

RIGHT RISK NEWS

Understanding the Importance of Risk With Influence Diagrams

DATES TO REMEMBER

Forage Insurance
- September 30th

RI-PRF Coverage
November 15th, 2021 for 2022 crop year coverage

Acreage Reporting
- November 15th

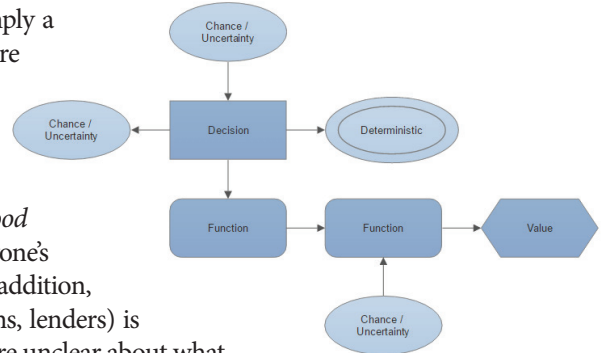
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In popular usage, risk is generally understood to mean future events for which the outcomes are unknown or uncertain. However, not all aspects of the unknown future are created equal. We might describe risk as a case where the unknown future matters; if the outcomes did not matter there would be no risk. In such cases, the consequences make a difference to those who are making the decisions or may be affected. Also keep in mind that risk does not always imply a negative or bad outcome. Uncertain future events may result in good, bad or neutral outcomes.

What is Risk?

In his book, *Risk Savvy: How to Make Good*

Decisions, Gerd Gigerenzer explains that although risk is part of nearly everyone's daily life, few are trained to evaluate risk alternatives in any formal way. In addition, information provided by many trusted sources (doctors, lawyers, politicians, lenders) is often inaccurate, incomplete, or incorrectly portrayed because the experts are unclear about what the practical implications are.

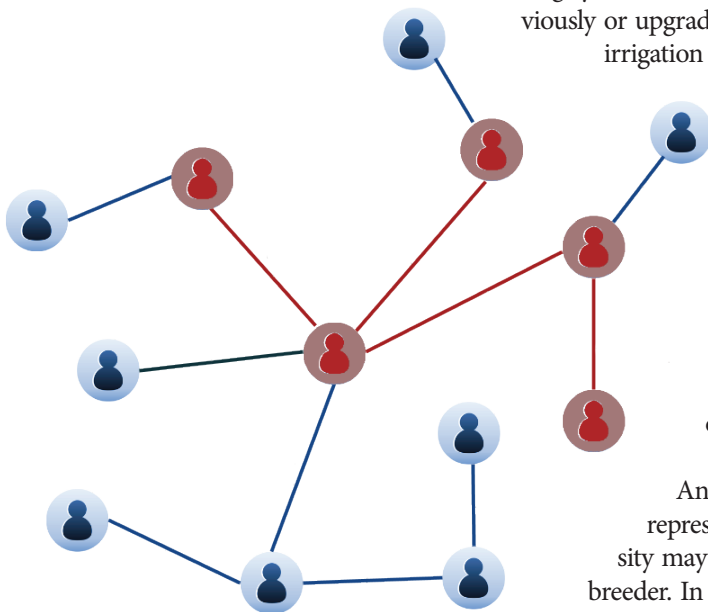


Future events are unknown as a result of two, separate and distinct factors. The first of these is variability. Variability means alternative or different outcomes in the future due to the effects of chance. As a result, this type of change or variation in results cannot be reduced by further study or by any type of measurement. Variability is also what most managers mean when they refer to risk.

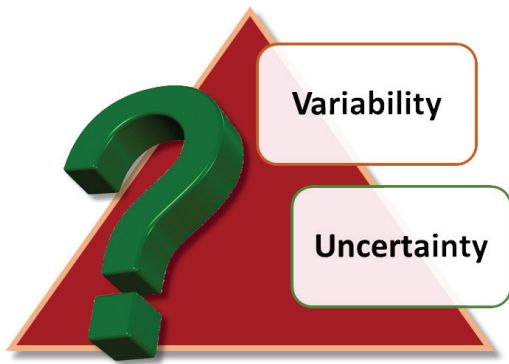
Variability may be reduced, in some cases, through a change in the underlying system. Agricultural examples might include changing a calving system to include calving sheds, where calving in the open was practiced previously or upgrading an irrigation system or associated technologies, where flood irrigation practices were followed in the past. Another example of changing the system in a game of chance might be using weighted dice where normal dice were used previously.

