by Chuck Chakrapani, Ph.D.

decision models of marketing research roi

Decision models link research to ROI either by assuming an intuitive relationship or by extrapolating past experiences of successes and failures to the current situation. These connections are generally based on either past experience or logical assumptions or both. Since they can be intuitive or experience-based or both, they give us the freedom to incorporate past knowledge and current judgments. In doing so, they force us to think about the decisions we expect to make on the basis of research and also about the possible impact of those decisions.

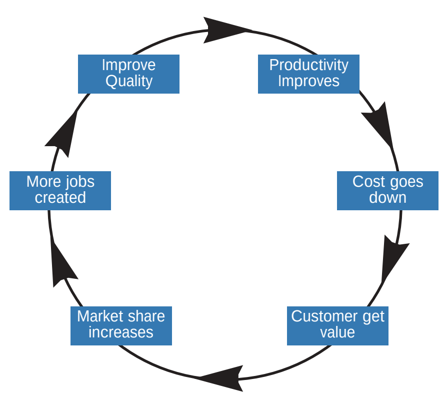
INTUITIVE MODELS

Intuitive models have been used by many successful businesses throughout the centuries, continuing to this day. For example, there is no way to calculate possible ROI on innovative and novel ideas prior to taking action. Bill Gates could not possibly have calculated the return on the Windows operating system when it was first introduced, even if he had undertaken extensive marketing research to assess its potential. However, like most astute business people, he likely foresaw the profit potential. As a matter of fact, many successful business ventures are predicated on logical connections postulated by the business innovators.

One particularly striking example of this assumptive model is provided by Dr. Edwards Deming. After the Second World War, Japan had a reputation for producing substandard goods. The basic assumption was that creating quality goods costs more, i.e., to keep prices low and capture the market one had to sacrifice quality. Expenditure on quality was seen as an expense. Deming was invited to Japan to explain to business people how they could overcome their poor image and be competitive in the international marketplace. Deming used a simple assumptive model to explain to them that quality is not an expense, but an investment. His model is shown in Exhibit 1.

The model simply showed that quality, by standardizing the manufacturing process, lowered the cost, which in turn created greater demand for the product and hence higher profit for the firm. Therefore money invested in increasing product quality is an investment and not an expense.

Exhibit 1 - Deming's Model



This model, based on theory and intuitive logic and not on hard data, turned out to be a very powerful one, resulting in the Japanese economic revolution. In the ensuing thirty years, the Japanese followed this model, erased their image as a substandard manufacturer and captured world markets. There is little argument about the ROI created by this model. Yet, generally speaking, it is difficult to use models like these to assess market research ROI, unless they can be formalized and applied to on-going decisions.

EXPERIENCE-BASED MODELS

One way to formalize decision models is to use concepts of decision theory to estimate ROI. Decision theory makes use of probability concepts. Suppose you take into account all your past decisions based on research and find that such decisions have turned out to be right 75% of the time. This could be formalized to mean that if you consistently take action based on research, you will be right 75% of the time (probability = 0.75) and wrong 25% (probability = 0.25) of the time.

While we can never be certain which decisions will be correct and which ones will be wrong, we can establish an expected monetary value of our decisions. The expected value can be viewed as the average pay off of your decisions (not a specific payoff of any particular decision).

To arrive at the expected monetary value of a decision, we simply:

a. multiply the probability of success with the payoff that will accompany success;
b. multiply the probability of failure with the payoff that will accompany failure; and,
c. add the two values.

Here is an example. You would like to introduce a new product. Past experience with new products in your industry shows that 8 out of 10 new products fail (i.e., the probability of success is 0.2; the probability of failure is 0.8). You also know that when a product succeeds, the average payoff is $25 million and if the product fails you'd lose $5 million. Your expected payoff under these conditions is (Probability of success x Payoff of success) + (Probability of failure x Payoff of failure)

Outcome	**Payoff**	**Probability**	**Expected payoff (Payoff x Probability)**
New product succeeds	$25mm	0.2	$5mm
New product fails	- $5mm	0.8	- $4mm
Total			$1mm

Simply stated, if you make a decision with no information, 8 out of 10 decisions you make will end up losing money. However 2 out of 10 decisions will generate enough profits to pay for your losing decisions. Since your winning decisions win far more than losing decisions lose, you will, in the long run make money, on average $1,000,000 per decision.

However, if the expected value of your decision is $1,000,000, it does not follow that each decision will make $1,000,000. It is just a long run expectation. It is possible to make five wrong decisions in a row, resulting in a loss of $25 million to the firm.

What if research provided us with perfect information so we cannot fail? In this case, the expected value of perfect information (EVPI) is

= (Probability of success x Payoff) + (Probability of failure x Payoff)
= (1.0 x $25,000,000) +
(0.0 x -$5,000,000)
= $25,000,000 - $0
= $25,000,000

Note that no research can be worth than the value of perfect information. Positive ROI cannot be established for research whose cost exceeds EVPI.

