TOOLS AND ANALYTICAL

FRAMEWORK TO MAKE DECISIONS

IN TURBULENT TIMES

by

Maud Roucan-Kane, Michael Boehlje,
Allan Gray, and Jay Akridge

Working Paper #09-17

December 2009

Dept. of Agricultural Economics

Purdue University

TOOLS AND ANALYTICAL FRAMEWORK TO MAKE DECISIONS IN TURBULENT TIMES

by
Maud Roucan-Kane, Michael Boehlje, Allan Gray, and Jay Akridge
Dept. of Agricultural Economics, Purdue University
West Lafayette, Indiana 47907-2056
mroucan@purdue.edu; boehljem@purdue.edu; gray@purdue.edu; akridge@purdue.edu
Working Paper #09-17
December 2009

Abstract

The dramatic changes occurring throughout the agriculture industry are creating an increasingly turbulent business climate for the sector. The objective of this paper is to present a methodology to understand, assess, evaluate, and manage uncertainty. Five methods are discussed: scenario analysis, scorecarding and heat mapping, payoff matrix, decision tree, and options portfolio mapping. Scenario analysis can help identify the alternative futures that may unfold. Scorecarding and heat mapping assessment tools can be used to assess and map the uncertainties, and decide which uncertainties the company should capitalize on and which projects could be pursued to exploit those uncertainties. Payoff matrices and decision trees (using real option valuation) analysis tools can then help make a decision on which project to pursue. Finally, these projects cannot be evaluated in a vacuum. Mapping the portfolio of projects is necessary to make sure the company diversifies the risk. This paper includes an illustration of the methodology by applying the tools to a real life example that has been tested in several executive agribusiness educational workshops. A list of psychological traps to avoid and be mindful of when making decisions in an uncertain environment is also discussed.

Keywords: uncertainty, risk, heat mapping, scorecarding, scenario analysis, payoff matrix, decision tree, real option, traps

JEL Codes: D81

Tools and Analytical Framework to Make Decisions in Turbulent Times

Maud Roucan-Kane, Mike Boehlje, Allan Gray, Jay Akridge

The changing food and agribusiness landscape (disease and food safety crises, and changes in government policy) is creating new risks. Strategic risks, those typically unforeseen, are now higher on the radar screen. Managing these risks or uncertainties requires assessment tools and decision frameworks. This paper provides some tools (scenario analysis, scorecarding and heat mapping, payoff matrix, decision tree, and options portfolio mapping) organized around an analytical framework for agribusinesses to make quick decisions in situations where uncertainty is a given and the company has access to a limited amount of information.

Scenario analysis can help identify the alternative futures that may unfold. Scorecarding and heat mapping assessment tools are presented as a tool to assess and map the uncertainties, and decide which uncertainties the company should capitalize on and which projects could be pursued to exploit those uncertainties. Payoff matrices and decision trees (using real option valuation) analysis tools assist in deciding which project(s) to pursue. Finally, these projects cannot be evaluated in a vacuum. Mapping the portfolio of projects is necessary to make sure the company diversifies the risk. In this paper, all these tools are accompanied by an illustration using a real situation[1]: a cooperative having to decide whether or not to invest in the ethanol boom.

Many authors have studied the selection of projects under uncertainty. Hammond et al. (1999), in Smart Choices do not focus exclusively on uncertainty, they do, however, offer a systematic approach to making the right choice. Raynor (2007) proposes the use of scenario planning and

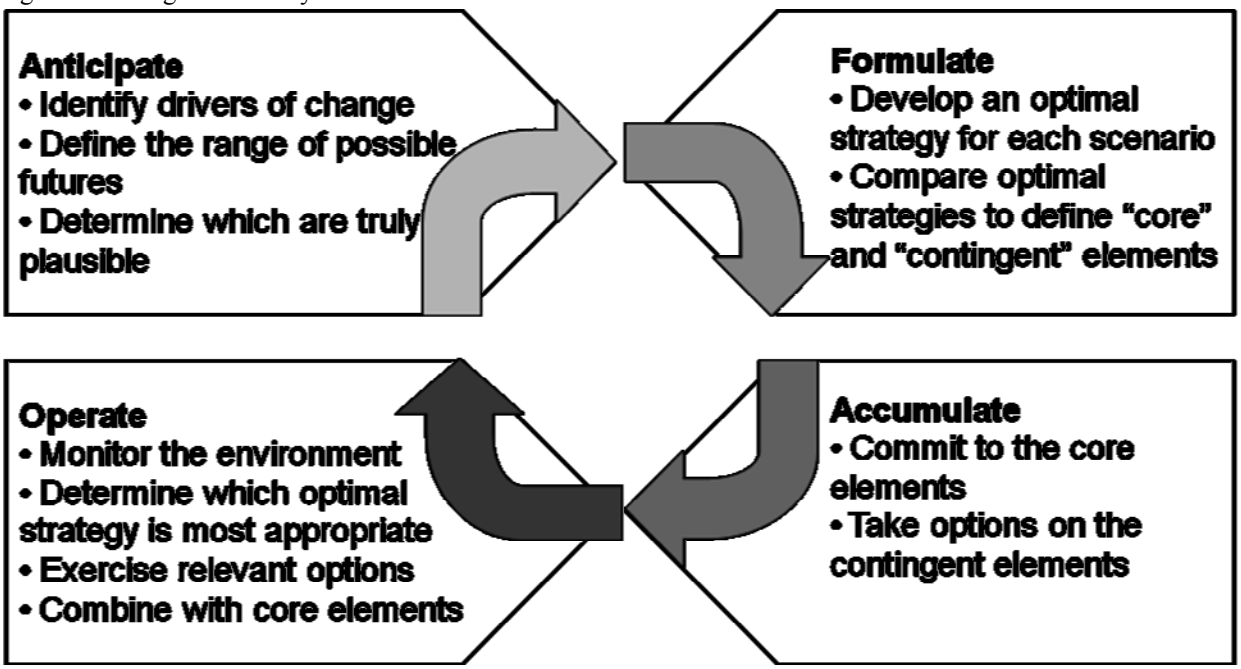
[1] The case study and teaching notes are available upon request to the authors.

real options to develop strategic flexibility. Raynor uses examples from companies such as Johnson & Johnson, Microsoft, Bell Canada Enterprises, Sony, and Vivendi to show how these companies have successfully used strategic flexibility. Detre et al. (2006) present a mental model to assess strategic uncertainty from a potential and exposure perspective. Scorecarding and heat mapping assessment tools are used to operationalize the mental model. They apply the framework to three hypothetical seed companies. Boehlje et al. (2005) have discussed scorecarding, heat mapping, decision trees, and real option. This paper builds on Detre et al.'s and Boehlje et al.'s by including their decision tools in an encompassing analytical framework and illustrating the use of this framework in strategic decisions.

Raynor's mental model is a useful framework to structure this discussion of strategic decision making in an uncertain environment. Raynor, in his book The Strategy Paradox, shows that for companies to succeed in an unpredictable future, they must develop practical strategies based on multiple choices that respond to the requirements of different possible futures rather than on a single strategic commitment. To do this, Raynor suggests that the key to such decisions is strategic flexibility, and the decision process involves the steps of anticipate, formulate, accumulate, and operate (see Figure 1). Anticipation involves identifying the drivers of change or the forces that are shaping the future, identifying the range of possible futures and deciding which futures are plausible or have the highest chances of actually occurring. The formulation step includes developing an optimal strategy for each scenario and identifying the "core" or common elements and the "contingent" or unique elements of these strategies. The accumulation step includes the decision to commit to the core elements of a strategy and take options on the

contingent elements. Finally, the operations step is one of implementation and monitoring the strategic choices including exercising appropriate options.

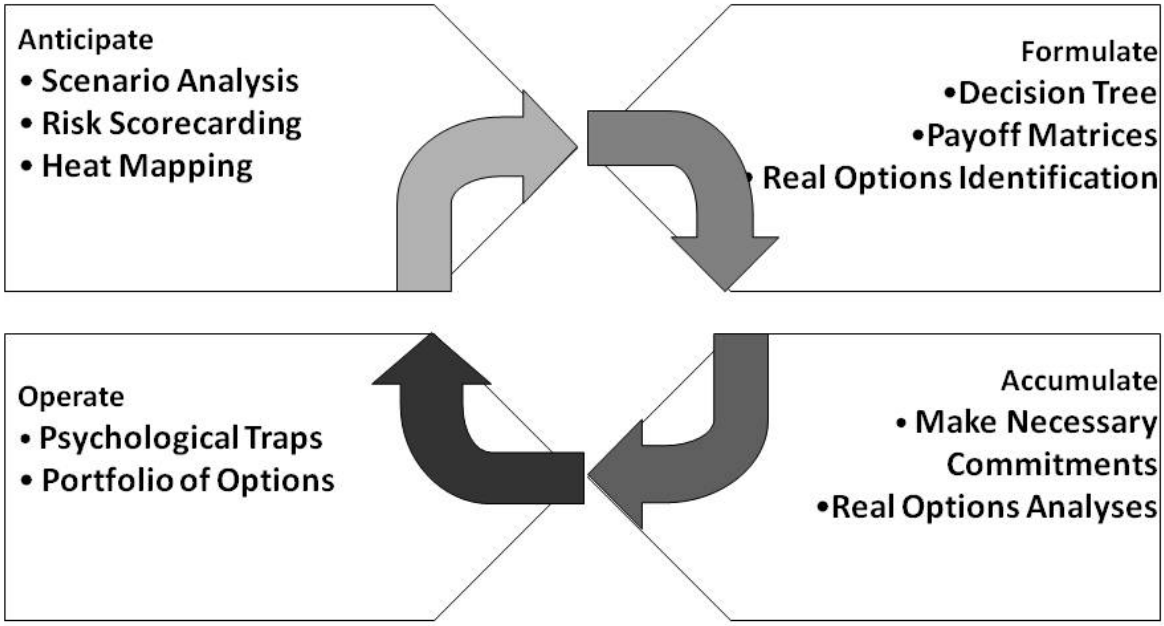
Figure 1. Strategic Flexibility



Source: Raynor (2007)

To apply Raynor's four steps, we propose a series of tools available in Figure 2. Our discussion of the tools will follow. For example, the tools used in the anticipation step are scenario analysis, risk scorecarding, and heat mapping. The decision tools for formulation are decision trees, payoff matrices and real options thinking. For the accumulation step, the tools used are making commitments and a more complete and comprehensive real options analysis. Finally, the tools useful for the operations step include psychological traps and structuring a portfolio of options.