In each case, the outcome of future events remain unknown. However, the variability of those outcomes has changed, due to a change in the underlying system. Sometimes management changes increase the variability, at other times consistency is increased. Decisions to manage variability generally focus on reducing the consequences of negative outcomes, increasing the likelihood of positive outcomes, enhancing the benefits of positive outcomes, or possibly all of the above at the same time.

Another important point to realize is that not all risk is bad or represents a substantial threat to a business. Variations in genetic diversity may offer a competitive advantage to a seed-stock producer or plant breeder. In addition, it may offer a higher degree of resilience to a business operating in a risky environment.



How Much Risk is Right for You?



Uncertainty About the Future

The second factor of the unknown future is uncertainty. Uncertainty refers to our lack of knowledge about the future. It may even represent our uncertainty about the meaning of current events and what they may imply for future outcomes. Uncertainty can sometimes be reduced by further study or measurement. In such cases, a manager becomes more aware about the outcomes that are possible or perhaps is better able to estimate the likelihood of a set of outcomes through research on the underlying system. Some aspects of uncertainty are unknowable and, as a result, unmanageable. Stated another way, it is impossible to know much of anything about the unknown unknowns!

Estimating Risk via Influence Diagrams

Most threats faced by farmers, ranchers and agribusinesses are complex and changing. Despite often extensive efforts to identify and to quantify key relationships, it is frequently difficult to integrate all the potential threats that enter into a risk management decision. Risk management involves significant judgment on the part of the decision maker to evaluate the threats of different events and the probability that his or her actions will alter those threats. The process can be made easier through the use of one or another technique for evaluating the threats and potential consequences in a particular decision.

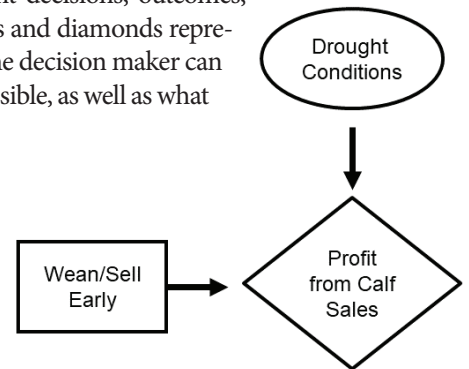
A risk influence diagram is one of the most basic starting points for beginning to understand those relationships. In general, risk is estimated by making projections about the probability and the potential impact on the person or business. Sometimes just getting the various points of the problem down on paper can be a big help.

An influence diagram is a graphical figure with enough structure to organize complex and confusing relationships. Influence diagrams are probably the most intuitive method available for organizing the basic facts for a given decision. A pencil and scratch paper are all that are really needed to develop a useful influence diagram for describing the situation in broad terms. This approach is highly recommended as a starting point. However, it can quickly become difficult to develop a detailed influence diagram for a complex problem.

A formal influence diagram 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. Arrows show how these occurrences are connected. Following this approach, the decision maker can begin to better understand what comes first (chance), what decisions or remedies may be possible, as well as what the expected consequences might be.

