Logistyka - nauka

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OBsolete INVENTORY MANAGEMENT. CASE STUDY
Zarządzanie zapasami produktów przestarzałych. Studium przypadku

Introduction

For an organization which is supplying goods to its customers, the major activity is to have suitable products available at an acceptable price within a reasonable timescale³. Inventory decisions are high risk and high impact for supply chain management. Without a proper inventory assortment lost sales and customer dissatisfaction may occur, just as shortages can disrupt planned marketing and manufacturing operations, inventory overstocks also create operating problems. Overstocks increase cost and reduce profitability as a result of additional warehousing, working capital, insurance, taxes, and obsolescence⁴.

Fig. 1. Standard product life cycle curve.
Source: Rushton et al. 2010.

One of the aspects of inventory management is obsolete stock cleaning. According to A. Anil Kumar and N. Nuresh obsolete items are those materials and equipments which are not damaged and which have economic worth but which are no longer useful for the company’s operation⁵. Other definition of the phenomena is: components that cannot be sold on the market any longer because a better successor has been introduced to the market for the same price⁶.

In order to better understand the obsolescence phenomena the product life cycle concept (PLC) needs to be introduced. The principle behind the PLC is connected with the staged development of a product. This starts with the introduction of the product into the market and follows (for successful products) with the steady growth of the product as it becomes established. The life cycle continues with the accelerated growth of the product as competitors introduce similar products, which stimulate total demand, and ends as the demand for the product runs into decline⁷. The PLC concept is illustrated in Figure 1.

The reasons for generation and accumulation of obsolete items are among others the following ones:

- changes in product design: This may lead to some items getting invalid so far as the final products is concerned. Hence, the entire stock of such items becomes surplus obsolete
- faulty planning and forecasting: the marketing department may have projected a sales forecast which might be on the false. Any material planning has to be based on sales forecasts and this could result in surplus items
- faulty purchase practices: sub-optimizing decisions like buying in bulk to take care of discounts and transportation economy without taking into account factors such as, shelf life, storage space requirements and technological changes once again lead to the accumulation of surplus and obsolete stocks⁸.

All these are common phenomena in some businesses. They all cause self-inflicted obsolete stocks and can be avoided by improving communication between departments. The responsibility for organizing this communication revolution lies with stock control⁹.

Some organizations have introduced formal documentation in introducing changes in design or product. It is called the “Effective Point Advice”. This is popularly known as EPA. Here, the proposed changes, details of new materials and products required, details of materials and the products which will be invalid/obsolete when the change occurs and the approximate date when the change is expected to be introduced are detailed and circulated to concerned departments¹⁰.

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Nevertheless, one needs to realize that some steps should be taken not only before identifying the obsolete products, but also ex ante. Various approaches to disposing obsolete stock exist such as: sell at net price, temporarily raise commissions for salespeople, discount the price, return to vendor, donate, write it off or auctions\(^{11}\). Of course, the choice of the solution depends on a sector on which a company operates, range of products, company’s policy, position in the supply chain, relationships with trading partners, the market specific and so on\(^{12}\).

The above described problematic concerns only a small part of inventory management. There is almost no detailed solutions (case studies) in the literature that would handle the obsolete stock management. This fact was one of the incentives to write the paper. The other one was connected with the need to build and implement an obsolete stock cleaning procedure in a company of the global home appliance industry.

In the section 2, the case study of the analyzed company will be presented. Methodology and expected results will be described within this section as well.

**Case study**

There is a value in obsolete inventory items, but if these items pile up and sit over a period of time, they become worthless. That is why, there is a need to propose a specific, detailed procedure coping with obsolete products management in order to minimize losses connected with the phenomena. The case study concerns an obsolete stock cleaning procedure that could be introduced to an exemplary company.

Case study is an analysis of a single case, namely a detailed description, usually a real case, which allows drawing conclusions about the causes and result of its course and the broader business model, market characteristics, technical considerations etc. The purpose of the case study is to demonstrate the concept worth copying, as well as potential errors to be avoided\(^{13}\).

Following the above mentioned definition, first the case needs to be described. It is assumed that so far, the company had no procedure coping with obsolete products. The category managers and sales managers once a month got information that some products will be soon replaced by new ones, so that the obsolete ones needed to be sold out in order not to take space in warehouses and not to generate losses. If some SKUs\(^{14}\) were not sold they piled up in warehouses and waited for the annual sales for the employees.

