8 Step 4
Prioritize Risks

Dana Hoag

CONTENTS

Step 4 of the SRM process is the first task in the tactical planning section. While earlier chapters focused on discovery and goal setting to prepare for tactical planning, the purpose of this chapter is to identify, quantify, organize, and prioritize your risks. When goals are too broad, they become overwhelming. Tactical planning helps you find a more manageable problem to address. Step 4 is very important because it sets the direction of your entire management plan.

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most important to manage later in the process. As difficult as it might seem, sometimes you will need to ignore certain risks because they don't have a big impact on you (or you simply can't have a significant influence over them). Most importantly, you will need to concentrate your energy on those risks you can impact, on those areas you can influence, and on those risks that will cause significant problems for you if they are not managed. The tools in this chapter will help you identify the risks you want to address, so you can develop a tactical action plan that specifies exactly how you will manage, ignore, retain, or ensure against these risks.

As with previous chapters, this chapter is divided into three parts. In Part 1 we look at the EWS Farms case study. The Spragues have to prioritize which risks to manage and which to ignore. The SRM process will help the Spragues identify all the risks that may be important and then show them how to choose which ones to start managing first.

The fundamental principles scientists have developed to help identify and prioritize risks are presented in Part 2. For comparison, we define and discuss common sources of risk shared by most farmers and ranchers, like low prices or bad weather. Although most managers are aware of their operational risks, it is probably insightful to review the kinds of risks other farmers, ranchers, and risk management experts have identified as common to agriculture. Finally, since not everyone likes the same approach, we describe five different methods that can be used to identify and prioritize risk.

In Part 3 we develop a Risk Navigator management tool called the Risk-Influence Calculator. This online Risk Navigator tool can help you organize and prioritize your own operational risks. You can find the Risk-Influence Calculator for this chapter on the Web site, www.RiskNavigatorSRM.com.

EWS Farms is a perfect case study as it is a traditional farm where the owner needs to evaluate risks as he contemplates how to integrate his family into the farm operation. As usual, we apply the example to the case study in order to demonstrate that Risk Navigator tools and techniques can be used in real-life settings.

8.1 PART 1: THE EWS FARMS CASE STUDY

8.1.1 Objectives

Like all farmers, the Spragues face a multitude of risks, including production, marketing, financial, institutional, and human. Managing risk is a complex process, and the Spragues do not have the resources to address all their risks at one time. No one does.

The objective of Step 4 is to obtain a list of the Sprague family's risks and to prioritize the risks to address in a Tactical Plan.

8.1.2 Strategy

We start by interviewing the Spragues to identify their risk sources, then use the Risk Navigator tools to help the Spragues prioritize which risks to address. To ensure that we don't miss any risks, we'll begin with broad, big-picture risks, and then narrow our search to prioritize the specific risks that are most important to manage. The

goals the Spragues developed in Step 3 also can be used as a starting place to review broad risks.

In the EWS Farms case study, we narrow the Spragues' risk focus by using the Risk-Influence Calculator, which helps the Spragues list and prioritize their risks into the five risk categories: production, marketing, financial, human, and institutional. The Risk-Influence Calculator helps the Spragues identify and manage the risks that will have the most impact on their operation, rather than spend valuable time on controlling risks that might seem to be more convenient. A discussion about tools other than the Risk-Influence Calculator can be found in Part 2 of this chapter.

8.1.3 Implementation

We will implement Step 4 for the Spragues in three stages:

1. Review the risk goals created in Step 3 and risks cited in formal studies
2. Develop a list of the most important risks
3. Select risks to be prioritized in the Tactical Management Plan

8.1.3.1 Review Risk Goals

In Chapter 7 the Sprague family identified four risk goals for their operation:

1. Financial: Ensure short- and long-term financial success by maintaining business profitability while expanding the overall financial resource base.
2. Family: Continue to live, work, and grow with our families in a rural, agricultural environment. Encourage individual development and exploration in a manner that is consistent and flexible enough to allow all individuals to reach their full potential. Seize the opportunity to help manage business risks using the skills of additional family members, and provide support to family members who do not wish to return to the farming operation.
3. Operational Structure: Continue to pursue organizational structures that fit the family dynamics of the operation, as well as allow for strategic goal attainment. Also, increase the business activities' efficiency of the operation.
4. Integrated Farm Management: Manage our farm as a co-integrated unit while providing a step-by-step process for developing a strategic risk management plan for each of the five types of risk: production, market, human, institutional, and financial.

Obviously, the Spragues' goals center on family growth. This is important because Aaron's father is trying to make a living, while also making a place in the operation for two of his children's families. In addition, two other children are away at college and may also want to return to the farm someday.

Based strictly on the goals generated in Step 3, we would not conclude that production risks or price risks are a concern. Yet Aaron wanted more information and decided to examine literature on risk to see what other farmers were concerned about, just in

case he missed anything. After reviewing the types of risks that other farmers and researchers have cited, Aaron added several more basic, production-oriented risks to his list, including price risk and yield risk. This demonstrates the importance of using multiple risk-identification approaches to assure that some risks are not overlooked. That is, if you look at something from more than one angle, you might see different needs.

