Report: Flower supply chain planning

1.

Based on our Scenario Analysis, the possible fluctuation of demand and the sunk cost of the 125,000 flowers the growers decided to produce in advance, the **Worst Case Scenario** would bring a loss of 10,000 euros, as we always incur in the sunk cost of 25,000 euros, which refers to growing the flowers at a 0.20 cents cost per-unit.
Our **Best Case Scenario** supposes an actual demand of 200,000 flowers but we would sell only the 125,000 we already produced, as we have no decisional power on this variable at this point. This would secure us a profit of 12,500 euros.
This can be explored in detail in Q1 (*in the appendix*).

We have discovered a range of 22,500 euros between the best and the worst case scenario, moreover, our **break-even quantity**[1] is set at 83,333 flowers sold, therefore, under this number of flowers sold, we would incur a loss.
The graph “Sensitivity Analysis” (*in the appendix*) clarifies the cited relationship.

2.

By keeping our production level constant at 125,000 flowers produced and varying the actual demand in steps of 5,000 units from 50,000 to 200,000 flowers sold, we can argue that, as we would expect, the profit never goes below a net loss of 10,000 euros or above a net profit of 12,500 euros because of the **production constraint** we incur.
As expected, the first positive value in profit - equal to 500 euros - comes at 85,000 flowers sold, while at 80,000 we would register a 1,000 euros loss, this happens because of our **break-even quantity**, set at 83,333, as we pointed out before.
Clearly, from 125,000 flowers sold on, the profit remains fixed at 12,500 euros, as can be seen in Q2 (*in the appendix*).

We do not agree with the flower grower, in fact, by averaging the profits obtainable with a demand between 50,000 to 200,000 flowers and fixing 125,000 flowers produced, we come to understand that the **average profit** reaches 6,694 euros[2], assuming equal probabilities for each of the 30 demand scenarios.

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[1] Break-even quantity = Fixed cost / Contribution Margin = (125,000*02) / (0,3-0,2) = 83,333
[2] See Q2.1 (*in the appendix)*

3.

We have been finally able to incorporate the uncertainty regarding the actual demand value by running a Montecarlo Simulation, defining Profit as our output variable and defining the Actual demand as a Uniform distribution between 50,000 and 200,000 flowers.

Our result gave us an average gain of 6,875 euros and we can highlight how our **profits** would **range** between a net loss of 7,781 euros and a net gain of 12,500 euros in 90% of the cases, as Risk1 (*in the appendix*) suggests.

As can be inferred from Risk2 (*in the appendix*), we find a 22,3% **probability of incurring in a loss** in the current condition, which complementary gives us a 77,7% probability of running a profit.

Risk3 (*in the appendix*) shows us that the **probability of running a profit equal or higher than 10,000 euros** is set at 55,6%.

From this we can conclude that, we observe roughly ⅕ probability of incurring a loss. Therefore, reducing this probability could be optimal and we could do so by leveraging a different production decision, which would potentially allow us to minimise the opportunity cost incurred when producing less than the actual demand.

At the same time, we have more than a ½ probability of running a profit higher than 10,000 euros, which signals a very good profitability for the cited demand projection, which could be potentially increased by changing the ex-ante production decision.

4.

After creating a table reporting all the possible **production decisions** from 80,000 to 200,000 flowers in steps of 5,000 units, we ran 25 simulations with 1000 iterations each on the scenario and we have been able to obtain some data for each of the scenarios in our Risk Summary.

By analysing each of them, we found out how the best scenario would be to produce 100,000 flowers, 25,000 less than what we assumed throughout the previous simulations. This choice has been based on the **evaluation of the highest mean**, which in this case reaches 7,500 euros, representing an **increment in average expected profit** of 9% over the previous simulation, which delivered us a mean of 6,875 euros.