Figure 2. Strategic Flexibility/Tools for Decision Making



Source: Adapted from Raynor (2007)

The methodology and tools presented here have been tested and used in executive education courses. Students/participants are challenged to conduct an analysis of the strategic issues and key uncertainties facing a company, Excel. Excel is a cooperative having to decide whether or not to invest in the ethanol boom. Using scenario analysis, the students are challenged to determine how the uncertainties may unfold. Building on this analysis, decision-makers score and map the uncertainties, and decide which uncertainties to capitalize on and which projects could be pursued to exploit those uncertainties. As a follow-up to the scenario analysis, payoff matrices are suggested as a tool for students to determine the decision Excel should make. Students are then challenged to use the results of the payoff matrices to draw a decision tree for Excel. Students are then taught about real options and asked to alter their decision tree using a

real option such as a growth or delay option. Finally, students are asked to apply the concept of portfolio mapping by mapping the different projects Excel should pursue.

Illustration

Excel Cooperative is a mid-sized, 'local', farmer-owned cooperative serving farmers in north central Indiana. The diversified organization sells crop inputs and provides a range of agronomic services; sells and delivers energy inputs (diesel fuel, gasoline, etc.); manufactures feed and has a pork production business; and stores and markets grain. The well-run cooperative has been profitable and enjoys a very large market share in its primary geographic market.

Excel Cooperative is located in one of Indiana's most productive corn growing regions. Hence, it is a hotbed of ethanol activity. Four plants are operating, under construction, or planned, and the announcement of the fifth plant is expected any day. The massive expansion in corn processing capacity affects each of Excel's four divisions: Agronomy, Energy, Grain, and Feed and Livestock.

Agronomy Division

The Agronomy Division of Excel Co-op has three branches that offer a complete line of crop production inputs to area growers: herbicides, insecticides, fungicides; custom application of liquid and dry fertilizers and chemicals; soil sampling; and corn, soybean, wheat, and legume seeds. Precision or site specific services such as soil sampling with GIS and variable rate application (VRT) of fertilizer and lime are offered by Excel. Excel is still evaluating their overall approach to precision services, hence revenue and profit contributions from precision services. Excel sales of plant nutrients have been relatively steady in recent years. Crop protection chemical volumes and margins have declined due in part to biotechnology advances

and seed varieties with 'input traits' which require lower levels of (and lower cost) pesticides and herbicides. Custom application revenues have held up. Looking longer term, the additional corn acres driven by growth in biofuel production could be a real boost for Excel's agronomy business. In fiscal 2006, Agronomy Division sales were $16.9 million, accounting for 19% of total Excel sales and 10% of the cooperative's net operating income. Although, competition in the Excel market is intense, Excel is the market leader in one of its counties with a market share of 50%.

Energy Division

The Energy Division offers several locations with farm and home delivery of diesel fuel, LP gas, and gasoline. For fiscal 2006, the Energy Division's sales were $24.6 million, 28% of total Excel sales. Net operating income from the Energy Division represented 30% of the total in fiscal 2006. Excel holds more than 80% of the market in liquid fuels for on-farm use in its trade territory, and has very strong presence in bulk commercial fuels.

Grain Division

Excel owns a total 4.9 million bushels of grain storage over several locations and is currently adding another 700,000 bushel storage facility. Excel also has capacity to ship rail car loads. In total, Excel markets between 10 and 11 million bushels of grain each year – about 2.0 to 2.5 million bushels of soybeans, and the rest corn. In fiscal 2006, grain accounted for 35% of the cooperative's sales volume and 23% of its net operating income. Currently, most of its grain is shipped to the states of North and South Carolina and Georgia in 65 car trains, where it is primarily used as hog and poultry feed. The other major market is Lafayette, Indiana for the two

Tate & Lyle corn processing plants. Excel Co-op has two large competitors and several smaller ones that compete for grain in their market territory.

Feed and Livestock Division

Excel Co-op works with individual pork producers in the contract production of hogs, producing 75,000 hogs annually. In addition, Excel mills produce feed for another 125,000 hogs. The cooperative has two contract nursery sites and numerous contract finishing facilities. Excel makes about 60,000 tons of feed annually through its two mills. While growth has slowed, the pork production business does continue to expand in the Excel trade area as integrators look for low cost sources of corn, and low transportation costs to the two large pork processing facilities at proximity. Excel's biggest competitor hogs all over Northern Indiana and feeds a total of about 200,000 hogs annually. In addition, there are two farmer/integrators that have feed milling capacity and feed about 125,000 hogs annually. In total, there are at least 650,000 hogs in the area.

Analytical Framework/Tools

A set of concepts and tools are useful in assessing uncertainties and making decisions in turbulent times.

- Scnerario analysis
- Risk scorecarding/heat mapping
- Payoff matrices
- Decision trees
- Real options valuation (time delay)

- Options portfolio mapping
- Psychological or decision traps

1. Scenario Analysis

Scenario analysis consists of analyzing different scenarios of the future based on the uncertainty, i.e., "future-now" thinking. It came into prominence in the 1970s when used to help Royal Dutch/Shell anticipate the future of the oil industry. The scenarios are specially constructed stories about the future. Usually and preferably, scenarios come in sets – most often groups of three or four- each one modeling a distinct and plausible future world, rather than one likely end-state. They each determine a plausible path the present may take, with one event following another as a necessary consequence (Raynor, 2007; Schoemaker, 1995; Schnaars and Ziamou, 2001; Hammond et al., 1999; Wilkinson; Bristow, 1990).

Scenario analysis is a seven step decision aid process (Raynor, 2007; Schoemaker, 1995; Schnaars and Ziamou, 2001; Hammond et al., 1999; Wilkinson; Bristow, 1990):

1) Define the Problem/Issue

Defining the issue or problem is best accomplished by considering the following dimensions:

   a. What are the goals/objectives/criteria in the decision?
   b. Specific product markets, geographic areas and technologies need to be determined
   c. The time frame to look at depends on the rate of technological change, product life cycles, elections, competitors' planning horizons and so forth
   d. What knowledge would be of greatest value (look at the past)?

2) Identify the Dimensions of Uncertainty

Several dimensions can be looked at: business/operation uncertainty, financial uncertainty, market uncertainty, technological uncertainty, business relationship uncertainty, policy/regulatory uncertainty. Once all the uncertainties have been listed, the key uncertainties must be identified; scorecarding and heat mapping, as will be discussed shortly, assists with this process. The key uncertainties are the ones that are the most crucial to the outcome of any decision. Finally, relationships among these key uncertainties have to be recognized.

3) Determine the Limits of Uncertainty

Students need to define the boundaries of plausible outcomes for these dimensions: high/low, fast/slow, intense/weak, etc. It is often helpful to be somewhat explicit. For example, will a regulatory approval for a new plant take 6 months or two years?

4) Construct Scenario Sets

There are three different ways to construct the scenarios:

a. Intuitively: find some major themes and story lines to organize the elements
b. Heuristically: select the two most important uncertainties and place them in a matrix
c. Statistically: combine the outcomes of all the key uncertainties into internally consistent strings to provide feasible boundaries

Once the scenarios are written, they need to be given a name, the assumptions need to be stated clearly, and an optimal decision needs to be found for each scenario. Finally, a check for consistency and plausibility needs to be performed. There are three questions to test for internal consistency: 1) Are the trends compatible within the chosen time frame? 2) Do the scenarios combine outcomes of uncertainties that indeed go together? 3) Are the major stakeholders placed in positions they do not like and can change?

5) Identify Potential Strategies

Potential strategies that should be considered and may be implemented depending on which scenario may play out should be identified as a form of contingency planning. A concerted effort should be made to identify a strategy or strategies that are common to all scenarios – these strategies have the potential to be implemented more quickly because they are not dependent on the resolution of the uncertainties and can be easily adjusted over time to be more specifically tailored to the scenario that is becoming more likely to occur as more information becomes available. Strategies that are unique or specific to a particular scenario should be identified and logged so that they can be more readily implemented as the uncertainty is resolved and a particular scenario becomes more likely.

6) Determine the Relative Probabilities

In most cases, the relative probabilities of each scenario are not obvious and in fact they are frequently equally likely to occur. In fact, if there is a high probability that one might occur, it is possible that the most important sources of uncertainty have not been identified. As will be discussed later, over time and with additional information, some of the uncertainties will be resolved, and a critical later step is to identify the forces and early indicators that should be monitored to update these probabilities.

7) Track Unfolding Futures

Identifying and monitoring the potential forces and events that will provide early indicators of which scenario might be playing out is critical to making sure the appropriate strategy is implemented in a timely fashion. A procedure for systematically tracking these indicators is essential to scenario planning and should be put in place early in the planning process. The

driving forces used to identify the scenarios in step 2 should help identify the indicators that should be monitored.

Scenarios are not predictions but sets of logically derived connected futures. Scenario analysis is a process designed to identify robust actions to take today and key early warning signals of critical changes. Scenarios help executives understand the uncertainties that lie before us, "rehearse" their response to those possible futures, and help them spot the scenario that unfolds early thanks to the warning signs.

We will apply the scenario analysis tool to the Excel case shortly. But to more accurately and easily do so, the tools of risk scorecarding and heat mapping will be introduced as procedures that can be used to identify and focus on the most important risks to consider in the identification of scenarios.

2. Risk Scorecarding/Heat Mapping

The approach is to present a mental model that frames assessment of uncertainty from both a potential and an exposure perspective. Scorecarding consists of taking qualitative discussions about strategic uncertainty and turning these discussions into quantitative rankings. Heat mapping, a process of taking the rankings from scorecarding utilizing both colors/symbols and generic strategies to communicate the impact of the uncertainty on the business, are assessment tools which operationalize the mental model. In essence, the mental model is designed to promote and generate discussion around key areas of uncertainty through a systematic

framework that directs the firm in selecting an appropriate uncertainty management strategy (Detre et al., 2006).

The first step in assessing uncertainty requires an understanding of the sources of strategic uncertainty. The second step consists of scoring the uncertainties. One could argue that Excel's agronomy division faces at least four uncertainties. The division has recently introduced precision services. The adoption of precision service is uncertain: is the market ready for precision services? How big of a market does it represent? The demand facing the products of the agronomy division in general is uncertain depending on how long the current biofuel/ethanol trend will last and how big of an influence it will have on number of corn versus soybean acres. The ethanol trend will be heavily influenced by the biofuel policy: will the policy and the subsidies be favorable to ethanol or not? Demand for agronomy division products and services will also depend on how competitors respond to the potential change in demand: will they expand as well, will they quit the business, or will they maintain their size? Finally, as the future unfolds, there is some uncertainty on how much synergy the agronomy division can create with the other division of Excel.

