have the luxury of price breaks.

Orders are to be sent to the USA at least 4 months in advance, otherwise they are treated as unforecasted ones, with obvious results (delays etc.).

Greek market is not a huge one, so usually ordered quantities are small ones. A plant or a supplier can't work in campaigns very often, and the production slows down significantly because of that.

As an example, let us say that the MOQ for the cans (a pack

material) is 20,000. The average actual sales per month for that item are 4000. So, ordering the MOQ, we build inevitably a stock for the next 5 months. In that case, we have to decide either for the inventories, or to order smaller quantities at extra prices.

A JIT system is not yet feasible to the Greek reality, mainly because of the small market and because of the existing capacity of the suppliers.

So, the difficulty is that when we have almost continuously alterations at the Sales Forecast, we have to do, at the same time, all the necessary contacts with the manufactures and the suppliers. We have to argue and to try to convince and also to co-ordinate everybody to try his utmost for on-time deliveries, since we can't afford to lose sales.

But what about prices. Again the problem is to persuade suppliers to leave prices unchanged, though we are asking for an extra production at an extra time. At the same time we must convince the third party manufacturers to leave aside some other customers in order to help our production. And, finally, what will happen if we manage all these and the sales are not as the Forecasted ones?

We have the criticism.

Since this is the company's rule : if we sell we have to meet the requirements, if we don't sell, we must be able to carry instantaneously low inventories, though we are required to maintain always a working stock of one month sales and a buffer stock to cover 15 more days.

In that case, we must re-examine all programmes and projects for the next month. We even have to take some risks, such as ignoring partly the Forecasts.

The following Table 2 contains the inventories DOH for the last 7 years.

Table - 2 -
D. O. H.

	82	83	84	85	86	87	88
JAN	163	149	160	137	179	124	198
FEB	157	124	160	106	189	125	158
MAR	137	109	162	98	149	117	118
APR	124	110	161	108	144	118	100
MAY	131	145	166	141	148	129	96
JUN	115	176	148	156	166	111	88
JUL	115	189	144	151	134	137	74
AUG	119	195	160	175	159	163	100
SEP	133	189	150	134	131	172	119
OCT	152	176	166	137	166	170	140
NOV	149	152	140	109	146	138	120
DEC	139	144	120	129	130	177	109

This reduction at the DOH indexes, led to some out of stock situations. Fortunately, this happened in just a handful of cases.

The marketing department, in an effort to help the situation, reduced forecasts substantially and in some cases the actual sales were double the forecasted sales, or even worse.

Looking at the inventories we notice that 65% of the total inventory costs of our raw or pack materials is related to 35 main RMs. Similarly we have 4-5 packs which are the most expensive (costly) ones. So our main effort was focused on, how to reduce, first of all, these RMs and these pack mats. But RMs are imported from Europe or USA and the pack materials are cartons or outer cartons or cans for which we have already explained the problem. So we divided stock into three classes:

- 1) Vital
- 2) Important
- 3) Routine

The only way to go on in order to shorten production lead

times, react faster to all changes and to minimise inventories as much as we were able to, was with a daily follow up and continuous efforts to monitor all persons involved in the production, release and shipment, for either the RMs or the pack materials or finally the finished products.

Using simple statistics, we come up with a function, which relates Forecasts/Inventories with the actual planning departments reaction.

The function is:

$$K(t_i) = 185.31 + 1.49(t_i) + 0.7 K(t_{i-1}) + e_i$$

Where $K(t_i)$ are the forecasted inventories at the month i . $S(t_i)$ is the difference between the total sales forecast and the actual ones for the i month and $K(t_{i-1})$ inventories at the $i-1$ month.

It is shown then, that the difference which is expressed in terms of the $S(t_i)$ factor, contributes the most in the increase of the inventories.

This function has a R^2 of 85%.

So the problem is to reduce this factor $S(t_i)$ and, on the other hand, to increase the flexibility in ordering and re-scheduling new or existing orders for either raw or pack materials.

Conclusion

Generally, the results are optimistic, but the problems are still at large. Since we can't have a JIT programme, since we don't have domestic suppliers to cover our needs, since we have sales which can't be accurately forecasted, since we can't have a system for back orders (Company's policy), the only thing we are left with, is the daily follow up.

Moreover we have to invest time and efforts to combine all mentioned co-ordinates, in order to maintain inventories at the present levels.

So, we can conclude that, in order for the overall system to be efficient and effective, it is necessary for the various sub-systems and naturally the departments, to collaborate.