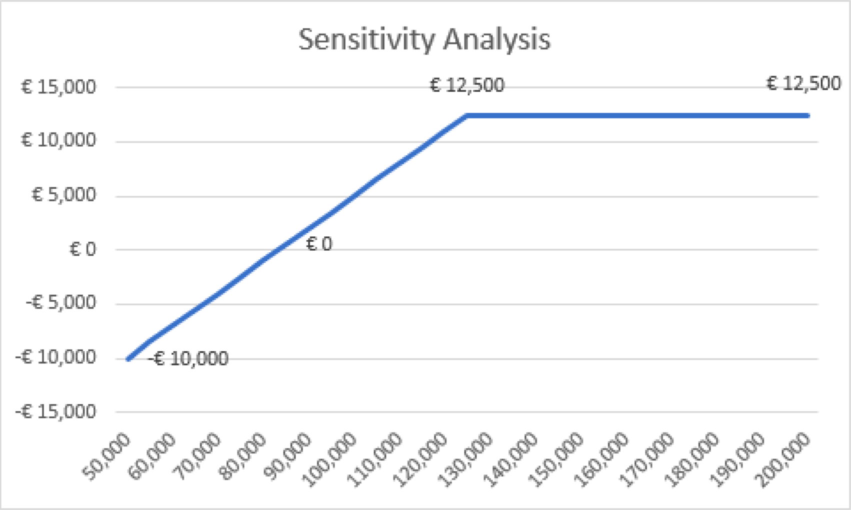
The “Average Expected Profit” graph (*in the appendix*) pictures the cited relationship and tells us how producing over 190,000 flowers delivers a negative mean, due to the fact that we would face a very low probability of encountering an actual demand higher than that number, which would leave us with a **potential loss (unsold)**, traceable to the high sunk costs (0.20 cents cost per-unit) we would incur in the production phase.

Appendix

Q1

Scenario Summary	Bad Scenario	Mid Scenario	Good Scenario
Changing Cells:			
Actual demand	50,000	125,000	200,000
Result Cells:			
Selling price	€ 0.30	€ 0.30	€ 0.30
Unit cost	€ 0.20	€ 0.20	€ 0.20
Min demand	50,000	50,000	50,000
Max demand	200,000	200,000	200,000
Actual demand	50,000	125,000	200,000
Growing flower	125,000	125,000	125,000
Flowers sold	50,000	125,000	125,000
Profit	-€ 10,000	€ 12,500	€ 12,500