Risk and uncertainties can be assessed on three dimensions: potential, exposure, and the likelihood of each. "Potential" is the opportunity that the firm can capture if it takes the risk. If the outcomes of the risk are favorable, the benefits may be a new market, more loyal customers, etc. "Exposure" represents the downside loss if the outcomes of the risk are unfavorable. This may be represented by losses in sales because of lost customers, a tarnished image, as well as financial losses. "Likelihood" is the probability of seeing the potential of the exposure event happening (Detre et al., 2006).

Most of the time companies emphasize exposure management. The inclusion of potential is important in the sense that it affects project prioritization in assessing and managing the uncertainty. When only looking at the exposure measure decision-makers are likely to want to avoid some uncertainties at all cost, but with the inclusion of the potential then it is clear that taking risk can be rewarded. Examples of potentials and exposures for strategic uncertainties can be found in Detre et al. (2006).

The potential, the likelihood of the potential, the exposure, and the likelihood of the exposure can be scored on a scale of 1 to 5. A 1 indicates that the risk is low, unimportant, has minimal impact, or is highly unlikely. A 5 implies that the risk is high, important, has large impact, or is highly likely. Decision-makers are encouraged to have a team involved in the scoring. Each of the team members should individually score the uncertainty. A team discussion should then take place to build a consensus on the score (Detre et al., 2006). Tables 2 and 3 present a set of suggested categories of uncertainty and scores for the potential and exposure of Excel's agronomy division.

Table 1. Excel's Agronomy Division Strategic Uncertainty Assessment Scorecard Potential

Categories of Uncertainty	*Potential*		*Likelihood*	
	Score	Explanation	Score	Explanation
Technology -- Adoption of Precision Services	4	Precision services are high margin products and could generate significant profits if the demand is significant	3	High likelihood that there will be a demand for precision products, Low likelihood that the demand will be huge
Policy/Regulatory -- Direction of Biofuel Policy	4	If the biofuel policy is favorable to ethanol, the demand for agronomic products will increase	5	Extremely likely that the demand for biofuel will be favorable

Market Conditions -- Competitor Response	2	Even if competitors do not expand, Excel does not have great products that will satisfy the demand	1	Highly unlikely that Excel would become a leader or competitive player
Financial/Operational -- Synergies Across Divisions	2	Not much synergy with the other Excel divisions even if there is an ethanol boom	3	Not too likely that good synergies could be developed with the other divisions

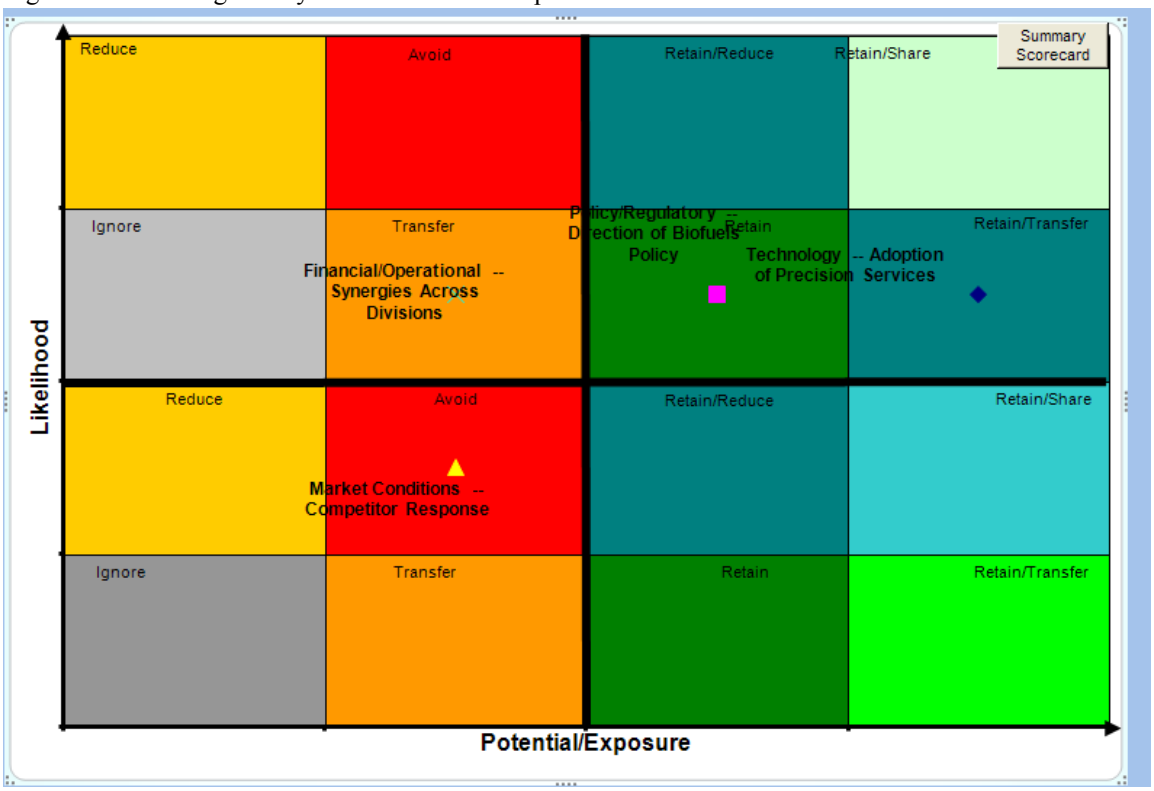
Table 2. Excel's Agronomy Division Strategic Uncertainty Assessment Scorecard Exposure

Categories of Uncertainty	*Exposure*		*Likelihood*	
	Score	Explanation	Score	Explanation
Technology -- Adoption of Precision Services	3	Excel has not invested too much in precision products so the loss would not be too significant	1	Extremely unlikely that there will not be some demand for precision products
Policy/Regulatory -- Direction of Biofuel Policy	2	Excel has not yet invested in ethanol so the loss would not be too significant	1	Extremely unlikely that there will not be some policy favorable to ethanol
Market Conditions -- Competitor Response	4	A significant competitor response could take all of Excel Business away	4	Extremely likely that there will be a competitive response. The potential reward for ethanol is too big to be passed on
Financial/Operational -- Synergies Across Divisions	4	Big synergies with other divisions in terms of customers. The agronomy is not too competitive but provide convenience to customers with a one stop.	2	Extremely unlikely that the cooperative system would spin-off one of its divisions

Using the scoring of the uncertainty, a generic strategy can be selected. Figure 3 contains Excel's agronomy division's heat map with one or more of six generic strategies for managing the uncertainty identified for each of the 16 quadrants. The generic strategies are capitalize, share, transfer, reduce, avoid, and monitor the uncertainty. These generic strategies serve as a filter for concentrating the firm's effort on choosing a specific action or set of actions to manage the

uncertainty -- to simultaneously capture the potential and mitigate the exposure (Detre et al., 2006).

Figure 3: Excel's Agronomy Division Action Graph



From the standpoint of the uncertainty in competitor response and in synergies across divisions, the action graph would suggest for Excel to avoid the uncertainty, i.e., not continuing to operate the agronomy division. The decision is not as clear cut from the precision services standpoint: the uncertainty could be retained or transferred, i.e., the agronomy division could either be maintained or spinned off. Finally, the potential of a favorable biofuel policy suggests keeping the agronomy division. In conclusion, this mix suggests a joint venture with a current competitor to improve Excel's offerings and for Excel to reserve its option to possibly in the future expand activity in the precision service and biofuel markets.

A clear conclusion that we can draw from the action graph is that the great profit potential of an ethanol boom suggests that Excel should try to find some ways to potentially profit from it. While it is clear from the action graph that the agronomy division is not the right division to pursue this uncertainty, the grain division may be a great candidate.

Through the use of the scorecarding/heat mapping procedures, two critical uncertainties for the Excel grain division can be identified: 1)VeraSun does or does not build an ethanol plant, and 2) the Southeast grain market continues to source from the Eastern Cornbelt or instead sources from elsewhere. The resulting scenario matrix is summarized in Figure 4 and the best decision to implement under each scenario is presented in Figure 5. One scenario can be labeled "A River of Grain Flow" and includes VeraSun building the ethanol plant and the Southeast grain market continuing to source from Excel. This creates a large demand for grain, and requires Excel to obtain additional storage capacity, increase its grain supply, and be able to logistically manage a larger quantity of grain. If Excel can deal with those challenges and be successful, this would put Excel in a strong financial position. If VeraSun does not build its ethanol plant but the Southeast grain marketing continues as is, then it is "Business as Usual", which means that Excel is still struggling with acquiring enough grain for the feeders, having to compete with ethanol plants. The absence of the VeraSun's ethanol plant, would leave Excel time to spend more energy in solidifying its relationships with the Southeast feeders. If the Southeast market decided not to continue its business with Excel but the VeraSun's ethanol plant gets built, Excel has to "change its stripes". Long-term, more grain storage will be needed to satisfy VeraSun's growing needs for grain and Excel will likely need to reposition from turning its storage capacity frequently to a strategy with longer term storage, fewer turns and more local trucking/logistics services. Finally,

the worst case scenario for Excel is a combination of the absence of the VeraSun plant and the loss of business with the Southeast feeders. If this were to happen, Excel at least has the financial strength of having most of its capacity paid for but would still end up with low income and weak financial performance. For Excel to stay in business, new customers or other sources of income would have to be found as soon as possible.

