# Aycada Simulation Game for Production and Capacity Management

## Examination: Decision Paper of the Product Manager

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Group (D1, D2, D3 or BWL/Block): E2

Companies (C1, C2, ... C11): C3

## Situation

The Executive Board makes monthly decisions on

* The planned production volumes for the four products offered by the company [PU/month] and
* The planned production capacity for the four production stages [hours/month].

Each month, the Executive Board as a body must therefore make eight individual decisions. The first decision is made for month 36.

Each board member has the task of creating a decision template, which serves in particular to support the first joint board decision for month 36. This paper answers the following questions:

## Questions

### Is it economically advantageous to offer the product? (2 points)

I believe that manufacturing Product 1 is economically advantageous to offer the product because its contribution margin is positive, as the sales price is greater than the variable cost and currently lies at 1003325 euro/month. As the contribution margin is positive, the production of Product 1 is contributing to the coverage of the production fixed costs, and thus should continue to be produced.

In addition, it represents a secure base of income for the firm, since the demand for the product is relatively high and stable, and therefore I think that the firm should continue producing Product 1 since it is economically advantageous.

Break-even analysis and contribution ratio

Learning rate should be considered, will become more advantageous

### Are there time-dependent patterns in past demand (measured in packaging units of the product)? (2 points)

Seasonal demand changes, use data peaks and doughts, every 12 months

### Which forecasting technique is best suited to provide the most accurate prediction of demand for the product? (2 points)

I believe that the best forecasting technique for predicting the future demand for Product 1 is the method of exponential smoothing, which is a type of regression analysis that takes into account the seasonal cycles the data follows, as it uses data from the past months to determine the underlying trend by minimising the sum of the squares of the deviations from the demand to the trend line, and thus predict the future values. To predict the future demand for Product 1, I used the forecast function available in Excel and included the available data from months 7-36.

Compare both, use graph to show it

### How high will the demand be in the month (measured in packing units) in which the production quantity to be determined now is available to be delivered? (Note: To answer this question, use the forecast technique recommended above.) (3 points)

The demand in the month in which the production quantity which will now be determined will be available refers to the month 39, as the production quantity to be determined now is the one for month 36, and it is known that the produced units take two months to reach the WiP inventory and another one to reach the inventory, thus it needs three months to be ready for delivery. Therefore, the demand to be forecasted is the one for the month which lies 3 months ahead, in this case, month 39.

Therefore, the forecasted demand using the abovementioned forecasting technique for month 39 for Product 1 will be of 188795 PU.

### What is the mean absolute deviation between the actual observed demand for the product and the forecast (both measured in packing units) for months 25 to 36 when the selected forecasting technique is applied? (2 points)

In order to find out the mean absolute deviation between the actual observed demand for the product and the forecast for months 25 to 36, the data in between these months have to be forecasted, as we were only given the actual incoming orders for these months.

To forecast this data, I followed the same forecasting process as I previously stated, but this time I only included the incoming orders for months 7-24 as the input data for the function.

Once I had the forecast data, I proceeded to calculate the mean absolute deviation between the actual and the forecasted data by subtracting the forecasted from the actual for each month from the 25th to the 36th. Then I calculated the average by adding the absolute values of all these calculated numbers and divided the sum by 12, which represents the number of months, and this would be the result for the mean absolute deviation.

Therefore, the mean absolute deviation between the actual observed demand and the forecasted demand for Product 1 for months 25 to 36 is 9180 units.

### What quantity of the product (measured in packing units) would you keep in inventory? (2 points)

Firstly, I took into consideration the difference in costs between inventory and backorder, which are 0.15 and 0.28 euros, respectively. This means that it is more profitable for the firm to inventory additional produced units and keep a larger inventory, which allows the firm to securely deliver incoming orders, rather than maintain a lower production level and get some of them backorder, since it would involve a larger cost.

Backlog also taken into account, new orders

Look at peaks/troughs say how will the decided production 3 months before will change and thus how the inventory reacts too

### What planned production quantity of the product you are responsible for do you propose for month 36? (1 point)

Demand for 3 months later (month 39) , deduct inventory (predicted)&backlogs.

A bit less for mine bc already have quite a bit of inventory

### What quantity of the product (measured in packing units) will be in the production and quality control process (WIP – work in process) in month 37? (1 point)

The Work in Process inventory is calculated by adding up the packing units from the previous two months, as they represent the units held in quarantine after being produced for the known period of two months postproduction. Therefore, to calculate the packing units which will be held in WIP in month 37, the sum of the released production quantity units for months 35 and 36 has to be calculated, since they represent the total amount of produced units that will be part of the WIP inventory at the start of month 37. The calculation needed is then: 180671+178288=358959 units that will be part of WIP at the beginning of month 37

## Evaluation criteria

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|  | Insufficient | Satisfactory | Very good |
| Correctness of the answer | Answer is grossly incorrect | Answer is partially incorrect | Answer is correct |
| Justification of the answer | No justification available, neither in text form nor as a calculation | Satisfactory justification | Clear and convincing justification of the answer, with calculation (if applicable) |
| Correctness of the data/information used | Incorrect data/information used | Partly correct, partly incorrect data/information used | Correct and appropriate data/information used |