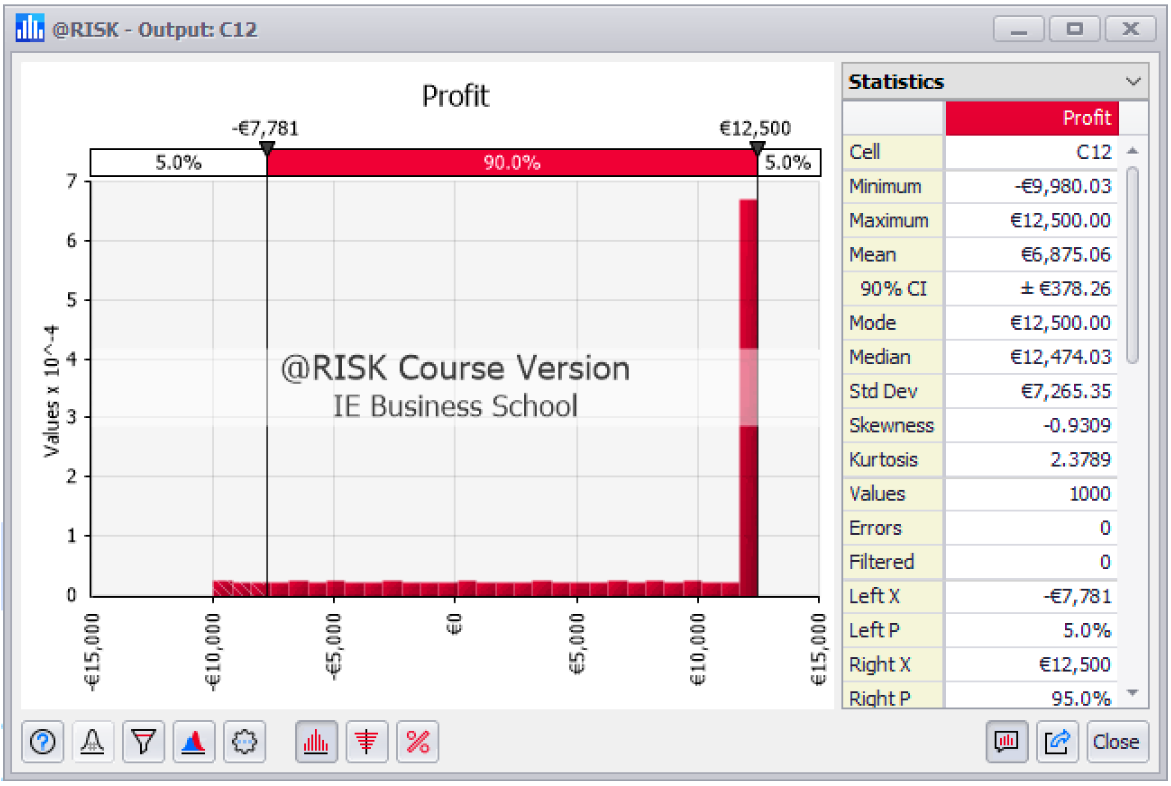
Q2



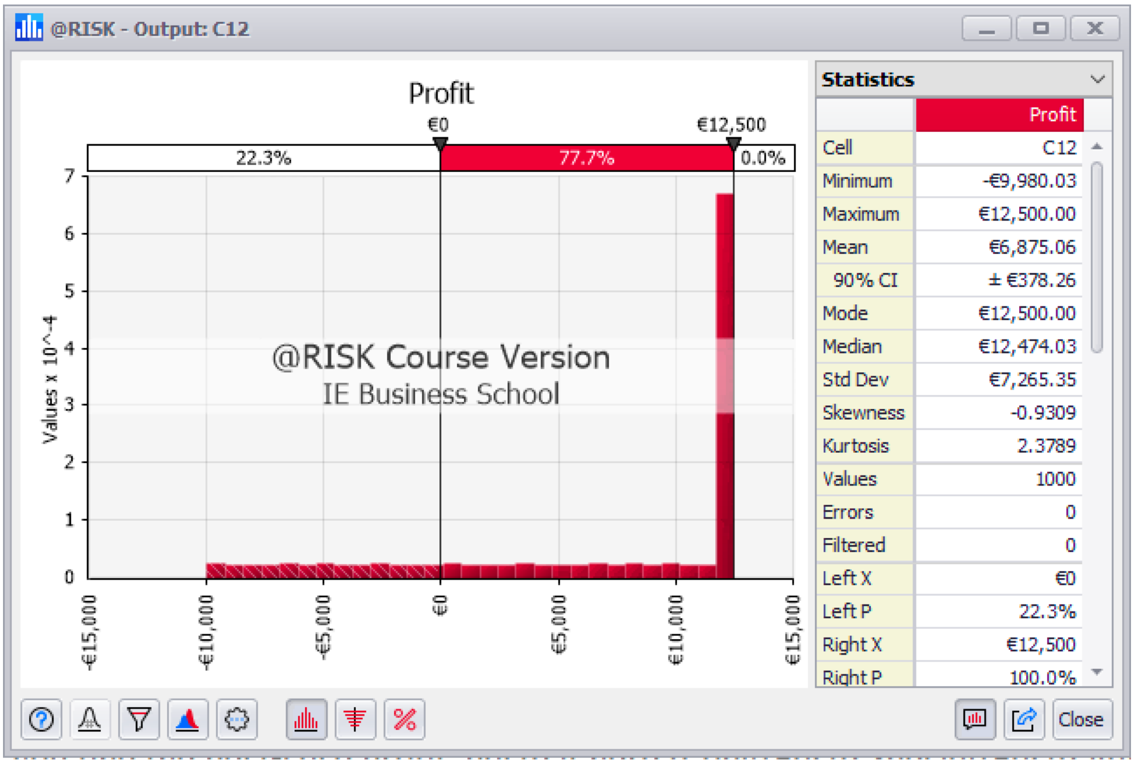
Q2.1

Sensitivity Analysis	*-€ 25,000*
50,000	-€ 10,000
55,000	-€ 8,500
60,000	-€ 7,000