Figure 4. Scenario Matrix for Excel

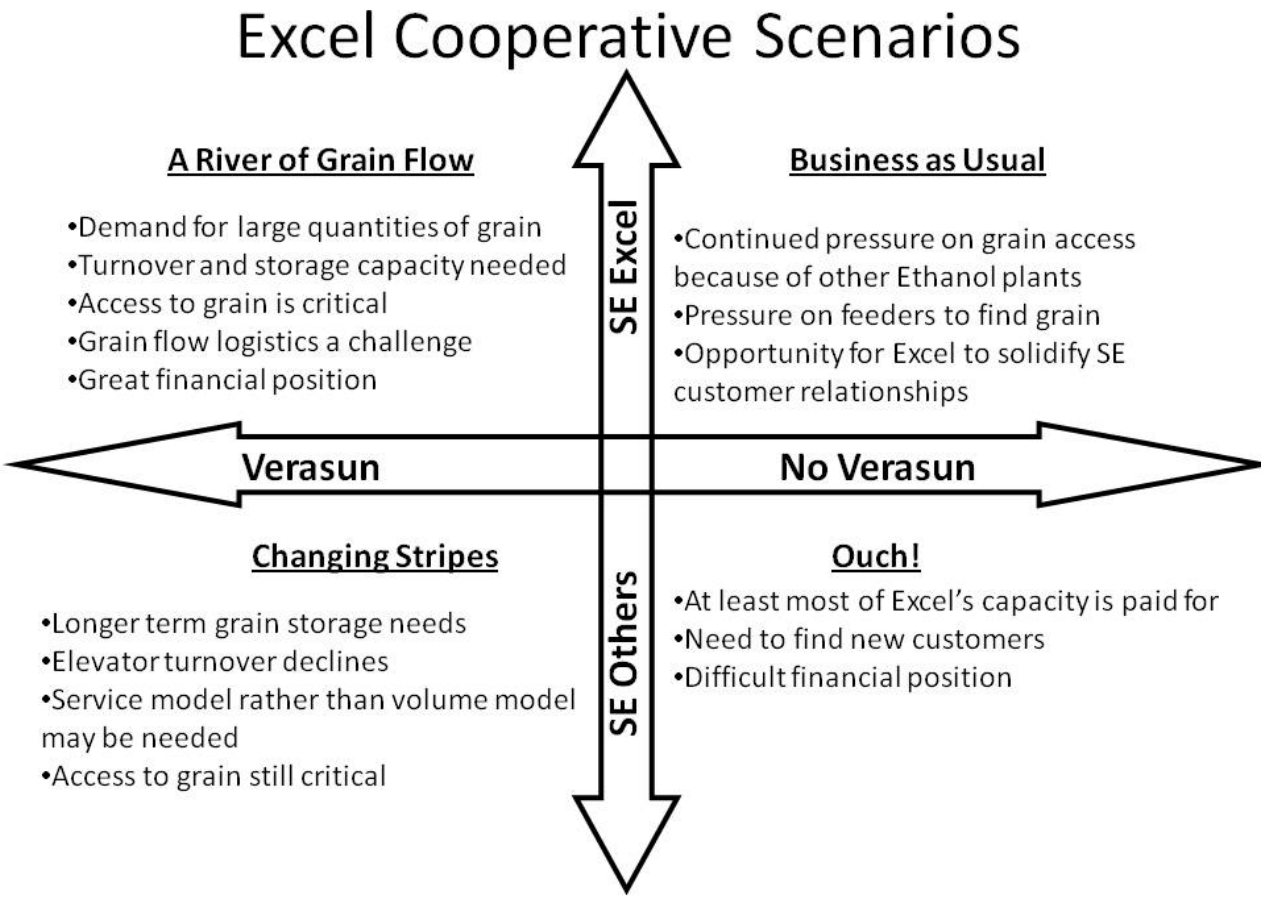
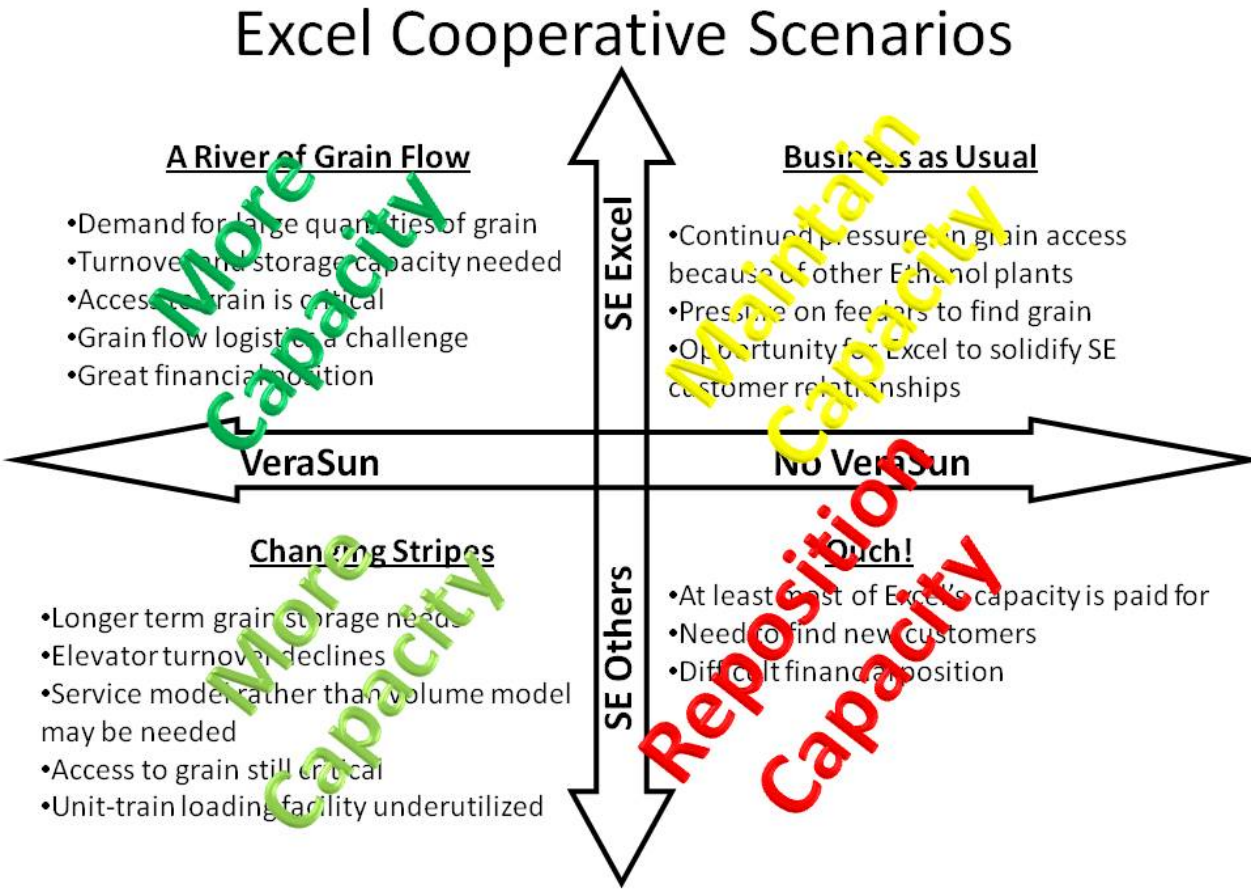


Figure 5. Excel's Best Decision under each Scenario



The strategy combinations are summarized in Table 1 with their associated probabilities and return (NPV)/loss. Let's call the first strategy combination "Acquiring grain more difficult". In this situation, Excel expands by investing $2.2 million in additional grain storage and handling capacity (700,000 bushels of additional grain storage at the South Reynolds plant) to take advantage of the ethanol demand. The market uncertainties are whether the VeraSun company will build the rumored plant (a 60% chance) and how the Southeast (SE) feeders will react. Here, the VeraSun plant is built and Excel supplies a good portion of the plant corn needs with its additional infrastructure. In addition, as a reaction to the VeraSun's plant's construction, the Southeast feeders find corn from other markets by aligning with and sourcing from Excel's

competitors (an 80% chance), and Excel has to compete aggressively to get the grain. According to the interview, in this case Excel could expect $0.192 million in returns.

A second possible strategy combination is called “Homerun”. Here, Excel also expands, VeraSun builds the rumored plant, but despite the construction of the VeraSun plant the Southeast feeders continue to procure most of their grain from Excel (this is less likely, i.e., a 20% chance). According to the interview, in this situation Excel could expect $2.7 million in returns.

A third possibility is called “Disaster”. Excel expands but the VeraSun plant (40%) is not built, and in spite of this, the Southeast feeders get their grain from Excel’s competitors (20%). According to the interview, in this case Excel could expect a $2.447 million loss.

A fourth possible strategy set is called “At least the Southeast feeders are still there”. Excel expands, the VeraSun plant is not built, but the southeast feeders continue to procure their grain from Excel (80%). According to the interview, in this situation Excel could expect a $0.324 million return.

A fifth possible strategy combination is called “Could be worse”. Excel does not expand, the VeraSun plant is built and Excel supplies to the plant, but the Southeast feeders aggressively drive margins down (50%). According to the interview, in this case Excel could expect a $0.115 million loss.

A sixth possible strategy set is called “Great if we don’t kill ourselves first”. Excel does not expand, the VeraSun plant is built and uses Excel as a supplier, and the Southeast feeders continue to source most of their grain from Excel (50%). According to the interview, in this situation Excel could expect a $2.079 million return.

A seventh possible possibility is called “Ouch”. Excel does not expand, the VeraSun plant is not built, and the Southeast feeders source their grain from Excel’s competitors. According to the interview, in this case Excel could expect a $1.963 million loss.

An eighth possible strategy combination is called “Depends on oil prices”. Excel does not expand, the VeraSun plant is not built, and the Southeast feeders continue to source most of their grain from Excel. According to the interview, in this situation Excel would at least breakeven, all being dependent on oil prices that will directly impact how competitive in price ethanol will be and therefore what the price of grain in Excel’s area will be.

Table 3. Summary of the Strategy Sets for Excel

Title	1st Decision	Event 1	Probability	Event 2	Probability	NPV ($1000's)
Acquiring grain more difficult	Expand Elevator	VeraSun	0.6	SE Others	0.8	192
Homerun	Expand Elevator	VeraSun	0.6	SE Excel	0.2	2700
Disaster	Expand Elevator	No Versasun	0.4	SE Others	0.2	-2447
At least SE feed still there	Expand Elevator	No Versasun	0.4	SE Excel	0.8	324
Could be worse	No Expansion	VeraSun	0.6	SE Others	0.5	-115
Great if we don't kill ourselves first	No Expansion	VeraSun	0.6	SE Excel	0.5	2079
Ouch	No Expansion	No Versasun	0.4	SE Others	0.5	-2425
Depends on Oil prices	No Expansion	No Versasun	0.4	SE Excel	0.5	0

Excel should closely monitor VeraSun, extensively communicate with the VeraSun’s executives and the Southeast feeders as these will obviously be the early indicators of which of the scenarios in Figures 4 and 5 will unfold. These actions will also continue to inform and update the probabilities in Table 3.

3. Payoff Matrices

The second step in Raynor's model is formulation which means creating optimal strategies for each scenarios. Payoff matrices initiate the implementation step by moving risk analysis further from a qualitative evaluation (scenario analysis) to a more explicit quantitative numerical assessment. Only the most likely scenarios should be carried out into a fully developed economic analysis that can be summarized into a payoff matrix. A payoff matrix is a table that summarizes the payoff associated with each decision and the realization of a specific event (see Table 4). The payoff values for Excel are calculated as the Net Present Value (present value of future revenue – expenses) of the decision given the realization of a specific event (Hammond, 1999; Brandenburger and Nalebuff, 1995).

