

Multistage decision making

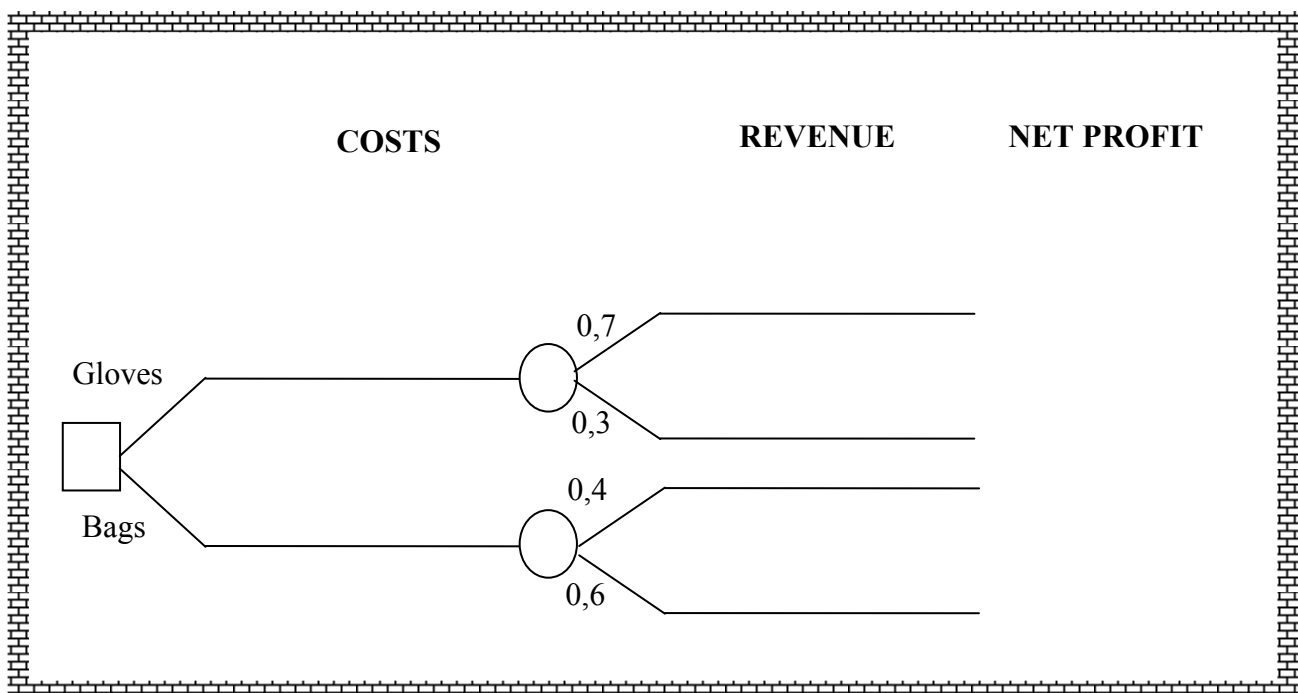
Workbook

Example 1

You are an owner of a shop with sport equipment and you face this decision problem: You have a great opportunity to buy golf-gloves or sport bags, unfortunately you don't have enough space in your warehouse, that's why you have to choose only one of these two commodities. As the winter is coming you know that you have to sell them as soon as possible. If you sell all the stuff during a Winter Market on Náměstí Svobody you can sell them for Price n.1, if you sell them later in your shop, you will have to sell them for Price n.2. There is 70% probability that you succeed to sell the gloves during Winter Market and 40% probability that you succeed to sell the bags during Winter Market. Which of these commodities would you choose to purchase, Gloves or Bags? (To make this example easier we consider that you sell either all pieces or nothing, i.e. you can't sell half on Winter market and half later)

- **Count "Expected Values" and Draw Decision tree.** Here are financial conditions:

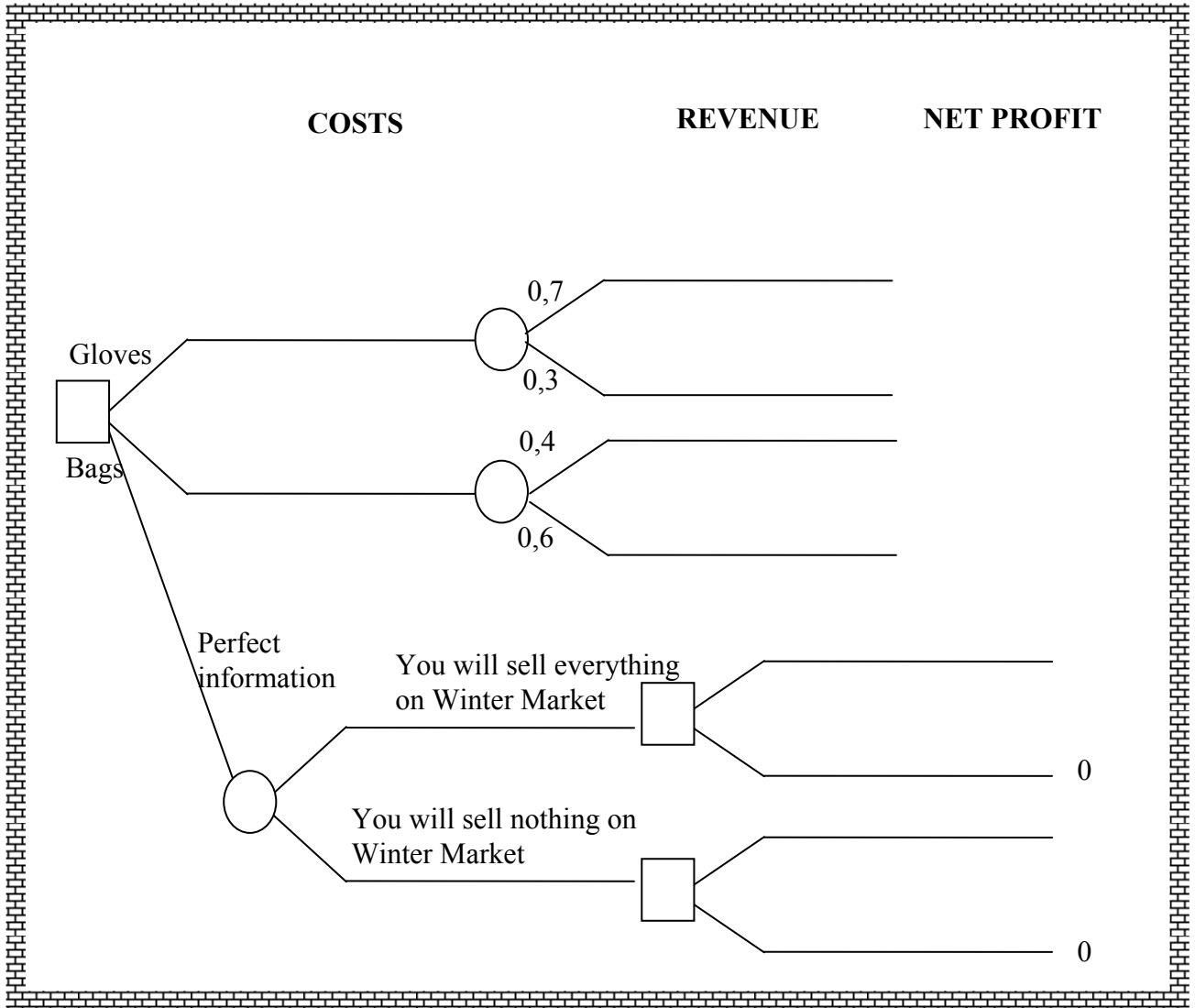
	<i>Pair of golf gloves</i>	<i>Sport bags</i>
Amount:	3000 pairs	4800 pieces
Purchase:	800 CZK / pair	500 CZK / piece
Sale Price n.1:	1000 CZK	750 CZK
Sale Price n.2:	700 CZK	450 CZK
Probability of selling everything during Winter market (Price n. 1)	70%	40%
Probability of selling everything later (Price n. 2)	30%	60%



Example 2

You've chosen to sell one of the stuff mentioned in Example number 1. Your friend Franta, whom you know from your University studies on ESF now works as a marketing analyst in Augur Consulting. He has perfect information for you about preferences of customers who will be present on Winter market. Franta asks for 100 000 CZK for his information.

- **Count** "Expected Value" of a perfect information and **Draw** Decision tree. How much it is worth to pay to Franta for his information?



Example 3

ArthroDax Company has been approached by Ranger Sound with a rush order offer to purchase 100 units of a customized version of ArthroDax's SoundScreamer audio mixer at \$5,000 per unit, and ArthroDax needs to decide how to respond. The electronic modifications of the standard SoundScreamer needed for this customized version are straightforward, but there will be a fixed cost of \$100,000 to design the modifications and set up for assembly of the customized Sound-Screamers, regardless of the number of units produced. It will cost \$2,000 per unit to manufacture the circuit boards for the units. Since ArthroDax has some short term spare manufacturing capacity, the Ranger offer is potentially attractive. However, the circuit boards for the customized units will not fit into the standard SoundScreamer case, and ArthroDax must decide what to do about acquiring cases for the customized units as it decides whether to accept Ranger's purchase offer. An appropriate case can be purchased at \$500 per case, but ArthroDax could instead purchase an injection molder to make the cases. It will cost \$20,000 to purchase the molder, and there is a 0.6 probability that it will be possible to successfully make the cases using the molder. If the molder does not work, then the purchase price for the molder will be totally lost and ArthroDax must still purchase the cases at \$500 per case. If the molder works, then it will cost \$60 per case to make the cases using the molder. Regardless of which case is used, the cost of assembling the SoundScreamer circuit boards into the case is \$20 per unit. Unfortunately, there is no way to test the molder without purchasing it. Assume that there is no other use for the molder except to make the cases for the Ranger order.

- (i) Draw a decision tree for ArthroDax's decision about whether to accept the Ranger offer and how to acquire the cases for the customized SoundScreamers.
- (ii) Using expected values of net profit as the decision criterion, determine the preferred course of action for ArthroDax

Summary:

Order from Ranger Sound: 100x customized SoundScreamer for 5,000 per unit

Fixed Costs (do not depend on number of units): 100,000 to customize the machine

Costs:

- Manufacture Circuit Board: 2,000 per unit
- Cases - Buy or manufacture:
 - Buy = 500 per unit
 - Manufacture using Molder = 60 per unit + 20,000 (for buying Molder)
- Assembling = 20 per unit

There is 60% probability that Cases Made by Molder will be OK.

