

## **The Anatomy of a Decision**

Decision making is complex. It involves knowledge of the factors that will impact and be impacted by the decision. It involves organized thought. It involves repression of biases, overconfidence, and other impediments that will influence the decision. It involves collaboration with other members of the management team having expertise that will be crucial to the decision.

The process itself will give rise to insights not heretofore considered.

The process, if done well, will silence the loudest voice in the room and lead to a carefully thought out decision.

## **Better Information Yields Better Decisions With WinDecisions™**

Every CEO loves it when they make a great decision and everyone is happy and the money rolls in. Let us eavesdrop on two hypothetical CEO's as they discuss some great decisions they made and what they learned about what they did to produce those successes.



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Bill and Jim are two CEO's and, together, they are about to leave for a Board Meeting of a third company on whose Board they both serve.,

"I read about that decision you made the other day wherein you rejected the idea of acquiring that small company in which you originally had interest," said Bill. "Can you share any of your thoughts as to how you arrived at that decision?"

"There was a lot of public information that my team had uncovered that had not been covered in the press. This company had some EEOC issues that were likely to come to a head soon and, from our analysis, they were being adversely impacted by the tariffs, recently enacted by Washington, on steel imported from Mexico," replied Jim. "Additionally, as part of our analysis, we utilized some very powerful decision enhancement tools that are not part of the mainstream, but definitely should be."

Bill was now intrigued. "Can you tell me more about those tools, Jim? We've made some bad decisions in recent months which clearly could have benefitted from such tools. I'm sure that some of our bad

decisions were based on listening to the loudest voice in the room, overconfidence on the part of the analytical team, management bias and other impediments. How could we have avoided these and made better decisions?"

Where did Bill's decision process go astray? What was the goal to be achieved by their decision? Was the decision-making process organized? Were all the factors (also known as strengths, weaknesses, opportunities and threats) considered? Were all the alternative courses of action considered? Did they role play how the competition would respond to their decision? Did they carefully evaluate the weightings that they assigned to each of the factors in terms of how important they were? Notwithstanding that the process resulted in a poor decision, did they gain any insights?

### **Jim's approach to decision making and the tools he utilizes**

A commonly accepted dictionary definition of a decision is "A conclusion or resolution reached after consideration." There are many aspects to the items to be considered in reaching a decision. Let's examine in detail the anatomy of a decision!

First, it is important that you understand who you are and the role you play in the decision. Then, you must articulate the goal to be accomplished. Initially you must also describe the choices that you are considering. Finally, you must consider the facts and factors that will impact the decision to be made. These are the key inputs to WinDecisions™, a revolutionary application that will take those inputs and, utilizing AI and Bayesian analysis, will provide a metric so that choices may be compared.

1. **Role** – Are you the CEO, the Marketing head, a line Manager? Where you are in the organization has a strong bearing on the factors that you will consider in making the decision. What are your emotions, motivations and fears with respect to that decision?
2. **Goal** – What is the overall goal or purpose of the decision?
3. **Alternatives** – What are the options or alternatives for achieving the goal? Initially, the choice may be between two alternatives. However, as more information comes to light, there may well be more alternatives to consider. You may also think of these as your opportunities.
4. **Facts and Factors** – What are the criteria for the decision? These are your strengths, weaknesses, and threats and your evaluation of how important they are to the decision expressed as a weight with a range of low to high.

Essentially decision-making is a problem in probabilities. The result of weighing all of the factors and considering the strengths and weaknesses with respect to those factors will likely result in producing a decision that has the greatest chance of success.

In evaluating those factors, you may find that you are quite strong in one factor which may lead you to a certain conclusion. However, you also may discover that you are quite weak in a related factor that would nullify your initial conclusion. How then do you make sense of your strengths, weaknesses and threats in making the best possible decision?

More than 250 years ago, the Reverend Thomas Bayes first provided an equation that allows new evidence to update beliefs in his *An Essay towards solving a Problem in the Doctrine of Chances* (1763).