Table 4. Payoff Matrix Template

	Event A	Event B
Alternative Decision A	*Payoff*	*Payoff*
Alternative Decision B	*Payoff*	*Payoff*
Alternative Decision C	*Payoff*	*Payoff*

Once the payoff matrix is created, a decision can be made. There are several ways to make the decision. The first three methods presented are non probabilistic methods. The maximax decision rule consists of selecting the alternative decision associated with the maximum payoff. It is an optimistic rule that does not take into account the potential loss associated with each decision. The maximin decision rule determines the minimum possible payoff for each decision and selects the alternative with the largest minimum payoff. The minimax regret decision rule involves the concept of regret or opportunity loss (or regret). It converts the payoff matrix into a

regret/opportunity loss matrix filled with opportunity loss values. For example, the opportunity loss (or regret) for alternative decision A equals the maximum payoff among all alternatives under one state of nature minus the payoff for alternative A. To apply this decision rule, one lists the maximum amount of regret for each alternative decision and chooses the decision with the smallest (or minimum) maximum regret (Hammond, 1999; Brandenburger and Nalebuff, 1995). A probabilistic method, the Expected Monetary Value (EMV), can also be used instead using Formula 1 (Hammond, 1999; Brandenburger and Nalebuff, 1995).

$$EMV = p_1 r_1 + p_2 r_2 + ... + p_j r_j \qquad \text{(Formula 1)}$$

r_j = Payoff for the given alternative under the j^{th} state of nature

p_j = Probability of state of nature j occurring

The probabilities (the p's in Formula 1) are between 0 and 1 for any given event, and the sum of the probabilities across events must sum to 1. Historical data can be gathered to compute the probabilities. An expert may help. If probabilities are unknown, one may use their best judgment, and then discusses the results with others to refine the estimate. Regardless of the method used to gather the probabilities, delays in the decision process should be used to continually search for information to refine the probabilities. Once an EMV has been computed for each alternative, one chooses the alternative with the largest EMV. A payoff matrix for Excel (based on the interview in the exhibit) is presented in Table 5.

Table 5. Example of Payoff Matrix for Excel[2]

	VeraSun		No VeraSun	
	SE Others	SE Excel	SE Others	SE Excel
Expand elevator	192	2700	-2447	324
Does not expand elevator	-115	2079	-1963	0

[2] The figures in the matrix are in thousands of dollars.

The maximum payoff is $2.7 million, so under the maximax decision rule Excel should decide to expand its elevator. The decision to expand the elevator has a minimum payoff of -2.447 million while the decision to not expand the elevator has a smaller loss of 1.963 million, so under the maximin decision rule Excel should decide not to expand its elevator. The regret/opportunity loss matrix for Excel is presented in Table 6.

Table 6. Regret/Opportunity Loss Matrix for Excel

	VeraSun		No VeraSun	
	SE Others	SE Excel	SE Others	SE Excel
Expand elevator	0	0	=-1963+2447=484	0
Does not expand elevator	=192+115=307	=2700-2079=621	0	=324-0=324

If the decision is to expand the elevator, the maximum regret is $0.484 million; the decision to not expand the elevator results in a maximum regret of $0.621 million. So under the minimax regret decision rule Excel should choose to expand the elevator.

Finally, the expected monetary value associated with the decision to expand the elevator is $324.08 thousand[3] while the expected monetary value associated with the decision to not expand the elevator is $196.5 thousand[4], consequently under the expected monetary value rule the expansion should occur. Table 7 summarizes the different decision rules and which decision each rule suggests for Excel to take on. This summary table above would suggest for Excel to expand the elevator.

Table 7. Summary of the Conclusion under each Decision Rule

Decision Rule	Conclusion

[3] [192*0.8+2700*0.2]*0.6+[(-2447)*0.2+324*0.8]*.4=693.6*0.6+(-230.2)*0.4=324.08
[4] [(-115)*0.5+2079*0.5]*0.6+[(-1963)*0.5+0*0.5]*.4=982*0.6+(-981.52)*0.4=196.6

Maximax	Expand the elevator
Maximin	Don't expand the elevator
Minimax regret	Expand the elevator
Expected Monetary Value	Expand the elevator

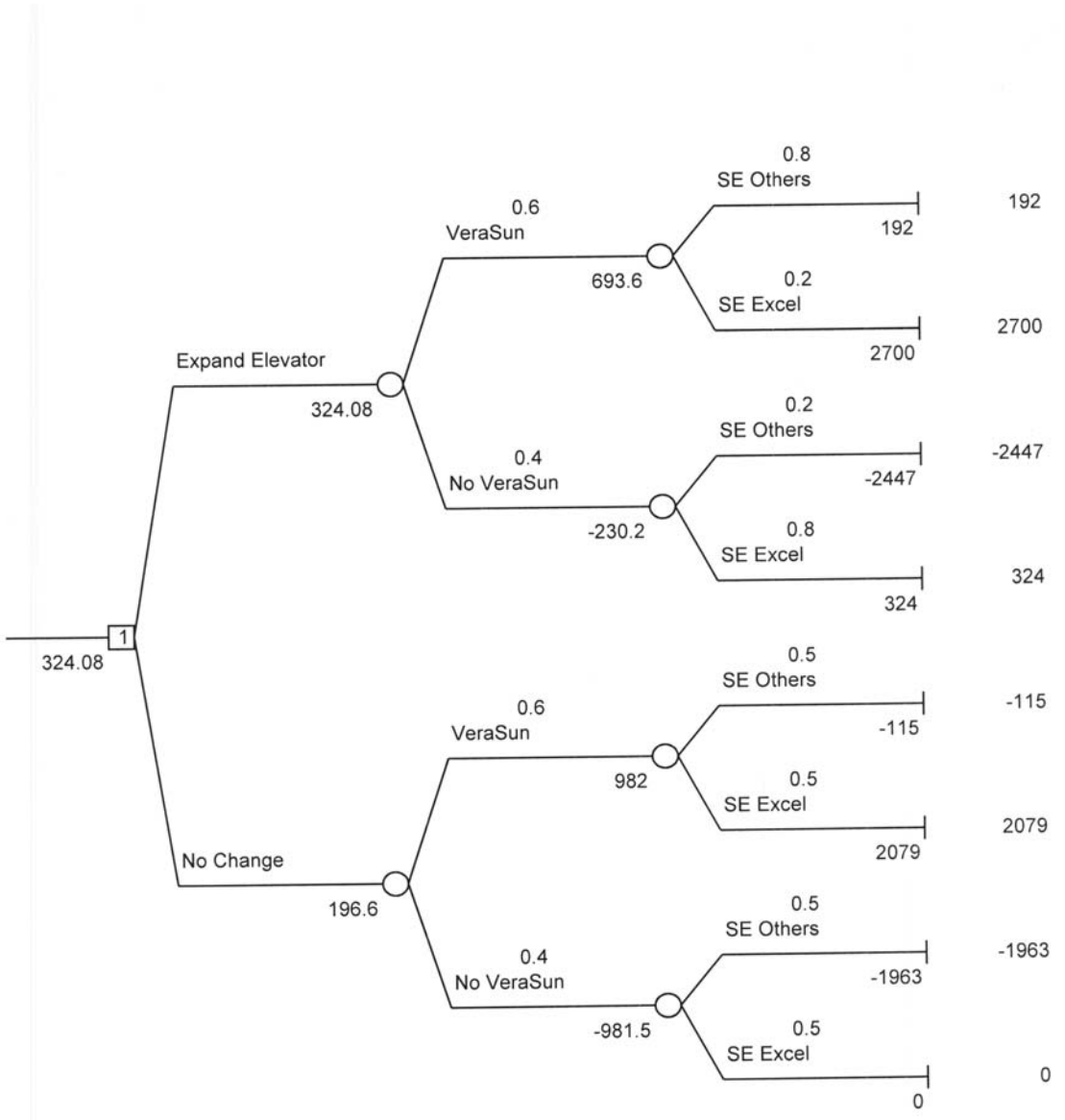
4. Decision Tree

An alternative way to visualize the information displayed in a payoff matrix is to transform the matrix into a decision tree. In addition, the decision tree helps lay out the sequence of decisions or events. A decision tree approach is useful for complex decisions/situations. It provides a graphical representation of all the interrelationships among choices and uncertainties which is particularly useful to explain decision process to others (as long as the labeling is self-explanatory) (see Figure 4). Creating a decision tree encourages thorough, logical thinking about a problem and allows for probabilities to be assigned to individual events and the expected outcomes. The TreePlan Software, an add-in to Excel Microsoft Office, can be used to build decision trees. A decision tree presents two or more decisions, followed by branches representing a set of potential unfolding events that will affect the net present value of the company. The probabilities of each event and the net present value associated with each event for a decision can be displayed on the graph (Hammond, 1999; Brandenburger and Nalebuff, 1995; Ragsdale, 1997).

Using the information presented in the earlier discussions on scenario analysis and payoff matrices, the decision tree can be constructed for Excel (see Figure 4) with the first node representing the decision to expand (or not) the elevator, followed by two events. The first event

is whether the VeraSun plant is built. This will affect the probabilities of the second event: whether the Southeast feeders continue to source their grain from Excel and go to other procurers.

Figure 6. Example of Decision Tree for Excel



5. Real Options Valuation

In addition to evaluating the uncertainties associated with decisions, it is also important to think about options to manage downside risk. One way to limit the risk is by using real options. Real options are a direct extension of financial options, but focus on physical or real assets instead of financial derivatives. In essence, a real option is like a financial option – investing a modest amount today to acquire a right to buy an asset in the future. When the future arrives, the purchase can be made or the option is allowed to expire, depending on the profitability or lack thereof of that asset at that point in time. In short, the option approach enables one to maintain the right or the position to exploit that potential opportunity without having to make a commitment to do so today. This same approach is regularly used in making business decisions where option payments are made to maintain the right to acquire a particular parcel of real property in the future, minority investments are made in startup companies with an agreement to have the first right to buy a majority interest in some future time period, or pilot plants are constructed to test an idea before a full scale manufacturing facility is built (McGrath and McMillan, 2000; Luehrman, 1998; Detre et al., 2005).

