**Case study 1**

Acceptance sampling

*Due date: 5th November, 14.00*

**Part 1: The economics of acceptance sampling**

Many companies use inspection in an attempt to control quality of incoming components. This case study deals with a company that assembles units purchased from an external supplier. In general, various inspection policies are possible, however, in this case, we will be comparing a single sampling plan with a double sampling plan and a continuous sampling plan. We will focus on the costs of these policies, but also on the quality of the decision taken for the lot.

We use the following unit costs:

* k1: this is the cost of inspection; it includes all labor, material, and amortization costs associated with the inspection of a unit. If you want to know whether a unit meets the quality requirements, you will have to pay the cost k1.
* k2: this is the cost per non-conforming unit that is placed in assembly; it includes all labor, material, and shipment costs to repair the failed assembly. If you use a unit that does not meet the quality requirements in your assembly process, this will cost you k2.

We assume that each unit either has the required quality, or doesn’t meet the standards (pass/fail). We also assume perfect inspection: inspecting the unit will always result in a correct quality assessment. We assume that the value of k2 = 200€. The value of k1 depends on your group and is specified in Table 1 (in euro).

Our company considers the following policies:

* A single sampling plan, with n = 45; c = 1.
* A double sampling plan, with n1 = 28; c1 = 0; r1 = 2; n2 = 26; c2 = 1.
* A continuous sampling plan, with h1 = -1.095; h2 = 1.348; s=0.04.

The lots:

The excel file “CaseStudy1 – Lots.xlsx” provides 100 lots, each with 200 units procured by the external supplier (N=200). Each lot corresponds to a row; the units correspond to the columns. A value 0 means that the unit does not have the required quality; a value 1 means that the quality of the unit is according to specifications. Depending on the inspection policy, the quality of the unit will become clear after inspection, or after the unit has been assembled (if the unit was not inspected).

The lots that you need to evaluate, and the value for k1 that you need to use depend on your group number and are given in the following table.

Table 1 Values for k1 and lots to be evaluated for each group



What to do?

1. Test the sampling plans on 10 lots (see Table 1 to find out which 10 lots your group needs to evaluate), and keep track of the costs. Be careful to describe exactly how you apply the three policies to the lots. Explain how you organized the sampling process. Mention which units were inspected, and what decision you reached for the lot. Make sure that it is clear how you computed the cost of each policy for each of the 10 lots. It needs to be very clear (and reproducible) how you implemented the sampling plans. For instance, if you solve this using Excel, then submit your Excel sheet (electronically) as well.
2. Summarize your results (costs) in a table. Which sampling plan is preferred from an economic point of view? Is there a dominant policy, or does it depend on the circumstances? Explain.
3. Suppose that your AQL is 5%. With hindsight (i.e., knowing the quality level of each lot), which of the policies offered the best decision (accepting/rejecting) for the lots you examined? Is there a dominant policy, or does it depend on the circumstances? Explain.

Note: there is no need to compute an OC curve for any of the sampling plans. Base your evaluation solely on your experiences with the 10 lots specified for your group.