...	...
190,000	€ 12,500
195,000	€ 12,500
200,000	€ 12,500
AVG	€ 6,694

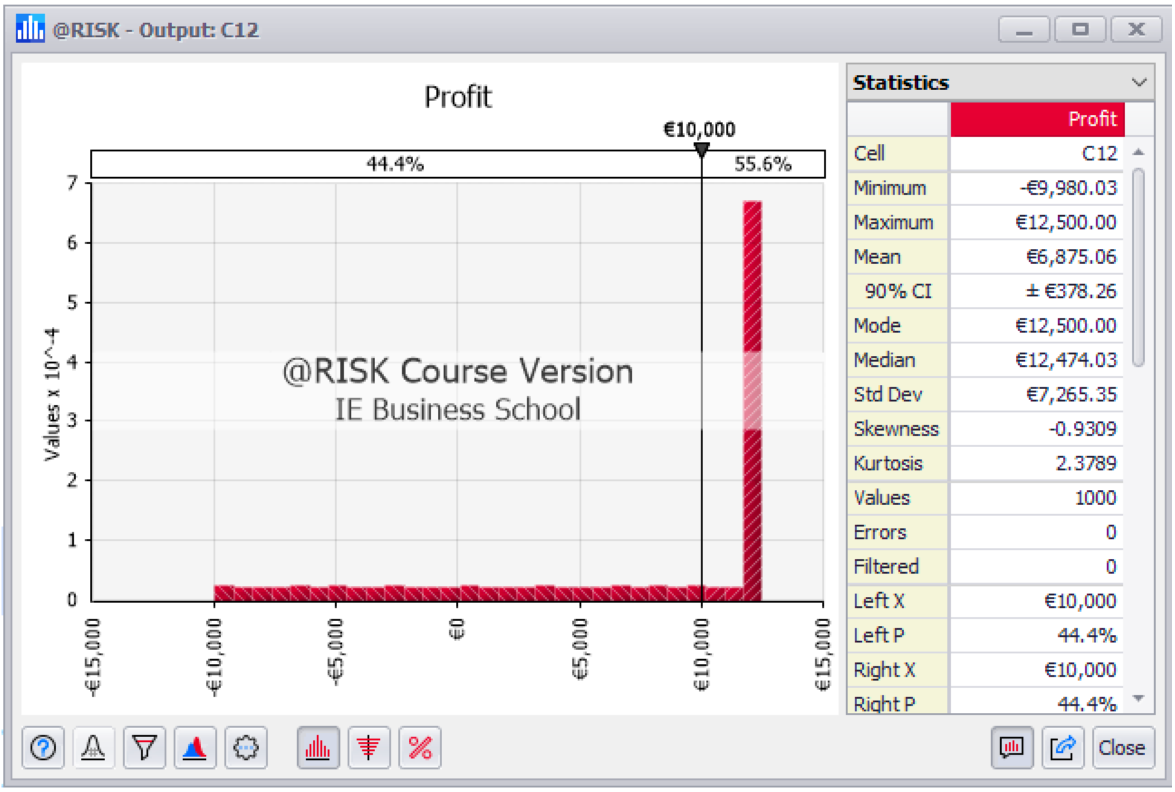
Risk1



Risk2



Risk3



Average Expected Profit