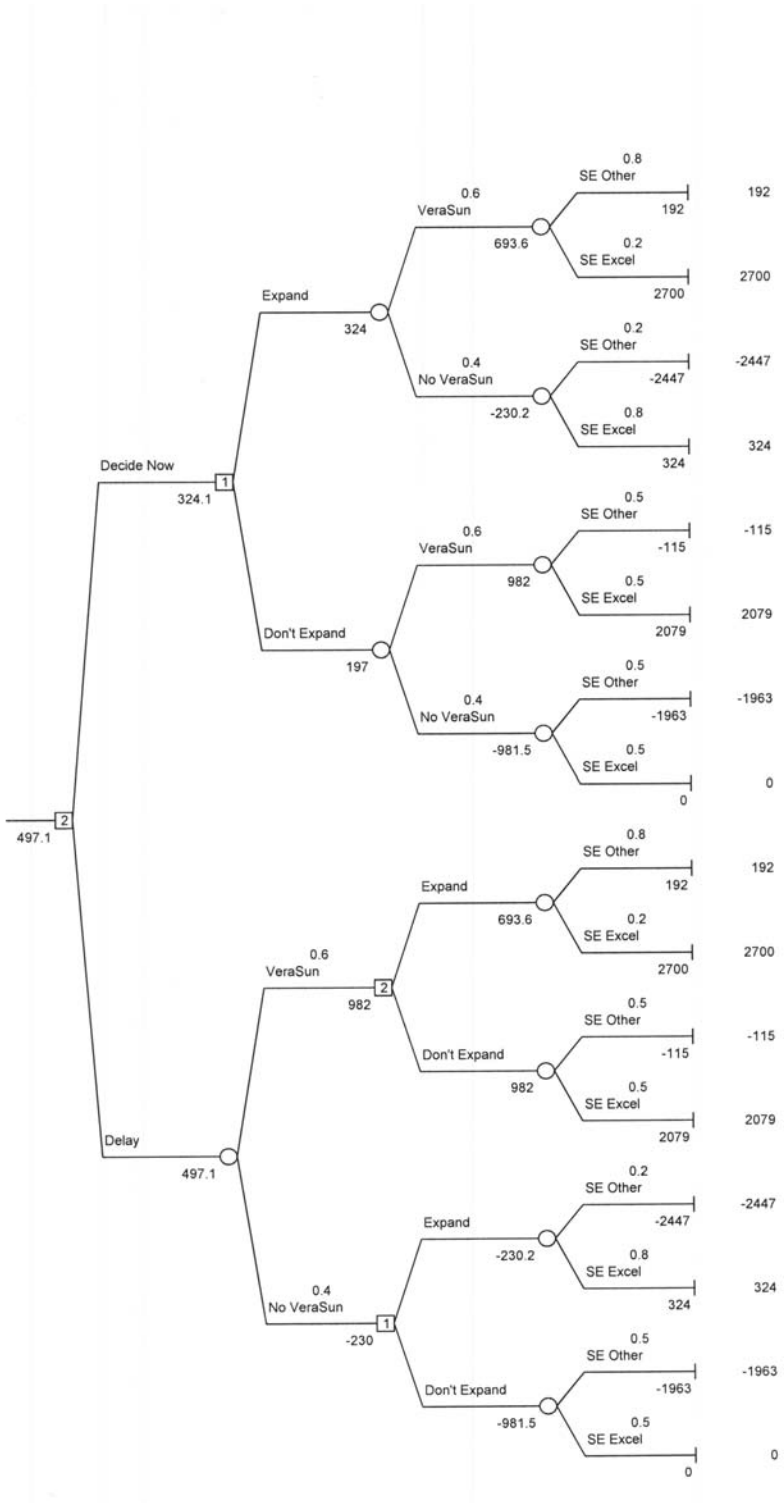
This method of thinking explicitly considers the benefits additional information will have on the value of a decision or investment. A real options framework is appropriate for situations where the manager can make incremental decisions throughout time, thus creating flexibility in the decision. Such options might include deferring, abandoning, or expanding a given project. This flexibility is only valuable if managers are allowed to incorporate new information into their decisions over time. Thus, real options are a learning model that allows management to make informed and accurate decisions over the course of time (McGrath and McMillan, 2000; Luehrman, 1998; Detre et al., 2005).

There are different types of real options (Boehlje et al., 2005):

- Growth : making investments today to maintain the "option to play" in the future.
- Contract/Divest: flexibility to reduce the commitment or divest resources in the future at high residual values or minimum costs if events turn negative.
- Sequence/Follow-on : Deliberately sequencing decisions and making incremental investments to maintain flexibility.
- Pause/Wait : deliberate reasons to delay with a trigger to commitment.
- Shut-down/Switch: temporarily stop production when variable costs cannot be covered

To illustrate the application of options analysis, the value for Excel to wait until VeraSun makes its decision whether to build the plant can be estimated. To do this, TreePlan can be used to create a new branch in the Excel decision tree (see Figure 5). The first node of the decision tree or initial decision would be a delay decision, and therefore the decision becomes: expand now or delay. Compared to the previous decision tree of Figure 4, in this one the decision on whether to expand the elevator is made after the VeraSun event has been determined. All other probabilities and the payoffs associated with each branch remain the same. One should recognize that some of the payoffs will be reordered relative to the original decision tree, but the amount of the payoffs does not change. For example, in the initial decision tree of Figure 4, the NPV of -$115 thousands was in fifth position while in the delay case of the second decision tree (see Figure 5), the -$115 thousand NPV is in third position; in both cases this value represents the combination of the following events: no expansion, presence of VeraSun plant, and the Southeast buyers switch distributor.

Figure 7. Example of Decision Tree for Excel with a Delay Option

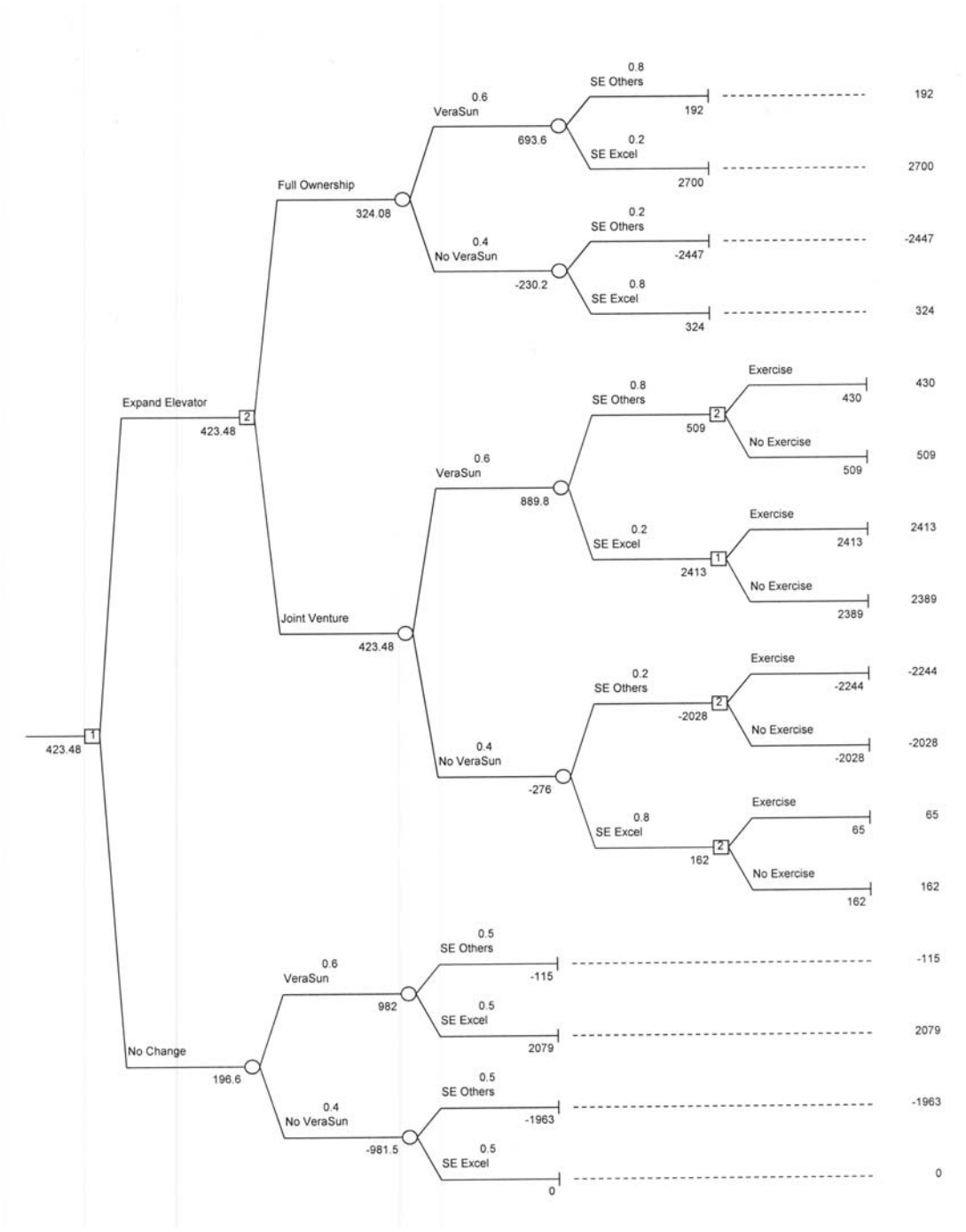


Using the numbers in Figure 5, the expected monetary value associated with the decision to decide now is $324.1 thousand while the expected monetary value associated with the decision

to delay is $497.1 thousand, consequently under the expected monetary value rule Excel would delay the decision.

An option for Excel to make an incremental investment to increase its elevator capacity can also be examined. Assume Excel has the option to enter a 50/50 Joint Venture with another elevator, to build an elevator of a capacity of 700,000 bushel of storage. Excel has the right to purchase the other 50% of the elevator for $1.5 million in 2 years. Meanwhile, Excel can gather additional information and decide whether to make the additional investment. Thus, Excel reserves the opportunity to invest more in the elevator after seeing how the market unfolds in a two year period, by exercising (or not) the option in two years. This decision tree is presented in Figure 6.

Figure 8. Example of Decision Tree for Excel with a Growth Option



Using the numbers in Figure 6, the expected monetary value associated with the decision to expand the elevator is $423.48 thousand while the expected monetary value associated with the decision not to expand the elevator is $196.8 thousand, consequently under the expected

monetary value rule Excel would expand. With full ownership the expected monetary value is $324.08 thousand, while with a joint venture with VeraSun the expected monetary value is $423.48 thousand. Consequently under the expected monetary value rule Excel would expand with a joint venture with VeraSun.

