Reading Assignment

Chapter 3: Decision Analysis, pp. 65–68

Unit Lesson

Starting with this unit, you will blend a newly acquired (or refreshed) grasp of mathematics that supports analysis with some ideas and reflections on making decisions. The first idea you may note with interest in Chapter 3 of the textbook is what statisticians consider a good or bad decision. Certainly results count, as many leaders have, no doubt, reminded many statisticians who support them with analysis. Even so, decisions by gut instinct will, sooner or later, lead to results that are detrimental to the organization—this is what probabilities over a range of situations show. In the U.S. Army, there is a saying among leaders that "hope is not a method," communicating that the public taxpayers are poorly served if military leaders rely on chance and optimism to succeed rather than on methodical steps taken to achieve a goal.

If a good decision is a decision logically reached after considering analysis results—even those as simple as looking at coin tosses—then it follows that a bad decision is one not based on science and reason, even if luck brings fortunate results. It is a natural fact that luck for all of us runs out from time to time, and that there can be costs associated with "bad" luck. Accordingly, continue to champion good decision-making even if the odds go against the analysis predictions and the results of such a decision may occasionally be undesirable.

The Six Steps in Decision-Making

When you review the commonly-agreed steps of good decision-making, you can test support of good decisions by showcasing the commonly agreed upon steps (Render, Stair, Hanna, & Hale, 2015):

1. *Define the problem.* Everything else will be in error or under dispute if the real problem is not precisely determined and agreed upon. Among other hazards, you may waste time later finding a precise answer to a different problem than the one facing you.
2. *List the possible alternatives.* Feasible courses of action are listed here and not necessarily *just* the ones you personally hope for. Remember that doing nothing is a possible alternative.
3. *Identify the possible outcomes or states of nature.* Possible outcomes range from the best possible, or most optimistic, to the worst possible—and the worst possible outcome may happen, or the organization may face an unusual opportunity with the best possible outcome turning up as real.
4. *List the payoff/profit of each combination of alternatives and outcomes.* This can be a list or a table.
5. *Select a mathematical decision theory model to use for this problem.*
6. *Apply the model (solve the equation) and consider the solution, then make a decision.* You can war-game your own decision here to test that it is rational by asking: why did you decide what you did? Would you encourage another leader to make the same sort of decision given the calculated decision theory model results? These reflections help you focus on using logic and reason, not a gut feeling.

On pages 66–67 of the textbook (including Table 3.1) you are walked through the decision-making example of the Thompson Lumber Company. See how decision-making steps are manifested in this realistic example:

Step 1: John T.'s problem was whether or not to manufacture and sell backyard storage sheds—an addition to his product lines.

Step 2: Once the right problem is described, developing the possible alternatives is key to selecting the correct mathematics function and the solution for a decision. Ensuring that all feasible alternatives are considered is key. Intentional or unintentional bias may leave out the alternative that is best for the organization. Here, John's alternatives list becomes: (a) invest in a large plant to make the shed; (b) invest in a small plant; (c) do not do anything with sheds.

Step 3: For his calculations, John has to match possible outcomes for each alternative. He designated two: a favorable market and an unfavorable market. Indeed, commerce may fairly be described as having one or the other.

Step 4: Next, John has to calculate the payoff/profit for each outcome. See his Table 3.1 on page 67:

	STATE OF NATURE	
ALTERNATIVE	FAVORABLE MARKET ($)	UNFAVORABLE MARKET ($)
Construct a large plant	200,000	–180,000
Construct a small plant	100,000	–20,000
Do nothing	0	0

(Render. et al.. 2015)

You label the $200,000 figure, payoff of a large plant in a favorable market, as a *conditional value* because its amount is dependent on other things happening. The $0 amounts for doing nothing in either market are not conditional because nothing had to happen to realize no payoff.

Steps 5 and 6**:** As mentioned, with the payoffs laid out, the final steps are to select a model, solve it, and decide. A table with six possible outcomes can be assessed without a model by just considering the six figures. Situations that are more complicated, or have more risk, may need one of the probability equations to reach a solution that can be considered.

Types of Decision-Making

This all seems a methodical way to lead to success, and indeed a close adherence to the steps is a promising start toward making good decisions. So what can go wrong with the decision-making process?

The wrong problem, or no problem at all, is when decisions are based on emotions, often fear, instead of being based on logic, and positive decision-making is difficult to achieve. An executive ineffectively leading a low-performing bureaucracy may never get around to defining what should be studied. The less pleasant the situation is, the more likely it is that an organization that lacks resiliency and order will never get to the point of analyzing what is afflicting it.

Poor science and staff work may lead the organization to define a problem other than the one it is actually facing. When this happens, the best math work leading to the correct solution for the model equation will not help the organization, as it will be the solution for some other problem. You may recall the phenomenon of *groupthink*, or the human tendency to agree with someone (especially someone with greater relative power such as a supervisor), without voicing one's own reservations about the other person's point of view. Groupthink may very well be a contributing factor to the organization's failure to recognize the actual problem. Perhaps no one dared to challenge the supervisor's (or influential peer's) conclusion of the nature of the problem.

Sometimes, not all possible alternatives are listed. Among several staff members writing late into the night, the idea of "this is good enough" may conclude the late hour's effort for them, but could leave a feasible alternative not identified to be considered at a later time. Watch out for the seasoned staff members who advise newer colleagues that "three alternatives are enough" or slant the list and subsequent work in favor of one alterative that "the boss really wants anyway." This is decision-making, but not good decision-making based on science. Slanting the steps is no better than the boss making a decision from a gut feeling.

A mistake in the payoff/profit table can be an issue. Sometimes, it pays to have a colleague play the role of the verifier of all steps—remaining true to the procedure can ensure the right solution is eventually reached.

The wrong mathematical decision theory model for the problem at hand may be selected. A team or staff member making the selection needs to know the models and how they are used. An apprentice system for decision-making may be a fitting idea. This way, a staff member works with more experienced analysts and, over time, learns how to make the steps work.

Finally, the solution may be wrong. As you can see, the first thing many students think of that could go wrong in decision-making analysis is actually the last hazard in the series of steps. Practicing with problems and learning from each experience builds confidence and diminishes the chance of a math error leading to a faulty analysis. Much can go wrong in a decision analysis before the math is ever conducted on an equation.

As mentioned in many of these units, leadership is the key to making decision analysis respected as a productive and effective process in an organization. Analysts must earn the trust of leaders with efficient work. Leaders must trust their staffs and supporting literature that reflects the merits of the science of decision analysis.

As noted in the textbook from chapter to chapter, analysts have a specialized job to do but also must feel invested in the leader's—and therefore the organization's—situations. A "drop off the numbers and leave" approach on the part of the analysts may result in leaders being skeptical of the analysis, and the analysts' work may be considered no better than making a "gut decision." Conversely, leaders have to trust that their personal judgment is not magic and that decision analysis is a proven method for determining and achieving success and increasing profits.