Of course, this way of handling the obsolete inventory had many drawbacks as:
- no database with obsolete SKUs, which would be updated e. g. on monthly basis
- no controlling system of the obsolete SKUs
- deterioration of relations with Trading Partners
- costs connected with financial assets, valor and margin loss (products are less and less in line with market expectations), storage (surfaces utilization).

That is why, there was a need to define an obsolete product and create database that will enable following the changes in products’ lifecycle and their stock-on-hand volume in order to sell obsolete SKUs at their early stage of obsolescence. The company’s product life cycle is presented below (Figure 2).

The status numbers are used in the company by the employees. Status A means the introduction stage of a product. There are ramp-up deliveries from plants and no sales. Status B consists of growth and maturity stage. Products are sold and supplies vary in volume depending on the product family and the product alone. Status C begins when the market is saturated and sales begin to decline, the product becomes technologically obsolete or customers’ interest falls down. Products that are at the obsolete stage are no longer manufactured. However the plants may have started to manufacture some lots, so they have to be finished and delivered to the warehouses. That is why obsolete products pile up even more.

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\(^{14}\) SKU stands for Stock Keeping Unit, in the paper the term „product” is used interchangeably.
The status C is the period of our interest, that needs to be investigated and there should be some procedure proposed that will improve obsolete inventory management. The methodology of the undertaken actions is presented in the next part of this section.

The status C of the product life cycle needs to be analyzed. The proposed stages of status C are presented in Figure 4. Each of the stages, namely C-0, C-1, C-2 and C-3, lasts 1 month.

The stages and undertaken actions are described below:

- **Stage C-0**: The first stage is an informative period. The products’ statuses are updated at the beginning of every month. Product managers have one month to prepare proposals for the next stage 3-A. These options are described in the stage 3-A.

- **Stage C-1.1**: During this period sales managers try to sell as much as they are able to, using three below options:
  - C-1.1 – trade promotions: sales kits including an obsolete product and regular products with high turnover or sales kits including few obsolete products (100% of the initial ASV);
  - C-1.2 – supporting regular orders with obsolete SKUs for free (0% of the initial ASV);
  - C-1.3 – internet sales – the company’s own page and its trading partners (80% of the initial ASV)

  Higher than typical provisions are the incentives for them to move that inventory.

- **Stage C-2**: Promotions to employees and factory employees. Obsolete products are offered at bargain prices. There are no limits in number of bought products. (50% of the initial ASV)

- **Stage C-3**: scrapping of the remaining obsolete SKUs (0% of the initial ASV).

All of the computations were conducted on the basis of the artificially generated data concerning:

- stock-on-hand volumes
- ASV – average sales values
- product’s statuses.

Only SKUs with status C were taken into consideration, so that the share of the capital covered by these SKUs is visible. In order to conduct simulation some assumptions were made and scenarios were chosen. The simulations were conducted in order to obtain the most probable total average sales value. The description of simulations and their results were presented in the part 3.

**Results**

There were 10 000 simulations carried out in order to obtain the most probable total revenue and costs of unsold items. In order to conduct simulations and see the results, the following assumptions were made:

- the company manufactures and sells 350 products; 10% of them have status C, so these products are obsolete items (35 SKUs)
- the ASV of these obsolete products varies from 300 PLN to 4 000 PLN
- stock-on-hand volume at a given date varies from 1 to 50 SKUs
- unsold products generate no value for the company and they are scrapped in order to minimize their warehousing cost.

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15 ASV stands for Average Sales Value.
The next step was to present the results in three scenarios which differ in terms of volume share of obsolete SKUs at each stage C-1, C-2 and C-3. In the first scenario it was assumed that 33% of obsolete SKUs were sold at the stage C-1, next 33% at the stage C-2, and the last 33% were scrapped at the stage C-3. In the second scenario all SKUs are sold at stage C-1. In the third scenario, it was assumed that a half of SKUs was sold in the stage C-1, 25% at the stage C-2 and the last 25% were scrapped at the stage 3-C. The volume shares at stages C-1.1, C-1.2 and C-1.3 are equally likely (33%). Within the framework of scenarios, the stage C-0 is not taken into consideration due to the fact that products are not being sold in this period,

