**year 11 Transition work**

**Please read the theory and guidance on a key DECISION-MAKING model – decision trees. Once you have understood the concept and process complete the question sheet on decision trees.**

**Decision Trees**

A decision tree is a **mathematical model** used to help managers make decisions.

* A decision tree uses **estimates** and **probabilities** to calculate likely outcomes.
* A decision tree helps to decide whether the net gain from a decision is worthwhile.

Let's look at an example of how a decision tree is constructed. We'll use the following data:

A screenshot of a business card

Description automatically generated

A decision tree starts with a decision to be made and the options that can be taken. Don't forget that there is **always an option to decide to do nothing**!

A diagram of a decision tree

Description automatically generated

The first task is to add possible outcomes to the tree (note: circles represent uncertain outcomes)

A diagram of a decision tree

Description automatically generated

Next we add in the associated costs, outcome probabilities and financial results for each outcome.

These probabilities are particularly important to the outcome of a decision tree.

Probability is

* The percentage chance or possibility that an event will occur
* Ranges between 1 (100%) and 0
* If all the outcomes of an event are considered, the total probability must add up to 1

A diagram of a tree

Description automatically generated

Finally we complete the maths in the model by calculating:

**Expected value:**

The financial value of an outcome calculated by multiplying the estimated**financial effect by its probability**

**Net gain:**

The value to be gained from taking**a decision.**

Net gain is calculated by adding together the expected value of each outcome and deducting the costs associated with the decision.

A diagram of a flowchart

Description automatically generated

Let's look at the calculations. What do they suggest is the best option?

**Option: Launch loyalty card:**

High sales: (0.6 x £1,000,000) = £600,000

Low sales: (0.4 x £750,000) = £300,000

Total expected value = £900,000

**Net gain: £900,000 - £500,000 = £400,000**

**Option: Cut prices:**

High sales: (0.8 x £800,000) = £640,000

Low sales: (0.2 x £500,000) = £100,000

Total expected value = £740,000

**Net gain: £740,000 - £300,000 = £440,000**

Both options indicate a positive net gain, suggesting that either would be better than doing nothing.

However, cutting prices has a slightly higher net gain & looks the best option of the two considered.

**BENEFITS OF USING DECISION TREES**

* Choices are set out in a logical way
* Potential options & choices are considered at the same time
* Use of probabilities enables the “risk” of the options to be addressed
* Likely costs are considered as well as potential benefits
* Easy to understand & tangible results

**DRAWBACKS OF USING DECISION TREES**

* Probabilities are just estimates – always prone to error
* Uses quantitative data only – ignores qualitative aspects of decisions
* Assignment of probabilities and expected values prone to bias
* Decision-making technique doesn’t necessarily reduce the amount of risk