**Bayes' theorem** describes the probability of an event, based on prior knowledge of conditions that might be related to the event. For example, if dementia is related to age, then, using Bayes' theorem, a person's age can be used to more accurately assess the probability that they have dementia, compared to the assessment of the probability of dementia made without knowledge of the person's age.

A consequence of the Bayes' theorem is Bayesian inference, a particular approach to statistical inference. When applied, the probabilities involved in Bayes' theorem may have different probability interpretations. With the Bayesian probability interpretation the theorem expresses how a subjective degree of belief should rationally change to account for availability of related evidence. Bayesian inference is fundamental to Bayesian statistics.

Bayes' theorem was further developed by Pierre-Simon Laplace, who first published the modern formulation in his 1812 "Théorie analytique des probabilités". Sir Harold Jeffreys put Bayes' algorithm and Laplace's formulation on an axiomatic basis. Jeffreys wrote that Bayes' theorem "is to the theory of probability what the Pythagorean theorem is to geometry".

Fast forwarding to the 21<sup>st</sup> century, thanks to the efforts of Professor Emeritus Willard Zangwill, University of Chicago Booth School of Business, Jim utilized WinDecisions™, software which incorporates the Bayes algorithm and which is now commercially available. ***It enables superior decision-making capability, identifies over confidence and other biases, provides a metric to compare alternatives, and, perhaps most importantly, provides new insights in reaching the decision.***

With this software Jim was able to get better information and data and use artificial intelligence and Bayesian methods to extract and interpret that data. Data and information that can be obtained includes:

- The probability that a decision will be successful. This is critical information which is not available with usual methodology and is highly helpful.
- The possibility of hidden risks. It is very important to identify potential risks.
- The chance of a surprise or of missing important possibilities. You don't want to be surprised.
- The financial value of the decision which may be obtained by using a "comparables" approach.

Over 100 templates are available that help you get started and save time. Templates also help you not miss considerations. Usually a template covers at least 80% of the relevant factors leaving roughly 20% that are unique to the specific situation.

Recently enacted tariffs by the current administration have had dramatic negative effects on companies in the United States. We will look at how a Bayesian approach to decision making might have saved at least one company from the devastating effects of the tariffs.