8.1.3.2 Develop a List of the Most Important Risks

It is difficult for most people to pull a list of risks off the top of their heads, no matter how familiar they are with their own operations. Doing so chances missing important risks. To avoid overlooking specific risks, we developed an extensive list based on what producers identified in various surveys and studies in the literature. (We present this information in Part 2.) After reviewing his goals and reading what others said about risks, Aaron identified the following strategic risks:

Market/Price:
  Corn Price—Will my price cover my costs?
Production:
  Weather—Will rainfall support crop stand?
  Hail—Will hail destroy half my crop?
  Input (seed)—Will good corn seed be available at a reasonable price?
Financial:
  Expansion—Can the operation generate enough profit to cover new land payments?
Human:
  Family—Will my dad retire?
Institutional:
  Water—Will irrigation water be restricted?

8.1.3.3 Select Risks to be Prioritized in the Tactical Management Plan

The Spragues have little influence over some risks, such as hail; however, they can influence other risks, such as ensuring adequate water supply by updating their irrigation system. These risks can be plotted into a risk-influence chart as shown in Figure 8.1. This chart is developed by asking Aaron to assign a number from 1 (not likely) to 10 (likely) to each risk and a number from 1 (no influence) to 10 (extreme control) about how effectively each risk could be influenced or managed by the family. For example, water is an important risk for irrigated crop producers in northeastern Colorado. There is a small chance of having water restrictions, but this would have a big impact on crops; so the Spragues assigned a 5 to this risk. The Spragues, however, have a high level of influence over water since they have installed irrigation systems on much of their cropland. Therefore, Aaron assigns a 7 to their level of influence. Aaron used the Risk-Influence Calculator to create Figure 8.1.

The Probability-Impact Calculator is another tool found inside the Risk-Influence Calculator. It can help determine *the risk part* of risk and influence. Risk is a combination of probability and impact, that is, the likelihood of whether or not something will happen and how important it will be if it happens. A low risk would be unlikely and of little significance. A medium risk could be either likely to happen but of little

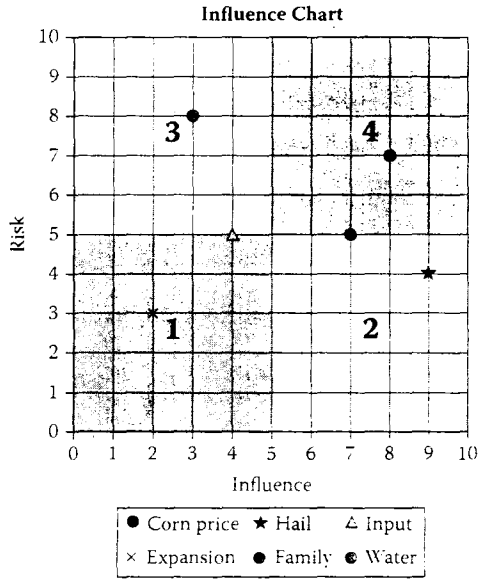

FIGURE 8.1 The Sprague's Risk-Influence Calculator.

consequence, or unlikely and significant. A high risk would be likely and have a significant impact on the farm. An example of the Probability-Impact Calculator is shown in Part 3.

The idea of the risk-influence chart is to identify needs that have a high risk and that have a reasonable chance of being influenced by the decision maker. After looking at the risk-influence chart, Aaron decides to focus on a strategy to manage corn price risk because it is the only clearly high risk that he can influence. The most important risks to focus on are in the upper-right quadrant, numbered 4 in Figure 8.1. The family also feels they have good control over most of their other high-risk options and wants to take advantage of Aaron's investment in learning about marketing in his new master's degree program in agricultural economics from Colorado State University. You can see the actual Risk-Influence Calculator that Aaron considered in Part 3. Try downloading these tools from the Web site and change some of Aaron's assumptions to see how it affects the importance of managing each of the risks.

8.2 PART 2: THE FUNDAMENTALS OF RISK IDENTIFICATION

Most farmers and ranchers are well aware of the risks they face. Nevertheless, it is always helpful to compare your experiences with others. Over time, economists and risk experts have identified the following five common sources of risk found in agriculture (Hardaker et al., 1997; Baquet et al., 1997; Harwood et al., 1999; U.S. Department of Agriculture Risk Management Agency [RMA], 1997):

1. Production risk
2. Market or price risk

3. Financial risk
4. Institutional risk
5. Human resource risk.

These risks are defined, described, and discussed in Table 8.1. The table defines each type of risk and summarizes sources and management controls. Each risk is