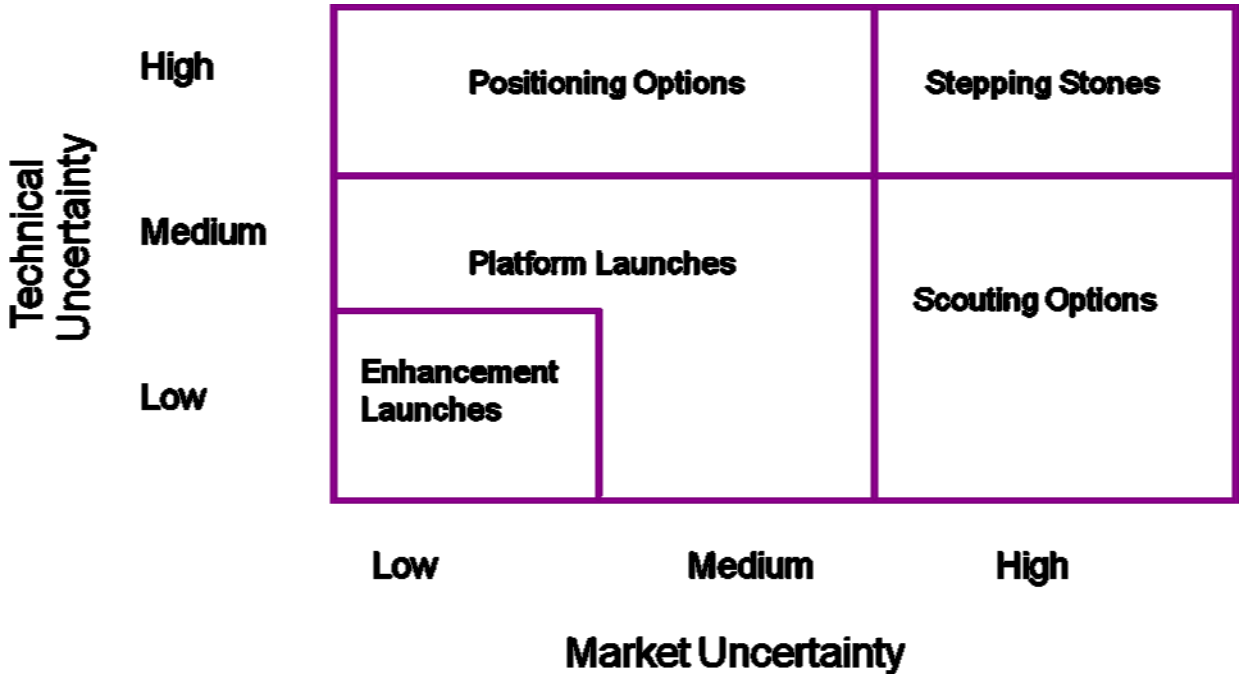
6. Options Portfolio Mapping

Real options is helpful for structuring a decision that helps manage downside risk while maintaining the possibility to capture upside potential. Most companies are pursuing several uncertain projects. It is important for companies to consider their portfolio of activities to make sure they maintain a healthy balance between innovative ideas and the level of risk taken by the company. The portfolio of options approach provides a useful framework for thinking about strategic choices in an uncertain environment. Given the technical and market uncertainty that surrounds almost all new projects, a real options approach combined with portfolio concepts has the potential to maximize the value of new innovations while minimizing the risk (McGrath and McMillan, 2000).

Market uncertainty refers to the lack of knowledge at the market and demand level. Major sources of uncertainty are the potential revenue/demand, the regulatory aspects, the associated cost, and the upstream supply chain reaction to the innovation project. Technical uncertainty comes from the lack of information about the viability of the innovation. The firm does not know whether or not the technology can be developed, and which inputs and skills are needed. The firm also does not know if it has the manufacturing skills and capacities to produce the product, nor if the user (and even the salesforce) will know how to use the product (McGrath and McMillan, 2000; Luehrman, 1998; Detre et al., 2005).

McGrath and MacMillian (2000) suggest that there are four basic categories of new projects when viewed from the perspective of market uncertainty and technical uncertainty – these four categories are shown in Figure 7. Positioning options create the right to wait and observe what technologies or standards will develop to serve a relatively well defined and certain market. Scouting options are focused on taking relatively well understood technologies and products to a new and not well understood potential customer base. Stepping stone options face both high technical and market uncertainty, and so should be initiated with "experiments" to either gain more information as to customer wants and needs, or increased capability and capacity relative to the preferred technology to respond to those needs. Launches (platform and enhancement) involve full blown commitments that can be safely made because both the technology and the customer base are reasonably well understood and less uncertain.

Figure 9. Portfolio Map



To foster the development of new projects and at the same time to reduce the risk of new ventures, expansion funding and activities should be allocated in a portfolio context with a specified percentage of the financial and personnel budget (say 10 or 20%) used to initiate activities that are positioning options, stepping stones, or scouting options rather than allocating all resources to platform or enhancement launches. The basic argument is that to sustain growth through innovation and new projects, but at the same time to manage the technical and market risk associated with that growth, a company should develop and manage a portfolio of innovations and new projects using this portfolio of real options framework.

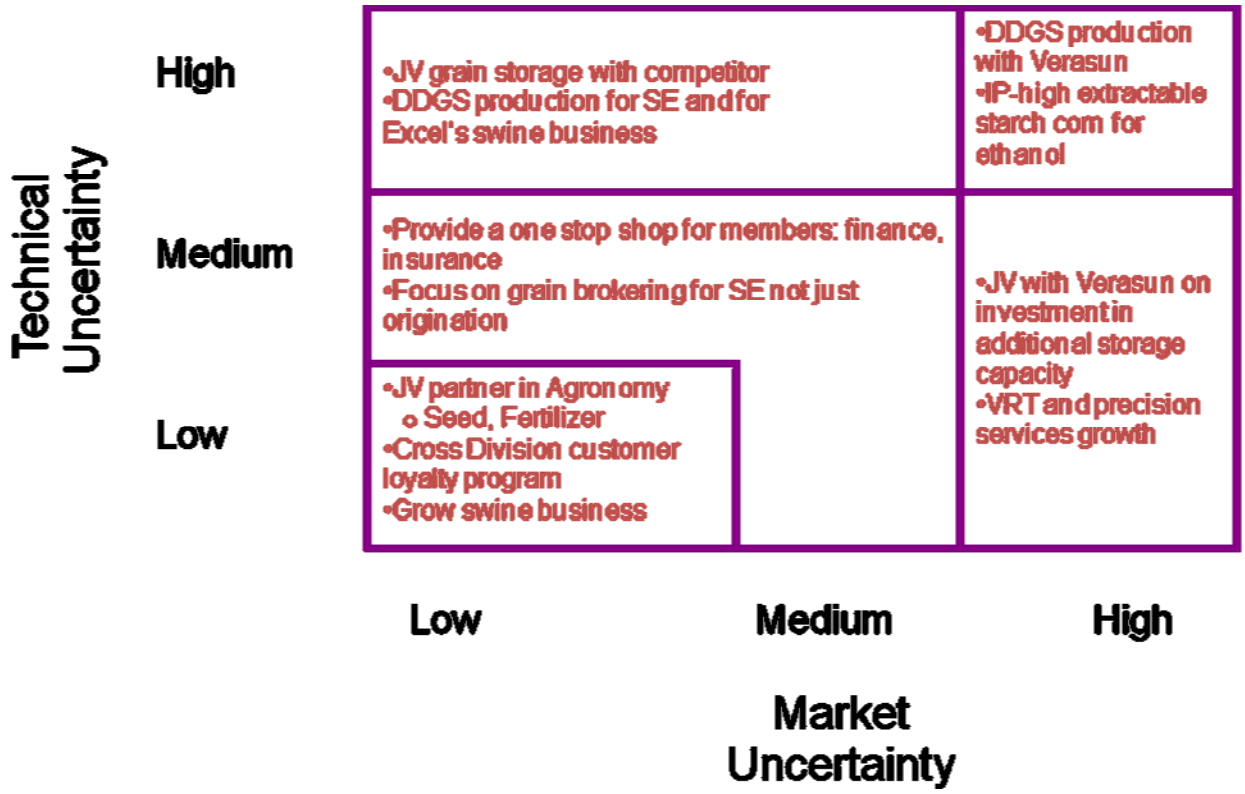
Figure 8 summarizes a portfolio of options concepts for Excel that have been gathered from the participants of one of the executive programs the case has been used in. There are several opportunities Excel can investigate besides expanding the grain elevator with VeraSun. In other words, there are several positioning options, stepping stones, and scouting options that Excel can use to capitalize on the uncertainty with the ethanol demand. For example, Excel may decide to expand the area it gets grain from. Excel could joint venture with a competitor in another region. This would decrease the market risk in that the corn acreage base is increased by the competitor's clientele. It would increase technical uncertainty in the sense that the competitor's facility is not at proximity - it is in another region. We can also map the situation presented in the decision tree: Excel could joint venture with VeraSun to invest in additional storage. This would not decrase the market uncertainty, but it would decrease the share of risk Excel takes on and would not create additional technical uncertainty. Excel could also investigate some opportunities with DDGS because of its proximity to VersaSun. This could be particularly useful if the demand for grain increases because of ethanol. DDGS could be used as a subsitute for

grain in Excel's swine business and for the Southeast market. While the DDGS production bears some technical uncertainty, market uncertainty could be limited if Excel builds a small scale plant that would only answer the needs of its customers – thus a positioning option. Excel could also share the investment and the risk with Excel by building a larger DDGS plant and be in charge of the marketing of DDGS –thus a stepping stone. Another area of opportunity is high extractable starch corn. High extractable starch corn provides more gallons of ethanol per bushel. Excel could be in charge of the storage and the identity preservation of high extractable starch corn. There is technical and execution uncertainty in the sense that the identity preservation (IP) would create a new organization for Excel. Currently, Excel handles and stores bulk commodities. Whether VeraSun would be willing to pay a premium for this corn and to finance the IP process creates market uncertainty. This would be a stepping stone.

In terms of scouting options not directly related to ethanol demand, Excel can also investigate growing its offerings of variable rate technology (VRT) and precision services. The technical and execution uncertainty is medium to low because the technology has already been developed and Excel already sells these services. Whether or not there is enough of a demand creates market uncertainty. We can also find some opportunities of platform launches for Excel. Excel could try to provide its members a one stop shop by also offering financing and crop insurance. New Excel's division would need to be created which would generate some technical uncertainty. Whether the member would use those services creates also some market uncertainty. Excel could also become a grain broker by buying grain from non cooperative members for the Southeast. This would generate medium technical uncertainty because Excel is used to buying grain, but not as a broker per say, and low to medium market uncertainty in that Excel already has contact with the Southeast market- - thus a platform launch.

Another avenue Excel could explore would be to partner with one of its competitors to sell seed, fertilizer, chemicals because Excel's performance in this area has been deteriorating. Excel could also create a cross division customer loyalty program and/or grow the swine business and feed the hogs DDGS. These projects would have both low technical (the technology exists) and market (Excel already has a customer base) uncertainties - - thus enhancement launches.