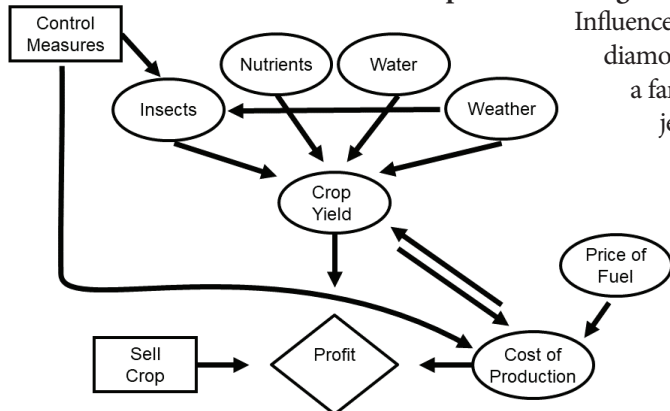
Drought Influence Diagram Example

One example of the application of an influence diagram might be to evaluate the risks associated with the decision of whether to wean early or hold calves to the regular weaning date in the face of drought conditions. Calves will be lighter and gross sales will be lower as a result if sales occur earlier in the year.



The influence diagram shows that the operation's losses (profits) will depend upon the chances of drought conditions and whether the decision is made to wean/sell the calves early. Profits will be higher if calves are sold at the normal time later in the year after gaining additional weight and with no drought conditions. Of course, this strategy also subjects the manager to greater risk of adverse weather events where drought conditions may develop after the decision has been made to place the calves on remote pasture. In other words, profits will be lower if the calves are not moved to remote pasture, but the likelihood of lower profits due to an inability to wean/sell early are lower, as well.

Crop Influence Diagram Example



Influence diagrams can be very complex if users attempt to include every box, diamond, oval and connecting arrow. You might consider a 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.

Then 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 should be a two-headed arrow between them. And each should have an arrow pointing to profit.

Next, as a second layer, add circles and rectangles you believe could have an effect on the previous circles and rectangles. Continuing our example, yield is affected by insects, water, nutrients and weather. Insects, in turn, are affected by weather and the decision (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.

Some researchers call the resulting figures spaghetti diagrams since a complex influence diagram can look like a plate of noodles with round, square and triangular meatballs. A good measure of judgment and practice may be required to find the balance between too little information to be realistic and too much to be practical. Visual learners often prefer this type of decision analysis tool and it is a popular approach for better understanding complex situations. Software that can create models based on influence diagrams for systems thinking is available for those who would like to use the influence diagram method.

Obviously, the influence diagram offers only a very basic understanding of the situation, and yet that basic level of understanding may help the manager catch sight of a more complete picture of the overall situation they face.

References:

Gigerenzer. *Risk Savvy: How to Make Good Decisions*. Viking, Penguin Group LLC. New York New York. 2014.
Hoag, Fathelrahman, Griffith, Hewlett, Keske, Parsons, and Pritchett. *Applied Risk Management in Agriculture*. CRC Press. Boca Raton Florida. 2009.
Hewlett, Parsons, Tranel, and Taylor. *Understanding Risk in Agriculture*. An eBook developed in conjunction with the online *Understanding Risk in Agriculture* online module. RightRisk.org. 2019.



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The national economy expanded at a moderate pace from early April to late May, at a somewhat faster rate than the prior reporting period . . .

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HIGHLIGHTED TOOL: *RISK INFLUENCE CALCULATOR*

The risk influence calculator allows the user to rank each threat by the expected impact it will have on the business and how much influence the manager has over it. Obviously, some threats would be expected to have a greater impact than others.

For example, a hail storm might be considered a greater threat than an equipment breakdown. This could be because the probability of the storm is greater than the probability of a breakdown. As a result, the expected impact on business profitability is greater for a hail storm or a combination of both. A manager 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 operators are skilled at keeping equipment functional. The purpose of the calculator is to help identify where risks are high and where the operator has the most influence to address the threat . . .

Risk Category	Risk Type	Description	Probability	Impact	Risk	Influence
Market/Price	Corn Price	Will my price cover my costs?	4	3	3	3
Production	Hail	Will hail destroy half my crop?	1	3	3	3
Production	Input (seed)	Will good corn seed be available?	4	3	3	3
Financial	Expansion	Can family cover new land payments?	3	3	3	3
Human	Family	Will my dad retire?	2	3	3	3
Institutional	Water	Will irrigation water be restricted?	2	3	3	3

To read more or to access the tool, see: RightRisk.org/Analytics > [Risk Navigator Toolbox](#)

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