TABLE 8.1
Risk Management Sources and Management Controls

Risk	Defined	Sources	Management Controls
Production	Uncontrollable events such as weather, pests, or disease make yields unpredictable. Changing technology makes a manager or capital obsolescent. Inputs are unavailable or low quality.	Weather, extreme temperatures, pests, disease, technology, genetics, inputs (availability, quality, price), equipment failure, labor ...	Diversification, insurance (crop, revenue), buildings, storage, vaccines, extra labor, production contracts (e.g. ensure input supply and quality), new technologies (e.g. automate watering)
Marketing and Price	Prices of inputs or outputs change after a producer commits to a plan of action. Price fluctuations stem from domestic and international supplies or substantial changes in demand.	Product quality (genetics, disease, handling, input/feed) Product price (quality, timing, global market, weather, government policy, contracts...)	Futures and options, forward contracting, retained ownership, quality controls, storage (timing), cooperatives, niche/value-added marketing...
Financial	Stems from the way a business is financed. Borrowed funds leverage business equity but increase business risks.	Market, production, legal and human risk, interest rate changes, natural disasters (drought), land market changes, foreign exchange, loan calls ...	Cash reserves, equity, borrowing capacity, reducing other types of risk (production, marketing, etc.), insurance
Institutional	Government or other institutional rules, regulations, and policies effect profitability through costs or returns.	Taxes, contract disputes, regulations, government policies, lawsuits, ambiguous and/or unwritten agreements, neighbors, environmental programs ...	Estate planning, tax planning, contracts, bonds (e.g. environmental liability), research and education about local laws ...
Human Resources	The character, health, or behavior of people introduces risk. This could include theft, illness, death in the family, loss of an employee, or a divorce for example.	Ambiguous and/or unwritten agreements, poor planning, miscommunication, health, or other family disasters ...	Family planning, including labor planning, clear contracts, training and goal setting, communication, estate planning ...

described in greater detail later in this chapter and in Chapters 13 to 16. We now proceed with a more detailed discussion about these sources of risk.

8.2.1 Surveys about Risk Sources

A good place to start the risk identification process is to look at what other producers and operators across the country have reported. Table 8.2 highlights one U.S. Department of Agriculture study that looks at 6 types of risk on 15 different farms. On a four-point scale, with four being very concerned and one not being concerned at all, the average producer rated changes in government laws and regulations as their top concern and changes in technology as their lowest concern. Producers also rated price uncertainty and crop yields as somewhat concerned. An interesting observation was that producer concerns varied by crop type. For example, cotton producers rated government programs much higher than did tobacco or vegetable farmers. Price risk seemed to be lower for nurseries and vegetables than for most other producers.

We also compared and contrasted results of three risk surveys in Table 8.3. Musser and Patrick (2002) surveyed top producers in workshops at Purdue University in Indiana. The Indiana producers agreed with producers in the national study that price risk and yield uncertainty were top concerns. In contrast, these producers identified laws and regulations as their last concern. The reason for the difference may lie in the fact that risk arises where we have the least control. Perhaps top producers in the Musser and Patrick study better addressed legal and institutional problems than the USDA (U.S. Department of Agriculture) producers.

In a study of Nebraska and Texas cattle producers, Hall et al. (2003) found drought to be the most important risk. This is not surprising as this region was in the midst of a devastating drought at the time. This phenomenon serves as a warning that current events can dominate our thinking. Risk management should encompass all risks, not just those that have recently occurred. Similar to other studies, price uncertainty was also a top concern. The producers cited input costs as a serious concern, although these producers did not think labor, disease, cold weather, or the government were significant threats.

8.2.1.1 Production Risk

It might be helpful to discuss the different types of risk one at a time. We will start with specific production risks, and base our discussion on comments made by Iowa corn growers as shown in the following chart (Mickelsen and Trede, 2001). The numbers at the end of each bullet indicate the numerical rating where 0 = no concern and 4 = very concerned.

Crop Production Risk	Livestock Production Risk
Weather, wind, hail, etc.—4.22	Adequate market outlets for livestock—3.68
Disease, insects, weeds—4.00	Disease—3.51
Use of new crop varieties—3.64	Initial investment cost of facilities—3.29
Adoption of new technology—3.52	Regulations on production practices—3.16
Consolidation of input suppliers—3.42	Adoption of new technology/methods—2.97
	Obsolescence of facilities—2.65

TABLE 8.2

A National Survey of Farmer's Degree of Concern about Factors Affecting the Continued Operation of their Farms (Harwood et al., 1999)

	Mean scores[1]													
How concerned are you about each factor's effect on the continued operation of your farm?	**Other Cash Grains**	**Wheat**	**Corn**	**Soybeans**	**Tobacco**	**Cotton**	**Fruit/Nuts**	**Vegetables**	**Nursery/ Greenhouse**	**Beef**	**Hogs**	**Poultry**	**Dairy**	**All Farms**
Decrease in crop yields or livestock production	3.35	3.51	3.20	2.98	3.16	3.68	3.05	2.85	2.78	3.09	3.53	3.20	3.40	2.95
Uncertainty in commodity prices	3.41	3.83	3.40	2.93	3.15	3.75	2.88	2.82	2.63	2.96	3.31	3.09	3.54	2.91
Ability to adopt new technology	2.52	2.38	2.39	2.33	2.21	2.77	2.34	2.09	2.24	2.25	2.63	2.60	2.45	2.23
Lawsuits	2.43	2.47	2.03	2.46	1.89	2.78	2.39	2.66	2.06	2.36	2.70	2.32	2.36	2.26
Changes in consumer preferences for agricultural products	2.65	2.55	2.39	2.40	2.40	2.86	2.44	2.59	2.69	2.58	3.01	2.79	2.76	2.47
Changes in government laws and regulations	3.31	3.36	3.15	2.79	2.77	3.54	2.97	2.75	3.09	3.03	3.23	3.34	3.31	3.02

[1] 1 = Not concerned, 2 = Slightly concerned, 3 = Somewhat concerned, 4 = Very concerned

