Questionnaire Validation of C4.0 Simulation

Total time: 40'

Part 1: Explain the simulation – 10'

This simulation helps to assess the collection (returned products) of components that could be suitable for remanufacture in the automotive sector. The collation rate is based from information taken from the literature review. Through the simulation we deliver a new term called Certainty of Product Quality (CPQ). The CPQ is a value between 0.1 and 1 and quantifies how certain you could be about the quality of a returned product. Some important facts of the CPQ are:

- CPQ is a function of {Physical Condition (PC), Part Remanufacturing History (PRM), Part Replacement History (PRH), and Data from sensors}

- If you were certain/confident about the quality of returned product, the number would be around 0.8-1.0. If you were uncertain, the number would be between 0.1-0.5.

- CPQ would affect the Disassembly time, Cleaning time, Inspection time, of the product.

- CPQ has impact on **time spent in a remanufacturing process and associated costs.**

- **Reuse ratio:** Reuse ratio is 80%. 80% products are going through inspection process to Reusable products, rest 20% are going to be disposed of

- The nature of the product determines the CPQ and the level of disassembly a component might go to. Data from sensors could help to determine the uncertainty and CPQ.

Part 2: Questionnaire – 30'

1) In the diagram below, please indicate the most prevalent scenario with returned products in your company

High Quality
Low Certainty

High Quality
High Certainty

Product
Quality

Low Quality
Low Certainty

Low Quality
High Certainty

Certainty of Product Quality
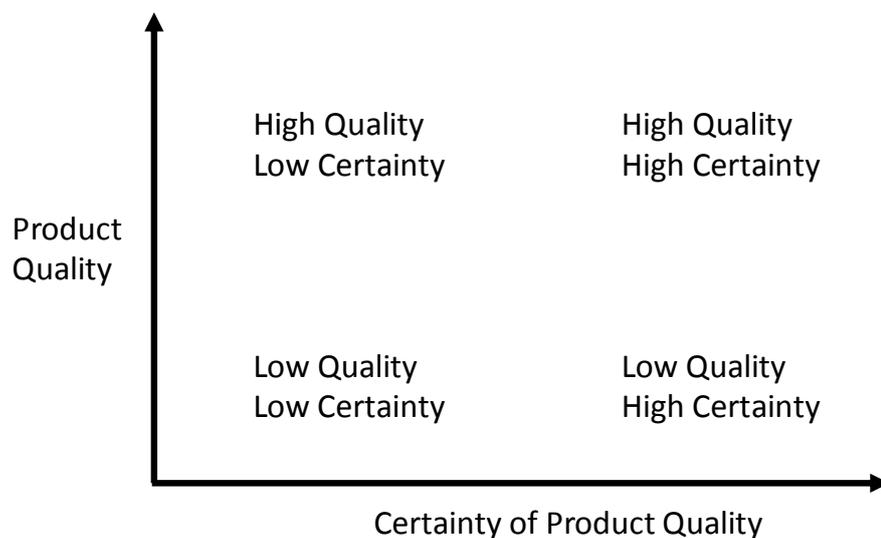
2) What are your initial thoughts about the simulation? Is it useful, what insights do you got?

3) Of all the 4 elements of the CPQ, which do you think is more important? OR, If you are to rank the elements of CPQ in terms of its impact on the decision to remanufacture/ impact on remanufacturing on the scale of High(H), Medium(M), Low(L)?

4) What are your strategies to reduce cost if the CPQ is low (quality is uncertain) when assessing a component? Would intrinsic knowledge (e.g. having highly experienced inspectors) could help to address this?

5) Would CPQ be able to substitute the intrinsic knowledge of remanufacture, or could they be complementary?

6) What if intrinsic knowledge from the shop floor could be automated, i.e. captured and digitised into a decision-making support tool. Do you think this would influence the CPQ? What type of value this could add to remanufacture?

7) What if product information from the OEM could be automated, e.g. using secure product lifecycle database based on block chain technology. Do you think this would influence the CPQ? What type of value this could add to remanufacture?

8) What if CPQ could be made into a standard according to the type of component you are assessing? Would this increase/decrease the certainty and decision to remanufacture a component?