Decision science essay

The Definition: Many times when faced with a hard decision to make or one that involves many different factors or consequences the executive tends to look for “ an educated guess” or “ take a calculated risk” but no real calculation is done nor any education is obtained to deal with uncertainty concerning the decision. The main goal of my Decision Science course is to equip executives or any decision maker with tools to deal with the decision making process.

The course provides us with a systematic, coherent approach to help with problem solving. It uses many different case studies that simulate the need of real decisions and explores the different outcomes and possible consequences of the decision. The use of the Decision Analysis technique intends not only to put executives in contact with the way how to use the technique, but also create the awareness and motivation for the use of an effective technique that intends to solve problems.

The Process: We had executive meetings every week to discuss what the problem in the cases was, to express how we would solve the problem and to present our numbers that led to our decision. We started our journey conceptualizing and practicing decision diagramming and the calculation of expected value; decision diagram is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. Expected value for random variable is equivalent to the probability-weighted sum of the possible values.

Calculating the values we are able to think about our outcomes and come up with an “ educated decision”. But right in the beginning we found out that there is no right or wrong answer, what we will have is a logical basis for a subsequent action. We were not looking for a “ good” outcome but for one that has been thought over and well crafted. We have to think about the qualitative factors that are involved in our decision making too. In the decision making process, as we saw in a case called The Nancy M. Hohman, we saw that many times the numbers will not speak louder than our personal preferences.

The Nancy M. Hohman was a less than one year old ship, worthy US$ 40 million, carrying 200, 000 tons of crude oil and 28 crew members and had an engine malfunction 9 miles way off the coast of South Africa. However, Port Elizabeth (the nearest one) was too small for the ship and the next close one was 380 miles away. The captain had the option of calling a tug boat, but there was a 15% chance that the tug boat would claim over the Ship.

They could try to repair the ship but there was a 20% chance that it could not be repair and they could not wait to repair first and then call the tug boat because it would leave soon and would not be available (25% chance). The weather played a great part on this decision too, because if the weather went bad (20% chance) and they decided to repair and failed there was a chance that 50% of the crew would die. Even worse than that would be a storm (25% of chance) hit them and they lose steerage (25% chance), it would result in 100% of the crew dead.

Even though the chances of the ship sinking were very small, because the Nancy Hohman had and 80% chance of making to the port by herself, with many other factors having to be considered, we started thinking about the price of a life. Looking at this scenario it is easier to consider the human lives and decide not to take any risk. Pay the US$ 6 million for the tug boat and get over with the problem would be easier and quicker. But is it in the best interest of the shareholder?

In this case we would be pricing a life at US$ 19, 000, 000, what makes us think if we really are willing to pay this price for a risk that was taken at the minute they decide to go on the ship. Choice under uncertainty represents the heart of decision science. In order to keep exploring the subject we started to practice the assessment of probabilities. This assessment is personal, subjective and judgmental. But how do you know a good assessor? A good assessor needs knowledge, accuracy and precision. If an assessor is right 50% of the time we can keep considering his/her assessments.

An assessor that is wrong all the time cannot be trusted. However, if you get an assessor that is right 100% of the time he/she cannot be trusted either because this assessor might be using too wide ranges to get his/her answers right. As a managers we can be using the assessments given to us as a decision making tool, because it can bring enlightenment on how many people to hire for a job, or how long it is going to take to get the job done and how much the salaries are going to be placed on. This kind of decisions can be crucial for the financial health of the business.

And once again we are using decision science tools to assess uncertainty, to try to minimize the penalty cost, define a better expected value and expected cost. Half way through our journey we added to the concept of expected value the concept of expected opportunity loss (EOL). EOL is the cost of not picking the “ best” solution. In other words, it’s the amount lost by not picking the “ best” alternative. The minimum expected opportunity loss is found by constructing an opportunity loss table and computing EOL for each alternative.

EOL is computed by multiplying the probability of each state of nature by the appropriate opportunity loss value. The sum of expected value and expected opportunity loss is the expected value with perfect information. At this point we have to pay attention on how much information you need to make a decision, because we cannot let the cost of this perfect information exceed the benefits of having that information. Managers have to be aware there is always uncertainty; only extra information can reduce uncertainty.

We have to buy information to the point its price doesn’t exceed its value. Another concept observed was the Incremental analysis, which is used to find the impact of changes in costs or revenues, given a specific potential scenario. In the case of Linmar Company we would lose more scrapping the excess calendar produced than producing less. However, we might consider producing extra calendar if we think we might lose future business not having at that moment the calendars to sell.

Decision science goes beyond the numbers because management decisions are quantitative, qualitative and strategic too. Another tool presented to the

executives for the decision making process was the Monte Carlo Simulation. Monte Carlo simulation is a computerized mathematical technique that allows people to account for risk in quantitative analysis and decision making. Risk analysis is part of every decision we make. We are constantly faced with uncertainty, ambiguity, and variability.

And even though we have unprecedented access to information, we can’t accurately predict the future. Monte Carlo simulation lets you see the possible outcomes of your decisions and assess the impact of risk, allowing for better decision making under uncertainty. This takes us to the next topic which is Personal and Organizational attitude towards risk. Our expected value at this point takes into account the risk aversion. We use a risk profile to define this risk. Risk profile is an analysis of the willingness of individuals or organizations to take risks.

A risk profile describes the level of risk considered acceptable by an individual or by the leaders of an organization, and considers how this will affect decision making and corporate strategy. The Conclusion: Decision Science comes in place to be the basis and argument for the decision making process. It provides useful tools that will enhance the process, help to deal with uncertainty and access risk. All these tools are needed in a world where uncertainty will never be completely eliminated and the consequences of mistakes can have drastic consequences, meaning the health of a business or the lives of people.