TABLE 8.3
Sources of Risk Identified in Producer Surveys

Sources of Risk[a]	Purdue University Top Farmer Crop Workshop 1999 (Musser and Patrick, 2002)	National Study-Economic Research Service (Harwood et al., 1999) Table 1, page 5)	Beef producers in Texas and Nebraska (Hall et al., 2003)
Price Uncertainty	1	3	2
Yield Uncertainty	2	2	
Business Contracts	3		
Cost of Capital Goods	4		
Government Commodity Programs	5		ns[b]
Technology	6	6	
Inputs/Costs	7		3
Injury, Illness, or Death	8		
Laws/ Regulations	9	1	ns
Legal (law suits)		5	
Consumer Preferences		4	
Severe Drought			1
Cold Weather			ns
Livestock Disease			ns
Labor Availability			ns
Credit/cash reserves			

[a] Sources names are adapted to integrate across studies.
[b] *ns* means rated, but neutral or of less importance in the study

Note that the participants in this study identified weather-related yield risk as the most threatening, followed closely by disease, insects, and weeds. Livestock producers fear the lack of adequate markets most, followed closely by disease. Both crop and livestock producers also report risks related to investments in technology or facilities as a significant factor. Risk also stems from the input side. Crop producers cited the consolidation of input suppliers as a threat.

8.2.1.2 Market and Price Risk

Market risk is related to the price producers receive for their crop. Price can be affected by the quality of a product, which is often within a producer's control, however, most price risk occurs off the farm and there is very little a producer can do about it. For example, corn price can be improved with proper management of moisture content. But the price is also influenced by domestic and international markets, government programs, and global events. In the Mickelsen and Trede survey (2001) shown in the following list, producers ranked narrow operating margins as one of their top concerns, largely due to price (in chart below, 0 =

no concern and 4 = very concerned.) They also cited accessibility to markets and volatility of prices as great concerns. In today's world, global markets are also on people's minds.

- Narrow operating margins—4.33
- Accessibility to markets to sell products—4.17
- Volatility in commodity prices—4.14
- Global economic conditions—3.99
- Fluctuating costs of inputs—3.94
- Trade agreements (North American Free Trade Agreement [NAFTA], etc.)—3.73

8.2.1.3 Financial Risk

In this study, supply of capital (money to borrow) was the top financial concern; however, as shown in the following list (Mickelsen and Trede, 2001), almost as important were the ability to recover from depressed times and to find lenders who were sympathetic to agriculture.

- Adequate supply of capital—4.05
- Recovery time from depressed agricultural economy—4.04
- Lenders knowledge of agriculture—4.01
- Business cycles in agriculture—3.69
- Volatility in interest rates—3.64

8.2.1.4 Institutional and Human Risk

Institutional and human risks are a bit outside the sphere of what producers generally think about when they think of risk. Institutional risk focuses on the impact institutions, such as government and the legal system, can have on producers. For example, the creation or elimination of government price and income support programs (or a special farm tax) can have a huge impact on producers. Since capital equipment has a high price tag, a change in the interest rate can have an enormous impact on cash flow. In recent years, environmental controls also have impacted many producers. As shown in the following list (Mickelsen and Trede, 2001), Iowa farmers were most concerned with changes in policies or regulations, including farm programs. Fears of increasing pressure from international groups followed closely behind.

- Changes in government policy/regulations—4.05
- Changes in government farm programs—4.04
- Foreign restrictions on products (genetically modified organisms [GMOs], etc.)—3.96
- Export trade barriers (tariffs, etc.)—3.91
- State/federal environmental regulations—3.87

Human risks stem from human behavior. For example, a divorce or death in the family can devastate a farm. The behavior of family members and employees is

important, and the more critical the role of the operator, the greater the human risk in that operation. Operators told surveyors they were most concerned about the death of the operator. Injury also was a concern (Mickelsen and Trede, 2001).

- Death of owner/operator—4.18
- Injury to owner/operator—4.08
- Lawsuits—3.69
- Injury to hired help—3.53
- Divorce of owner/operator—3.53

8.2.2 Internet Resources

There is a wealth of information readily available on the Internet to help you determine which risks are most important for your situation. Some examples are shown in Box 8.1; more can be found at the RightRisk.org Web site. From the RightRisk Web site, you can link directly into the Western Risk Management Library or the National Ag Risk Education Library. Each has thousands of papers, ranging from practical to academic.

Many Web sites provide graphs, tables, and charts, and some even let you download data in Microsoft Excel. For example, the severity of price and yield risks for crops in the United States is presented in Figure 8.2. This figure shows how volatile corn prices are around the country. Price volatility is a measure of how much price varies over time. The higher the number is, the more volatile the price. (See Chapter 13 on market risk for more information about price volatility.) Dry edible beans had the highest volatility measured, and beef had the lowest. This is just one example of the information you can find about risk on the Internet. Unfortunately, there is no easy, one-stop Web site to provide you information. It takes some hard work and ingenuity to find the information you need.