If we assume that the cost of research that provides perfect information is $2,000,000 (including test marketing the product), then the return on market research is as follows:

$$= \frac{\text{(Return with research – Return without research) – Cost of research}}{\text{Cost of research}}$$

$$= \frac{(\$25{,}000{,}000 – \$1{,}000{,}000) - \$2{,}000{,}000}{\$2{,}000{,}000}$$

= 1100%

Obviously, perfect information, as described above, doesn't exist. Marketing research, by its very nature, cannot provide perfect information. There are many reasons for this. Marketing research deals with samples of consumers. If we are certain about something at the 95% level of confidence (the level that is used most frequently in marketing research), it follows that we are likely to be wrong about 5% of the time. Again, past experience may show that marketing research is correct in predicting the future behavior of consumers only 75% of the time, even after accounting for the confidence level. This means that, when we use research, we will be right about 70% of the time. We will be wrong 5% of the time because the level of confidence we use and another 25% of the time because that is the evidence we have from the past. Now we can build this into our model:

= (Probability of success x Outcome) + (Probability of failure x Outcome)
= (0.7 x $25,000,000) + (0.3 x -$5,000,000)
= $17,500,000 - $1,500,000
= $16,000,000

This would mean that we could spend as much as $16 million on research.

What if past experience shows that our probability of being right with research is only 0.6 and not 0.7?

= (Probability of success x Payoff) + (Probability of failure x Payoff)
= (0.6 x $25,000,000) + (0.4 x -$5,000,000)
= $15,000,000 - $2,000,000
= $13,000,000

Even here we can spend as much as $13 million on research. The probability of success has to be far lower for the organization to proceed without research.

As another example, is research worth doing if without research the expected value of our decision is $1,000,000 and with research it is $2,500,000? That would depend on the cost of research. If we assume that the cost of research is $2,000,000, then

$$= \frac{\text{(Return with research – Return without research) – Cost of research}}{\text{Cost of research}}$$

$$= \frac{(\$2{,}500{,}000 – \$1{,}000{,}000) – \$2{,}000{,}000}{\$2{,}000{,}000}$$

= - 25%

In this instance the maximum one can invest is $1,500,000 on research. Obviously any expenditure on research in excess of $1.5 million cannot be justified. Otherwise, it will be a losing proposition and it is better to take a decision without the help of research.

Obviously, these calculations involve judgments on the part of decision-makers. Their input to the model could be less than accurate. However, as mentioned earlier, the main advantage of models like these is that they force the decision maker to take a closer look at the expenditure and the possible return on it. They can also provide information on how much to spend on research by projecting an ROI based on known facts and best assumptions of the decision maker.

To apply these models to assess the ROI of marketing research, one needs to estimate the probability of research findings being right (i.e., correspond to future consumer behaviour), the cost of making a wrong decision and the payoff associated with a correct decision. Decision models are often expressed as decision trees, which are visual displays of outcomes, probabilities and payoffs. The accompanying box explains how to create decision trees.

The application of decision models to the ROI problem is the beginning of quantification. However, because its inputs can be completely subjective, it may often be less "scientific" than it appears. Nevertheless, decision models are a good way of formalizing the problem of ROI under uncertainty. We will consider more complex models of ROI later on in this series.

[1] This is in theory. In practice, you'd want the research costs to be far lower than the expected return.

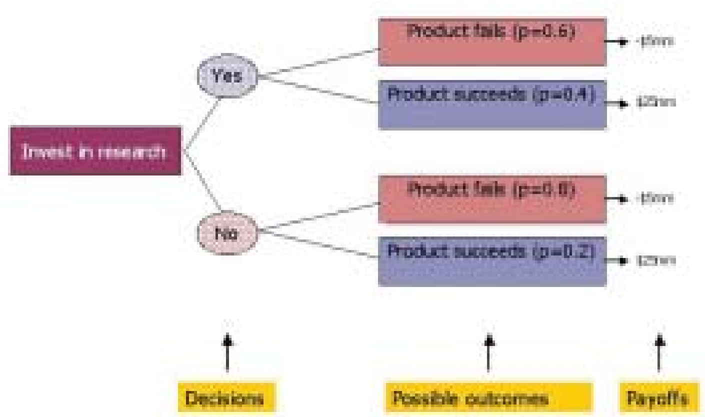
DECISION TREES: HOW TO CREATE THEM

Decision models are often expressed as "decision trees" that visually display the alternatives and the probabilities associated with the alternatives. Decision trees offer an effective structure to display the options available to the decision maker and assess the possible outcomes of choosing any those options. They make explicit the rewards and the risks associated with alternative courses of action.

We start a decision tree with the decision we need to make: to invest or not to invest in research? Draw these two choices in two boxes as shown in the chart below. Then consider:

• What are the possible outcomes for each of these decisions?
• What is the probability of each outcome?
• What is the payoff for each outcome?

Indicate these pieces of information in the decision tree as shown in the diagram below.



Once the chart is complete we can calculate the expected value of each course of action by creating a table as follows:

Decision	Possible outcomes	Payoffs	Probability (p)	Expected value (payoff*p)
Invest in research	Product fails	($5,000,000)	0.6	($3,000,000)
	Product succeeds	$25,000,000	0.4	$10,000,000
	Expected value			**$7,000,000**
Do not invest in research	Product fails	($5,000,000)	0.8	($4,000,000)
	Product succeeds	$25,000,000	0.2	$5,000,000
	Expected value			**$1,000,000**

The last column (expected payoff) is created by multiplying the payoff for an outcome with the probability of that outcome. Expected value is the total for all possible outcomes for that decision. Because the input for decision analysis can be either subjective or based on past experience, the two columns – Possible Outcomes and Payoffs – can be based on actual past experience or best estimates of the decision maker.

Since the expected value for investing in research is $7 million and for not investing in research is $1 million, the difference of $6 million is the ROI on research.

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