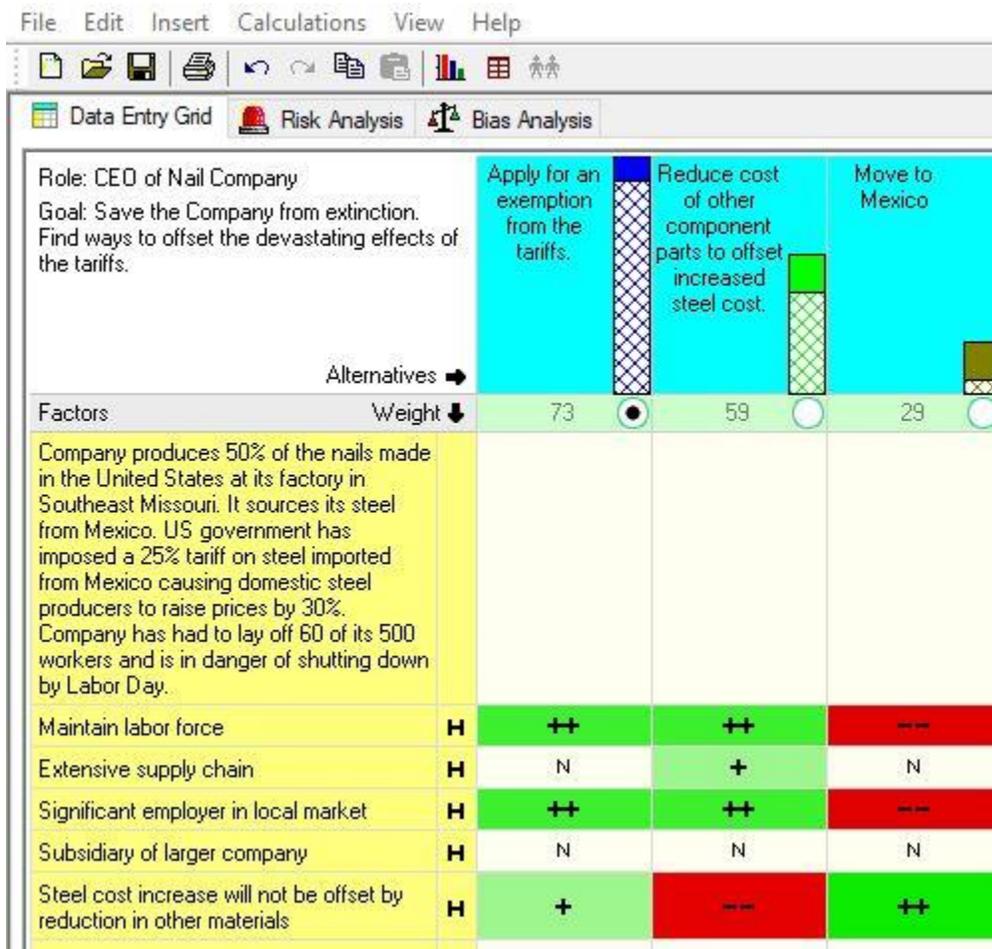
A company in Southeast Missouri produces 50% of the nails made in the United States at its factory. It sources its steel from Mexico. The imposition of a 25% tariff on steel and aluminum imported from Mexico caused it to raise their prices by 25% which promptly resulted in orders for nails plunging by 50%. Domestic steel producers raised their prices by 30% (because they could) which essentially eliminated domestic steel as a viable alternative. The company laid off 60 of its 500 workers and is in danger of shutting production by Labor Day if it is not granted an exemption from the tariff. About 21,000 US companies have filed for tariff exclusions.

Suppose the executive team at this company had access to the Bayesian tool described earlier. It might have decided to look at three alternative scenarios to combat the increased steel cost:

- 1) Apply for an exemption to the tariffs
- 2) Offset the increased steel cost with reductions in other material components
- 3) Move to Mexico

Which of these alternative courses of action has the greatest likelihood of success? Are there, perhaps, other alternatives which the executive team might have overlooked as they explore the best decision in a very methodical way.