BOX 8.1 FINDING INFORMATION ON THE INTERNET

- Risk Management Education (U.S. Department of Agriculture) http://www.usda.gov/rma/rme
- Weather (National Oceanic and Atmospheric Administration) http://www.noaa.gov
- Markets (Agricultural Marketing Service) http://www.ams.usda.gov/marketnews.htm (Chicago Board of Trade Market Plex) http://www.cbot.com/mplex/
- Statistical Information (National Agricultural Statistics Service) http://www.usda.gov/nass (USDA Economics and Statistics System) http://usda.manlib.cornell.edu/usda/usda/html
- Economic Information http://www.ers.usda.gov (Economic Research Service)

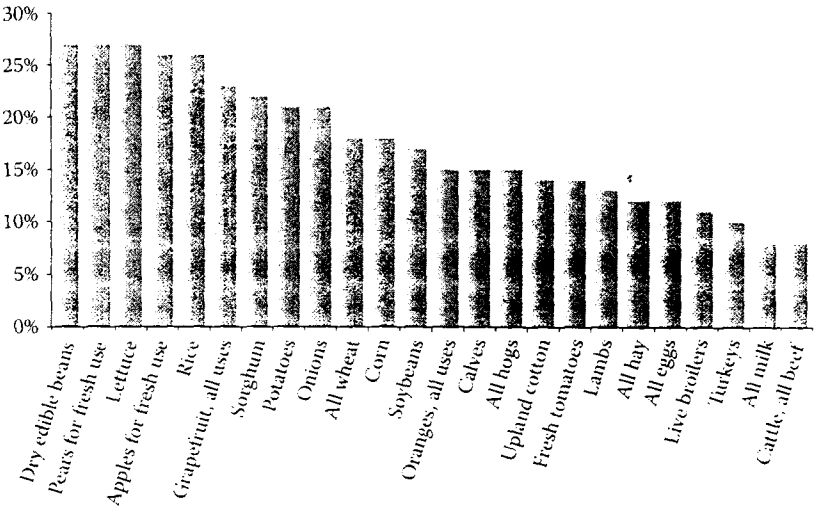

FIGURE 8.2 Price volatility of selected commodities, 1987–1996. (Harwood et al., 1999)

As we leave this section, it is important to emphasize that we cannot possibly list all of the risk resources on the World Wide Web, but spending a little time surfing could pay off big.

8.2.3 Prioritization Techniques

Most risks faced by farmers, ranchers, and agribusinesses are very complicated. Despite often extensive efforts to identify and quantify key relationships, it is frequently difficult to integrate all potential risks in a single risk management decision. As with other chapters about each step, this segment presents you with an array of tools to assist in identifying and prioritizing your risk. We recommend that you use the Risk-Influence Calculator; however, reading over the examples of the other methods is also recommended as it will help cement the concepts for listing and prioritizing decisions.

Risk management involves significant judgment on the part of the decision maker to evaluate the risks of different events and the probability that his or her actions will alter those risks (Greenspan, 2003). This process can be made easier through the use of decision analysis tools—tools that help organize information into a format that helps make better decisions. These tools often are available in electronic format. The following are four different decision analysis tools to help you identify risks:

1. Influence diagram (ID)
2. Contributing factor diagram (CFD)
3. Risk-Influence Diagram
4. Strengths, weaknesses, opportunities, and threats analysis (SWOT)

8.2.3.1 Influence Diagrams

An *influence diagram* (ID) is a graphical diagram with enough structure to organize complex and confusing relationships. IDs are discussed here because they are probably the most intuitive method available. For our purposes, a pencil and scratch paper are all that is needed to develop a useful ID for scoping out your problem in broad terms. This concept is highly recommended as a starting point; however, it is very difficult to develop a detailed ID for a complex problem. We recommend additional techniques to advance through Step 4. If you wish to develop a formal ID, there are software programs that can help.

A formal ID uses shapes, like circles, rectangles, and triangles, to represent decisions, outcomes, probabilities, and other factors. Rectangles represent decisions, ovals represent chance events, and diamonds represent payoffs (Clemen and Reilly, 2001). Arrows show how these occurrences are connected. We can demonstrate how to use an ID to evaluate the risks associated with the decision of whether to vaccinate cattle against foot and mouth disease. Cattle will be worth next to nothing if exposed to the disease. As shown in Figure 8.3, an operation's losses (profits) will depend upon the chance the herd is exposed to foot and mouth disease and whether a decision was made to vaccinate the cattle against the disease. Profit will be highest if the producer does not vaccinate and the herd is not exposed to the disease. Of course, this strategy also subjects the producer to the most risk because he stands to lose a substantial amount of money if the herd is exposed to and contracts the illness. In other words, profits will be lower if he vaccinates, but the likelihood of disease will be lower as well.

Influence diagrams can be made very complex if you draw every single box, triangle, and oval and connecting arrow. Try this simple exercise for a farm, ranch, or other business that you own or are familiar with. Put the objective "profit" in a diamond in the middle of a piece of paper. Start adding circles and rectangles to represent decisions and chance events that could have an effect on your profit. For example, add "crop yield" and "cost of production" in circles. Add "sell crop" as a decision in a rectangle. Be sure to draw every arrow connecting any two figures that are related. Remember, costs affect yield and yield affects costs, so there needs to be a two-headed arrow between them. And each of them needs an arrow pointing to profit. Then, for the second layer, add circles and rectangles that you think could have an effect on the previous circles and rectangles you drew. Continuing our example,

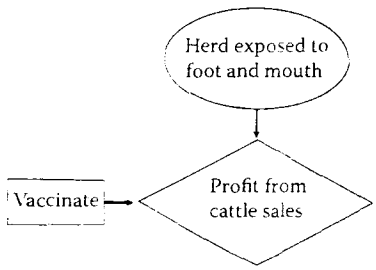

FIGURE 8.3 Influence diagram of foot and mouth vaccination decision.