<table>
<thead>
<tr>
<th>Stage</th>
<th>Volume share</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td></td>
<td>33,3%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>C-1.1 (33,3%)</td>
<td>33,3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C-1.2 (33,3%)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C-1.3 (33,3%)</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-2</td>
<td>33,3%</td>
<td></td>
<td>-</td>
<td>25%</td>
</tr>
<tr>
<td>C-3</td>
<td>33,3%</td>
<td></td>
<td>-</td>
<td>25%</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Stage</th>
<th>% of initial ASV</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td></td>
<td>Volume share</td>
<td>Revenue</td>
<td>Volum e share</td>
</tr>
<tr>
<td>C-1.1</td>
<td>100%</td>
<td>11,09%</td>
<td>156 756</td>
<td>33,3%</td>
</tr>
<tr>
<td>C-1.2</td>
<td>0%</td>
<td>11,09%</td>
<td>-</td>
<td>33,3%</td>
</tr>
<tr>
<td>C-1.3</td>
<td>80%</td>
<td>11,09%</td>
<td>125 405</td>
<td>33,3%</td>
</tr>
<tr>
<td>C-2</td>
<td>50%</td>
<td>33,3%</td>
<td>237 510</td>
<td>0%</td>
</tr>
<tr>
<td>C-3</td>
<td>0%</td>
<td>33,3%</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>519 671</td>
<td>855 035</td>
<td>605 828</td>
<td></td>
</tr>
<tr>
<td>Cost of unsold items</td>
<td>33,3%</td>
<td>475 020</td>
<td>0%</td>
<td>25%</td>
</tr>
</tbody>
</table>

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they wait in warehouses – it is only an informative period for the employees.

On the basis of 10,000 simulations carried out in Microsoft Excel 2010, it is possible to compute exactly, how much the company can yield on obsolete inventory at each stage and what the cost of unsold items is. The estimations are that the whole capital covered by obsolete products (stock-on-hand volume equals to 854 items) amounts to 1,426,485 PLN.

It is presented in the Table 2, that scenario 2 (100% at the stage C-1) is the most rentable one and the revenue amounts to 855,035 PLN will be returned to the company and there will be no cost of unsold items.

The total capital covered by the sold obsolete SKUs in the three scenarios and the cost of unsold SKUs as a share of total potential capital is showed in the Figure 4. The total potential capital is the value expressing the situation if all the obsolete products are sold. If all stages are likely probable the capital which will be gained by the company in scenario 1 amounts to only 36% (almost 520,000 PLN) and cost to 33% of the potential capital (over 475,000 PLN). Within scenario 3 revenue equals to 42% (over 600,000 PLN) and cost to 25% of the potential capital (over 356,000 PLN).

Of course the best scenario would be if all products were sold at the stage C-1.2, for the full price. It depends on category managers that prepare trade proposals. The worst scenario should be if there were no sales and the whole obsolete inventory range was scrapped. Then the company obtains no revenue. Unfortunately, it is very hard to forecast how the demand will behave under the assumptions made (discounts).

Conclusions

The aim of this paper was to propose an obsolete stock cleaning procedure. Thanks to the conducted simulation, one can see that the company can earn on the obsolete inventory.

The analyzed case study and its results proved that good inventory management and its control can generate money to the company.

All this highlights that a close coordination is required in order to avoid stock piling obsolete and surplus items. The stock cartography and its detailed elements should be included in the company KPIs and monthly followed-up by the Board of Directors.

The natural continuation of the proposed procedure would be an implementation to the real business case. A great possibility to check if the procedure brings advantages on the long run, would be controlling after e. g. half a year. What is more, ex ante analysis of data concerning demand and at each stage could be carried out. Then the category managers and sales people would have backward information and some adjustments within the framework of proposed prices and promotions would be made in order to maximize the sales volume of obsolete SKUs, and thus minimize their cost of warehousing.

Abstract

In the paper, the case study of obsolete inventory management is under consideration. Firstly, some background information on inventory management and obsolescence phenomena is presented. Further considerations include demonstration of the case study, the methodology of creating the obsolete stock cleaning procedure and the results. All the computations were conducted with usage of artificially generated data.

Keywords: obsolete inventory management, stock cleaning, product life cycle (PLC)

Streszczenie

Niniejsze opracowanie dotyczy zarządzania zapasami produktów przestarzałych („obsoletowymi”). W pierwszej części przedstawiono podstawowe informacje o zarządzaniu zapasami oraz o zjawisku starzenia się produktów. Dalsze rozważania obejmują studium przypadku, metodologię tworzenia procedury czyszczenia zapasów oraz wyniki. Wszystkie obliczenia zostały przeprowadzone z wykorzystaniem sztucznie wygenerowanych danych

Słowa kluczowe: zarządzanie zapasami, czyszczenie zapasów, cykl życia produktu (PLC)

References