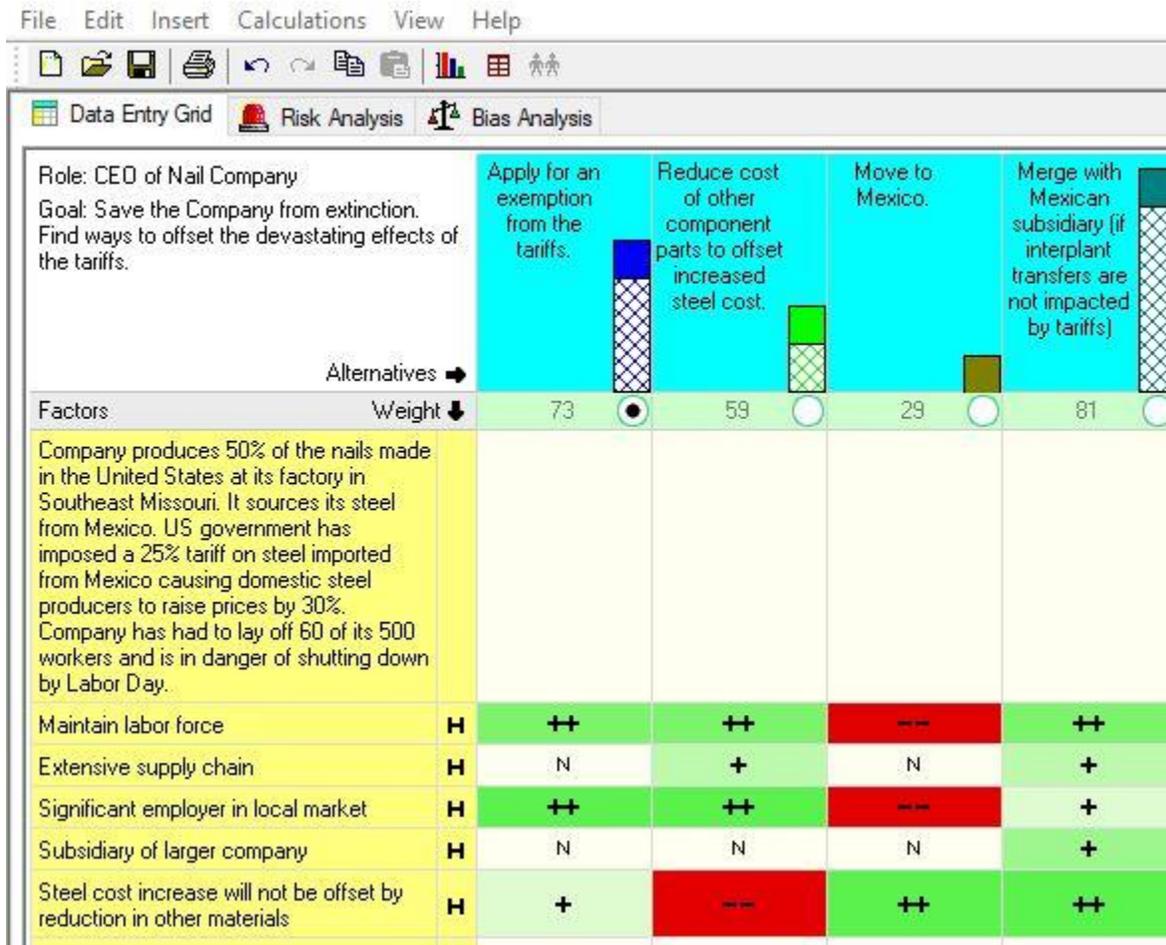
After applying management’s assessment of the factors involved in the decision as to which alternative to pursue and their importance (weightings) to the company as well as their assessment as to the company’s strength or weakness of each factor against each alternative, the grid looks like this:



Note the strengths and weaknesses are expressed as a range from ++ to -- (which could also be interpreted as a scale of 1 to 5.)

Note further that the Bayes algorithm suggests that the alternative with the highest probability of success (73) is to Apply for an Exemption.

The executive team then comes up with another idea. They don't know whether it is feasible, but they want to examine its potential effect. The other idea is to form a Mexican subsidiary and its shipments of steel would represent an interplant transfer which might not be subject to the tariff. The grid now looks like this:



Note now that the Bayes algorithm suggests that the idea of forming a Mexican subsidiary such that its shipment of steel would represent an interplant transfer would have a higher probability of success (81) than the previous case.

Note the heat map being generated on the grid indicating those factors having the strongest positive or negative impact. What is not shown above, but is available in the software, are the impacts of bias in the decision.

Note further that they could consider other alternatives to evaluate their effects. For example, what might collaboration with either customers, suppliers or both have on their ability to alleviate the effects of the tariffs.

The use of mathematical tools as part of a company's analytical approach to decision making and problem solving must not be overlooked. In many instances, it will silence the loudest voice in the room

or at least cause further self-inspection and provide greater insights before reaching a conclusion. And, of course, with better information, you arrive at better decisions.

**If you are interested in WinDecisions™ or other Decision Support Tools, please contact Bill Zangwill at ([Willard.Zangwill@chicagobooth.edu](mailto:Willard.Zangwill@chicagobooth.edu)) or Jerry Scherer at ([januerry@comcast.net](mailto:januerry@comcast.net)).**