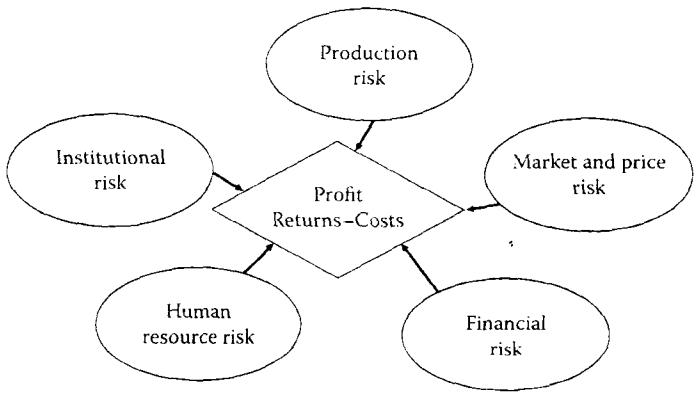

FIGURE 8.4 Contributing factor diagram of market price risks.

yield is affected by insects, water, nutrients, and weather. Insects, in turn, are affected by weather and the decision (a rectangle) to control them. Costs of production are affected by how you control pests and random events like the price of fuel. Finish drawing all the arrows between the shapes that represent related components.

Does it seem like you could go on forever? Some researchers call these "spaghetti" diagrams since a complex ID can look like a plate of noodles with round, square, and triangular meatballs. A good bit of judgment and practice may be required to find that balance between too little information to be realistic and too much to be practical. However, highly visual learners often prefer this type of decision analysis tool, and it is a popular method. Software programs, such as STELLA (iseeSystems.com), which builds models based on influence diagrams for systems thinking, are available for those who would like to use the ID method. Many public domain programs can be found free on the Web.

8.2.3.2 Contributing Factor Diagram of Foot and Mouth Vaccination Decision

To counterbalance the complex ID, we turn to a simpler diagram called a *contributing factor diagram* (CFD). The CFD focuses only on relationships between variables that contribute to a factor of interest, such as profit. Figure 8.4 is an example of a contributing factor diagram. Compared to the ID in Figure 8.3, the CFD does not include peripheral information such as how a disease is contracted, whether an exposed animal contracts the disease, the impact of temperature on infection rates, or the many factors that might have an impact on the efficacy of the vaccine.

CFDs are not flowcharts because events are not listed in sequence; they are free flowing with arrows that indicate where one item affects another. Generally, a person works backward in a CFD, starting from the problem and then working back to the issues that contribute to the problem. In this case, we will assume that most businesses start with the fundamental definition of profit below:

$$\text{Profit} = \text{Returns} - \text{Costs}$$

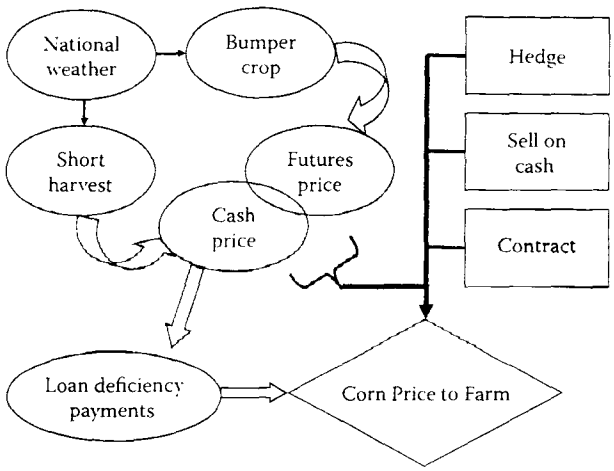

FIGURE 8.5 Contributing factor diagram of the EWS Farms corn marketing problem.

Working backward as shown in Figure 8.4, we focus only on how profit is affected by our five types of risk. We can then get more specific about where each risk comes from and prioritize how to affect that risk. A decision maker could choose price risk and move on to define it. Let's continue this example, since that's exactly what Aaron chose when he prioritized price risk for corn production. The CFD is expanded to illustrate the price risk decision on our case farm as illustrated in Figure 8.5. The net price a farmer receives is a function of how weather affects national supply, how the government sets price support program loan deficiency payments, and three decisions:

- Whether or not to sell on the cash market
- Whether or not to forward contract
- Whether or not to hedge on the futures market

The decisions shown in Figure 8.5 are typical for producers facing price risk, including EWS Farms. The Spragues would like to receive the highest price possible for their corn crop. They can sell on the cash market at harvest or store the crop, hoping for a better price later. They also could forward contract with the local elevator or their other option is to hedge on the futures market. (Note that storage is not represented in our simple illustration above.) The marketing plan developed by the Spragues, described in Chapter 13, allows them to choose any of these options, including a combination that includes selling one-third of the crop in each option.

8.2.3.3 The Risk-Influence Matrix

Up to this point we have discussed some rather elaborate methods for identifying risk. One of the most straightforward methods is called a *risk-influence matrix* (Clark and Timms, 1999). The concept of a risk-influence matrix is to rank each risk by how much impact it has on you and how much influence you have on it, as demonstrated in Figure 8.6.

