Using Models with Scenario Analysis—The Fundamentals

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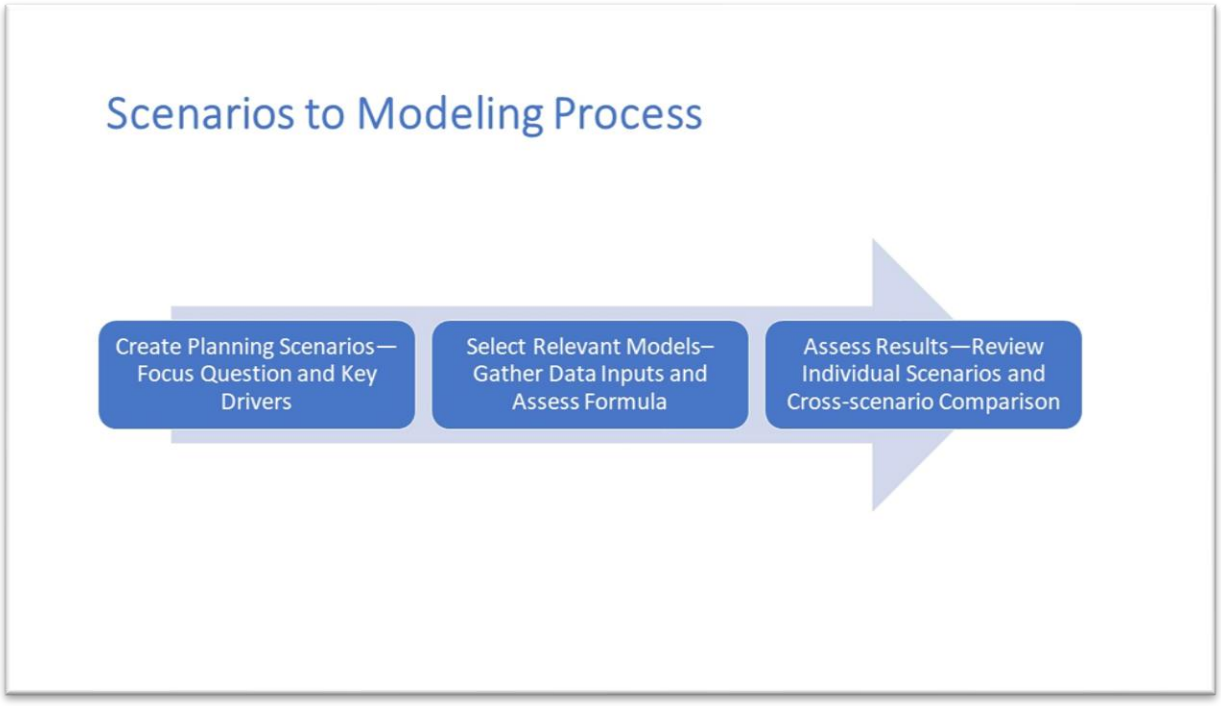
This paper explains the fundamental steps involved in moving from a set of planning scenarios to integrating them with analytical models. This paper assumes the reader is familiar with the process involved in creating planning scenarios which can be used for strategic analysis, thought-leadership, and risk assessments.[1] Analytical models in this paper refers to quantitative models which are created to assess issues in the areas of finance, economics, performance assessments and risk/options analyses. These models take data input and use formulas or algorithms to produce analytical results around key measures of importance, generally related to key decisions. All of these models exist with a context, market or environment from which relevant data is gathered and formulas are created. So, for example, in the electric power sector, models may be created to forecast future prices. In that case the inputs and formulas will be derived from electric markets and concepts on how they function.

Here are the key steps involved in using analytical models to enhance and expand the useful of scenario analysis:



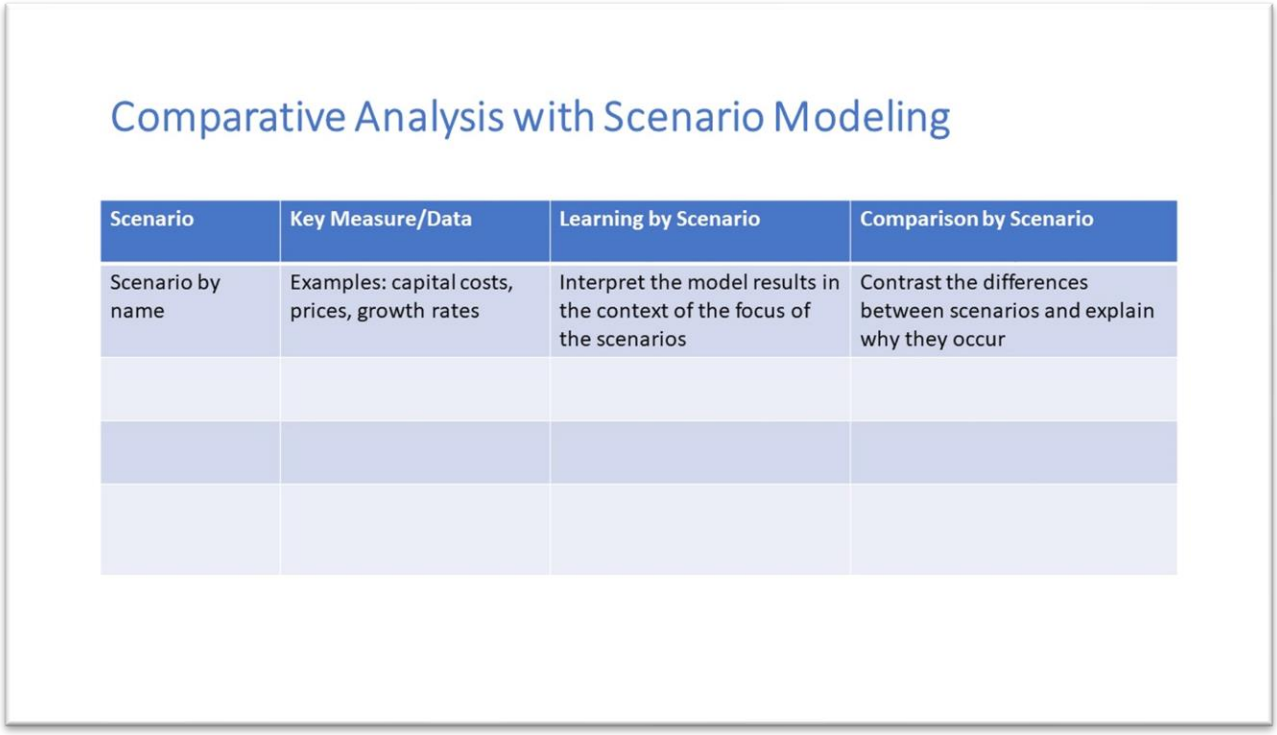
1. Use a good process to create planning scenarios. This involves having a clear focus for the scenarios (what are the scenarios about, key questions) and a set of key drivers derived from the environment where decisions will play out. For example, key drivers may include: economic

[1] For those readers who are not, please visit our website at www.artofquantumplanning.com where an introductory paper can be downloaded.

factors (interest rates, fuel prices, GDP growth, sales of key products); technological change (rates of cost reductions driven by innovation); product sales; regulatory changes (especially those that impact costs or market access); shifts in the natural environment (climate changes impacts), and more. Some level of research is generally useful in establishing those key drivers. But a good scenario process should iron all of this out.

2. The key step above is important because it provides some key "connective tissue" to the modeling. The logical arguments in the scenarios and the key drivers are connected to the models in terms of: (a) indicating which models might be most useful (are they assessing issues of importance in the scenarios); (b)the selection of key data inputs into those models (are they connected to the key drivers and how they vary in each scenario); and (c) the formulas and algorithms in the model (do they reflect the logic and trends in the scenario narratives).
3. The selection of models is often tied to which ones are actually available within or to an organization. Very seldom are models created from scratch in this process (this can be time-consuming and subject to distractions and spending time and resources which are just not available). In the real-world compromises are made and existing models are used. This is not necessarily bad because often existing models are already focused on key issues of concern to the organization. In this light the use of the models when paired with scenarios might demand "tweaking" inputs and formulas in the existing models. The analyst or decisionmaker at this point has to decide whether using the models will provide "good enough" results and insights to help decision makers or inform strategy or other important analyses.
4. Once the key models are chosen the next step is to find data inputs to run the models which are reflective of the conditions in the various scenarios. So, for example, if the fuel price shifts are important, then data with forecast of fuel prices consistent with the scenarios have to be found or created. If the scenarios suggest different levels of technological innovation, then variations in S-curve growth projections consistent with each scenario will be needed. The essential work here is determining which variables in the models the analyst wants to change in order to be consistent with the scenario narrative and arguments. Once those variables are chosen and the data collected and verified the models can be run *for each scenario*. The time frames of the models should match those of the scenarios. Sometimes a shift in the formulas underlying a portion of the model might need to be changed as well. If this is not too much work and will not "break the model" this should be done. An example of this may be that a particular market factor may be a contributor of a price forecasts. If that factor falls away in the scenario, then it might be removed from how the forecast data is created.
5. Once the models have been run consistent with the scenarios, the next steps involve assessing individual scenario modeling results (what do the models indicate about developments in a particular scenario); and then a comparative analysis of the results across the various scenarios. Assessing results within a particular scenario might be useful especially if that scenario is a preferred future. Seeing how various factors play out in the future can be informative. However, a scenario that may not be preferrable can also show and highlight important issues, risk and opportunities. The comparative assessment across the scenarios is best done by finding important data outputs and results and showing how they vary from one scenario to the next. Explaining why those differences occur is the key. So, for example, if sales of key products vary widely from one scenario to another, it is important to explain why.

6. One more word about the comparative analysis work—don't cut this too short if you can avoid it. This can be hard work. Explaining why changing some data inputs lead to very different outputs and results, and what those differences mean can take time. Making the comparison across all the scenarios can also be time-consuming (even with just three or four scenarios if there are multiple important variables to look at). However, very often the comparisons can indicate unanticipated developments. Doing this also completes the process, and very often important things are learned in doing the whole job.



Comparative Analysis with Scenario Modeling

Scenario	Key Measure/Data	Learning by Scenario	Comparison by Scenario
Scenario by name	Examples: capital costs, prices, growth rates	Interpret the model results in the context of the focus of the scenarios	Contrast the differences between scenarios and explain why they occur