Figure 10. Excel's Portfolio Map



7. Psychological or Decision Traps

Although, strategic flexibility should be seen as an answer to managing uncertainty, sooner or later, a decision must be made to exercise an option or to exit the project. These decision-making process is often accompanies by bias, particularly for entrepreneurs/managers deciding on projects in which they have a vested interested. Knowing the common psychological traps and

using the tools described above may help reduce this bias (Hammond, 1999). First, it is often not easy to accept that maybe it is time to kill a project particularly one in which substantial time and money have been invested. One may think about the sunk costs/non retrievable costs (the sunk cost trap) associated with a project, or refuse to acknowledge a mistake. Some tend to be overconfident about their estimates (the overconfidence trap), or/and be too pessimistic in the choice of probabilities (the prudence trap), and/or exaggerate the probability of rare but catastrophic occurrences (the recallability trap) because we tend to be overly influenced by past dramatic events. Some may also be tempted to seek (subconsciously) evidence to support a decision (the confirming-evidence trap). The way a problem is specified can profoundly influence the choices one makes (the framing trap): if a problem is posed in terms of gains, people tend to be risk averse; alternatively they are risk seeking if a problem is posed in terms of avoiding losses. In addition, the problem may subconsciously be framed such that a proposed solution seems to be the best answer. Some decision-makers may give more weight to the first idea, or piece of information (the anchoring trap), give weight to the wrong piece of data while neglecting the relevant ones (the base-rate trap), or assign trends when none are present (the outguessing randomness trap). Sometimes no change seems like the only solution (the status quo trap); it is rarely the case and the switching costs are often exaggerated! Table 8 lists those traps, provides definitions and solutions to limit the decision bias.

Table 8. Psychological and Decision Traps

Name	Definition	Solution
The Sunk Cost Trap	Throwing good money after bad Refusing to acknowledge a mistake	Deal with the reason the mistake is trouble for you Make the consequences of dealing with the issue part of the decision process

		How would I handle this if I were brought in to clean things up?
The Overconfidence Trap	We aren't nearly as good as we think we are when it comes to estimates Many times due to anchoring	Ask questions about the extremes, the 'remote' possibilities Homework! Use facts instead of opinions…
The Prudence Trap	Slanting odds, estimates to be safe A major problem in sales forecasting with limited supply	Seek/demand honest input Document information/reasoning Sensitivity analysis Use a process to document problem areas, focus on fixing those
The Recallability Trap	We remember the disasters, the unconditional victories	Use data, or build up your estimates in pieces if data unavailable
The Confirming-Evidence Trap	'Biased research' Make the decision before gathering the facts, then seek (subconsciously) evidence to support your 'decision'	Use a 'devil's advocate' in any major decision exercise 'Pressure test' with those outside the decision Expose yourself to conflicting information Watch leading questions in seeking advice
The Framing Trap	Framing as gains vs. losses – biases toward the gains	Framing with different reference points Can bias the decision up or down, magnifying or minimizing the consequences Don't just accept the initial frame, look for distortions caused by the frame 'Let's look at this problem in a different way'
The Anchoring Trap	First idea, piece of data, history anchors decision	Widen your perspective with outside opinions Think about on your own before getting outside perspectives Don't share your ideas until you get outside perspectives
The Base-Rate Trap	Neglect Relevant Info Focus on the wrong data in a decision setting	Use data, don't mix probabilities
The Outguessing	Assigning trends when none are	Don't try to outguess random

Randomness Trap	present Stuff happens	phenomena, it can't be done Revisit theory, seek good explanations
The Status Quo Trap	Change requires effort, 'the devil that you know and the one that you don't'	Status quo is virtually never the only option Would you choose the status quo, if it weren't the status quo? Avoid exaggerating the switching cost Don't compare 'is' vs. 'would be'

Table 8 describes some of the approaches that might be used to manage these biases. Using systematic analytical procedures including the ones previously discussed is the most effective way to reduce the impact of the biases or traps in making decisions in uncertain environment.

Conclusion

To make decisions in uncertain times, it is important to follow a methodology. The risks are too high to allow for an ad-hoc approach. This paper proposes a methodology with four steps.

1) Scenario analysis: for each uncertainty the company should capitalize on, a set of plausible strategies should be identified and described. This description should show which action should be taken in regards to each project (see step 2) under each scenario.
2) Scorecarding and heat mapping: the uncertainties are listed, scored and mapped to determine which uncertainties the company should capitalize on and which projects can be pursued for the company to capitalize on the innovation.
3) Payoff matrices and decision trees: the scenarios can be summarized in a payoff matrix or a decision tree. There should be one decision tree for each project. The profit and probability associated with each scenario and project will determine which decision

should be made: pursue or not the project. The calculation profits should take into account the valuation of real options.

4) Options portfolio mapping. Once a list of feasible projects is put together, one needs to evaluate the portfolio and make sure the risk is diversified among projects. Portfolio mapping is going to determine whether or not the portfolio is too risky or not enough risky.

The tools discussed here are used to create strategic flexibility for highly uncertain projects in uncertain times. This being said, every decision-maker using the framework discussed here should be aware of its pitfalls. First and foremost, this lengthy methodology requiring a lot of analyses is not needed for some smaller and less strategic problems. In addition, before conducting such extensive analyses, a good assessment of the strategic fit of a project should take place. Finally, although this methodology may help create more confidence in a given action, it should not delay it. In other words, at some point, the analysis must stop and a decision must be made. Strategic flexibility is not an end by itself.

Bibliography

Boehlje, M., A. W. Gray, and J. D. Detre (2005). "Strategy Development in a Turbulent Business Climate: Concepts and Methods." International Food and Agribusiness Management Review, 8 (2): 21-40.

Brandenburger, Adam M., and B. J. Nalebuff (1995). "The Right Game: Use Game Thoery to Shape Strategy". *HBR*, July-August 1995

Bristow, John B. (1990)."Note on Scenario Planning: An Abridged Version". *Graduate School of Business Administration, University of Virginia.*

Detre, J., B. Briggeman, M. Boehlje, A. Gray (2006). "Scrorecarding and Heat Mapping: Tools and Concepts for Assessing Strategic Uncertainty". *International Food and Agribusiness Management Review*, 9 (1): 1-22.

Hammond, John S.; R. L. Keeney, and H. Raiffa (1999). "Smart Choices, A Practical Guide to Making Better Decisions". *Harvard Business School Press*, Boston, Massachusetts.

Luehrman, T. A. (1998) "Investment Opportunities as Real Options: Getting Started on the Numbers." *Harvard Business Review*: 51-67.

McGrath, R. G., and I.C. MacMillan (2000). "The Entrepreneurial Mindset." Boston, MA: Harvard Business School Press.

Ragsdale, Cliff T. (1997) "Spreadsheet Modeling and Decision Analysis, a Practical Introduction to Management Science". South-Western College Publishing, 2nd edition, Chapter 16.

Raynor, Michael E. (2007) "The Strategy Paradox: Why Committing to Success Leads to Failure [and What to Do About it]." Currency Doubleday Publishing. Chapter Nine.

Schnaars, S. and P. Ziamou (2001) "The Essentials of Scenario Writing". *Business Horizons*, July-August 2001.

Schoemaker, Paul J.H. (1995) "Scenario Planning: A Tool for Strategic Thinking" *Sloan Management Review*; Winter 1995, p25.

Wilkinson, Lawrence. "How to Build Scenarios". http://www.wired.com/wired/scenarios/build.html accessed on 03/02/2009.

Exhibit. An Interview with Excel Green, CEO Excel Cooperative

WSJ: Excel, The dynamics of the grain industry in your region have really changed in a short period of time. How is this affecting Excel Cooperative.

GG: The increase in ethanol demand, nationally, is changing the shape of the corn and soybean market without question. In our local area there are 4 Ethanol plants being built around us. Plus, VeraSun Corporation is considering building a 100 million gallon ethanol plant right in our backyard. This change has implications for all of our divisions including the agronomy and feed divisions. But, probably the most important implications are in our Grain division. We are trying to decide if we need to invest in additional storage and handling capacity to take advantage of the situation or just stay where we are and let things play out.

WSJ: What does your current plan look like for expanding the grain storage?

GG: We have begun the process of looking into building 700,000 bushels of additional grain storage at our South Reynolds plant. With attendant infrastructure improvements we believe that this will require about $2.2 million in investment on our part. If the VeraSun plant comes in we would be well positioned to supply a good portion of that plants corn needs with this additional infrastructure. Part of our concern is that we are not sure how the feeders in the southeast, which we serve with much of grain now, will react to the increased demand for corn locally. And, if we commit to this investment now and VeraSun decides not to go through with its plans we could be struggling to get our investment back.

WSJ: Assuming VeraSun enters the market what impact will that have on the profitability of your expansion.

GG: My team has been running some numbers on this. As long as corn production increases as expected in the area and SE feeders can find corn from other markets without becoming to aggressive in using our other competitors to acquire grain we could see returns in the neighborhood of $2.7 million. If the SE feeders get aggressive with our competitors and we have to compete aggressively to get the grain then we would probably see a reduction in our elevator turnover and might see only $0.192 million in returns.

WSJ: So either way it is not a bad deal it seems.

GG: Well, if the SE feeders are aggressive it isn't great but we could live with it since the VeraSun entry will probably raise margins a little. What is more concerning is if VeraSun doesn't enter but the SE feeders are aggressive with our competitors anyway. If that happens we have a problem on our hands because we could end up with lower turnover and lower margins resulting in a loss of -$2.4 million. Of course, if we can keep the SE feeders looking to us for their grain and working with us to be aggressive in the marketplace while still maintaining our normal margins we could still come out ahead at about $0.324 million.

WSJ: What do you think the probabilities are that VeraSun enters and how your SE feeders might react?

GG: Right now we think that there is about a 60 percent chance that VeraSun will enter the market. The reactions of the SE feeders are a little trickier. If VeraSun enters the market we expect the SE feeders to be more aggressive. If we expand and VeraSun enters the market then we think there is an 80 percent chance the SE feeders will seek out our competitors in local markets to acquire grain. But, if VeraSun doesn't enter the market and we have our expansion in place we believe this will signal to the SE feeders that we can meet their needs and there is an 80 percent chance they will come to us. If we don't expand then it seems there is 50/50 chance that the SE feeders will go either way.

WSJ: Speaking of not expanding, what do the economics look like for you if you don't expand?

GG: Well, if VeraSun enters and we haven't expanded but we can deliver to them and our SE feed markets will let us be aggressive then we will be in pretty good shape with about $2.0 million return. But if our SE feeders seek other elevators for procurement we could be in some trouble with about a $0.115 million loss. If VeraSun doesn't enter but we can keep our SE feed markets we will breakeven. Where it gets scary is if VeraSun doesn't enter and our SE feed markets look elsewhere for their grain. Then we are looking at about $2.4 million loss.

WSJ: Excel, you have some pretty hefty decisions to make here. Certainly, there is plenty of opportunity here but there is also a lot of downside. Thanks for giving us an overview of your thought process and good luck to you.

GG: Thank you.