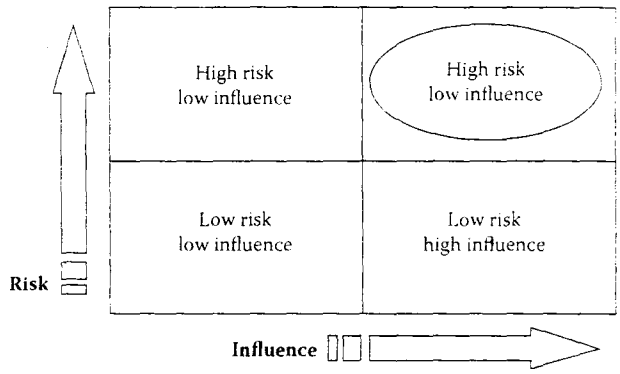

FIGURE 8.6 The Risk-Influence Matrix.

As can be seen in this simple illustration, some risks have a bigger impact on producers than others. For example, a hail storm might be considered a bigger risk than an equipment breakdown. This could be because the probability of the storm is greater than the probability of a breakdown, because the impact on profit is greater for a hail storm, or a combination of both. A manager or producer also has a varying degree of influence over different types of risk. There is little that can be done to reduce hail damage, but most producers are skilled at keeping equipment going. The purpose of the matrix is to identify where risks are high and where the operator has the most influence to address the risk. This area is indicated by the circle in Figure 8.6. Generally, you would prioritize managing the risks in the upper right-hand corner and setting aside those in the lower left-hand corner.

You can build your own customized matrix with the Risk-Influence management tool in Part 3. The tool allows you to compare impact and probability, which determines risk, and then to compare risk against influence. A detailed example can be found in Part 3.

8.2.3.4 SWOT Analysis

The last tool we will look at is a SWOT analysis. SWOT stands for *strengths*, *weaknesses*, *opportunities*, and *threats*. It involves the strengths and weaknesses internal to your business. For example, strengths on your farm or ranch could include good weather, well-working equipment or facilities, solid training, or a strong genetic line in a livestock herd. Weaknesses could include the opposite of any of the strengths, such as being in an area prone to hail damage. Strengths and weaknesses are internal to the business. Opportunities and threats, however, can come from inside the business or from external sources. An on-farm threat would be a recurrence of disease or weeds. An off-farm threat might include policy changes, rezoning, or your landlord terminating your lease.

The purpose of the SWOT analysis is a little different from the previous tools. SWOT helps you think about what your risks are by looking at where your SWOTs are, rather than looking at where your risks are. For example, suppose you were considering what career you would most like for yourself. You might fancy becoming an NBA basketball player, with becoming a polo star as second choice. However, after

On Farm	Off Farm (External)
Strengths Grew up farming in the area, father available for consultation and other help, family nearby, masters degree in agricultural economics	
Weaknesses New farmer, limited access to capital, rented land	
Opportunities On-farm storage, family help	**Opportunities** Crop insurance, rented land and water, government price support programs
Threats Estate claims by siblings	**Threats** Possibility of losing irrigation rights, hail

FIGURE 8.7 SWOT analysis on EWS Farms.

considering your SWOTs, you might scrap being in the NBA since you are only 5 feet 10 inches tall and can't even touch the hoop when you jump. You might give up on your polo dreams, too, if you drive a 1998 Dodge Neon and have trouble finding gas money. Your strength is your education in computer science, and you have an opportunity to get a job at Dell.

Consider Figure 8.7. At age 26, Aaron Sprague is a young farmer and he has a wife and three kids to support. This poses a serious weakness given how much capital and experience it takes to farm. Nevertheless, Aaron has a supportive family and is farming near where he was raised. He can take advantage of his family's extensive experience and capital reserves, including land, equipment, and even finances. On the farm, Aaron has some opportunities to use his family's help and crop storage facilities. But sooner or later the family will have to decide how to split the home farm and assets. Aaron's sister and her husband also farm, while his brother and other sister have not yet decided what they wish to do. Off the farm, Aaron has an opportunity to rent land and water, to insure his crops, and to use government programs. He is constantly threatened by hail and his source of groundwater is subject to a regional lawsuit with neighboring states.

8.3 PART 3: RIGHTRISK NAVIGATOR MANAGEMENT TOOLS

While we discussed several evaluation methods in the previous section, we now focus on the Risk Navigator SRM tool, the Risk-Influence Calculator. The purpose of this tool is to draw a visual map of risks in a way that helps you prioritize which risks need to be managed most. You will be asked to list up to ten risks and then indicate the probability that each will occur, the impact it will have on your operation if it occurs, and the amount of influence you may have to reduce the risk.

8.3.1 Risk-Influence Calculator

This tool is divided into three steps. In the first step, you are asked to enter the risks you wish to consider for prioritization. You are provided two slots in each of five risk

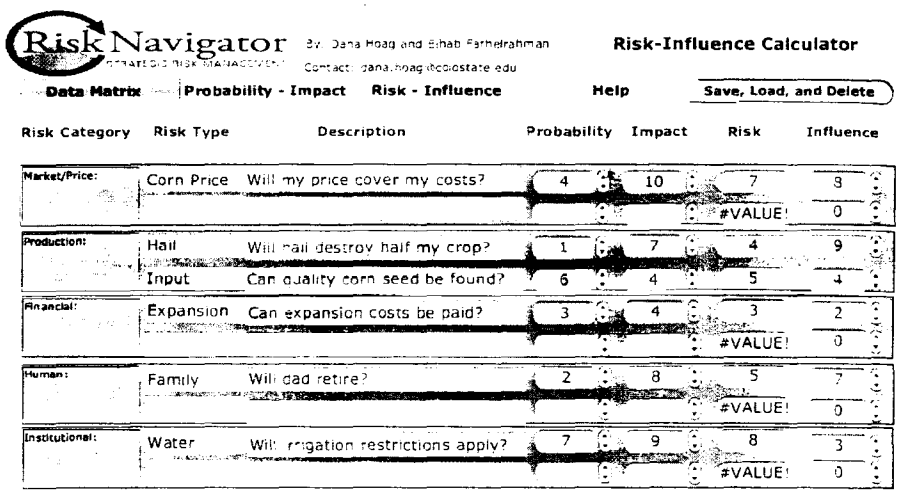

FIGURE 8.8 Risk-Influence Calculator.

categories: market, production, financial, human, and institutional. You may ignore the risk category when you enter risk types if you like. That is, you can enter more than two risks in any of the risk types by entering extras in other risk categories and ignoring the risk category label. The objective is to assign a level of risk and influence to each risk. Start by naming each risk and writing a brief description. Then enter the level of probability and impact for each risk type—risk will be determined automatically. Risk is equal to the (probability score + impact score)/2, rounded downward to the nearest integer. Then enter your influence level.

Figure 8.8 shows what we entered for Aaron from Part 1. Notice that when you assign a 1, there is little chance of a bad outcome and when you enter a 10, there is a high chance of a bad outcome. Aaron asks, "Will my price cover my costs?" Enter a 1 to mean that the costs will be covered and 10 to indicate that costs will not be covered. Likewise, enter 1 when the impact of the risk is very low and 10 when it is very high. Finally, we want to know how much influence you have on the risk. Enter 1 if you have no effect and 10 if you can control it perfectly.

The scores that Aaron Sprague used come up automatically in the tool if you download the EWS Farms example; otherwise the tool comes up empty and ready for you to use. Aaron assigned a relatively high probability of not being able to find good corn seed and to getting his irrigation water cut off. Aaron is probably concerned that corn seed might be short due to the increased plantings in recent years, and in eastern Colorado, farmers are embroiled in several battles that have resulted in lost water rights. He felt that a severe hail storm was unlikely and that his dad would probably not retire any time soon. Only a low market price and loss of irrigation water landed in Quadrant 4, where both impact and probability are high. Aaron entered his influence last. He felt that he had a lot of influence over the price of corn because he just completed his master's degree in agricultural economics at Colorado State University where he learned advanced marketing techniques. He assigned a low influence score to being able to do much about the loss of irrigation water. The

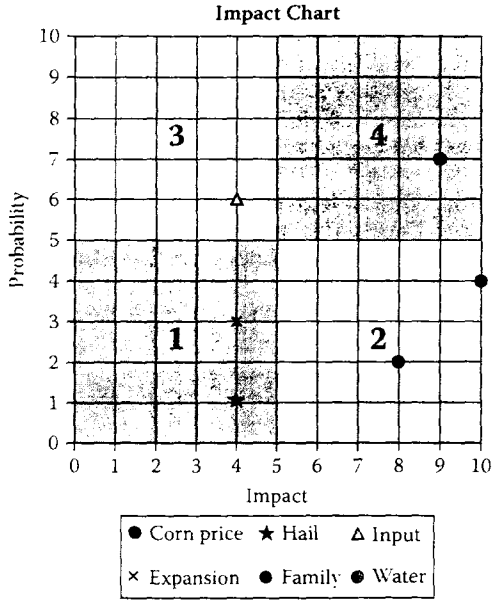

FIGURE 8.9 The Risk-Impact Diagram.

reason Aaron provided a high influence score for hail damage was not because he could control the weather, but because he could buy crop insurance to cover hail losses.

The second step is to examine and prioritize your list of risks. Start by clicking on the Probability-Impact tab. Risk is a combination of probability and impact. Use the probability-impact chart to examine where your risks are coming from (Figure 8.9). Risks in the upper-right quadrant (Quadrant 4; quadrants are numbered in the book) are a priority because they have a high chance of happening and will have a big impact if they happen. Risks on the lower left (Quadrant 1) are not a priority. Risks in Quadrants 2 and 3 are of concern. For example, a risk with a probability score of 7 and an impact score of 6 would have a risk score of 6, which will plot into Quadrant 4 in the chart ((7 + 6)/2, rounded down).

Finally, you can determine your risk priorities. Click on the Risk-Influence tab. Referring back to Figure 8.1, you can see the risk level of corn price is 7, as described previously. Aaron assigned an influence score of 8 to this risk, so it lands in Quadrant 4 as our top risk to prioritize. Hail has a high enough influence score to be a priority, but is only a 4 on the risk level, so it lands in Quadrant 2. Even though the probability of Aaron's father retiring is low, the risk lands on the border in Quadrant 4 because the impact would be high if he did retire; so it should be taken seriously.

The risk tool allows you to print or save your results. It is also a good idea to readjust your numerical estimates to make sure the charts represent what you really think.

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