Lessons Learned Building Analytical Models

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Understanding the Corporate Context for Building Analytical Models

It is important for individuals to know how well their company operates internally and compared to others in the industry. It is a competitive environment, and companies are continually looking for robust ways to improve their operations. Engineers are well suited to provide robust, analytical support to improve overall corporate operations. However, engineers have a propensity for detail and must keep in mind the overall objectives of the analysis that they are performing, ensuring that they are delivering the right solutions, in the right time frame and to the right decision-makers. There are a number of tools that can be used to identify areas for improvement and areas that need more robust tools to provide meaningful improvements in your organization.

By looking at industry benchmarks, you can learn where companies excel and where improvement is needed. This can help you pinpoint specific areas that show the most promise for improvement and how they can ultimately impact upstream and downstream functions. It is vital that lower-level decisions support the overall corporate goals. You can evaluate the product line in regard to which product should be put into the product line and which should be dropped. You can access the supply chain to determine areas in which performance improvements should be focused on. You can weight mergers for their impact on current operations and whether the merger is the right move.

Key in process improvement is to evaluate your organization from a comprehensive and holistic approach, assessing company performance and identifying areas for corporate improvement efforts. Many times, you look at the problem in a stovepipe manner and try to solve what appear to be key issues from a singular perspective. You must take a global, holistic approach to understand the overall impact a problem has on the entire organization. All organizations have multiple interactions, so you must look at the upstream interactions and the impact on the downstream functions before any decisions are made.

All levels of the organization must contribute to organizational improvements. The goal is to get people to think of the big picture and understand the tools and techniques that they can use to solve corporate-wide problems. The difficulty is to know when and where you should use these concepts. Understanding the problem and the environment and analyzing the information and quantifying results involve putting the conceptual and analytical pieces together to solve the presented problem. You can use this basic process from the production floor to the board room. It is based on applying the right solution approach to the problem and generating a sound, implementable solution.

In general, corporate planning approaches are based on establishing a vision, doing a situation analysis, setting objectives, and developing strategies. However, engineers can provide the corporate leadership to focuses on structured analysis processes that you can use to quantify, explore, and solve problems from a cross-functional perspective. Depending on the executive, a traditional strategic planning approach may be conducted by a vice president for a given functional area. The traditional approach would focus on optimizing this particular area. It is crucial, however, to ensure that the optimization of one functional area does not negatively impact another. This is why the integrated, cross-functional approach to problem-solving is critical to benefit the company as a whole.

If organizations approach problem-solving from a corporate perspective, the organization will undoubtedly become an effective and more efficient operation. The solution then is based on an overall objective approach, and not on individual agendas, and a well-operating environment such as this is a true measure of the future success of a company. *Knowing where to begin, what to assess, how to look for workable solutions, and what to measure provides effective solutions that can be implemented by the entire organization.*

It is easy to get mired into details, overlook key elements of the problem, and not know what techniques are most appropriate. Time is always of the essence, so solutions must be quickly developed to solve problems in an ever-changing environment.

Experienced employees are important to any organization. The knowledge they possess provides valuable insight into the operation of the organization. Individuals with different educational backgrounds and experiences have a variety of ideas and perspectives on how the organization should operate. Experience must be part of the decision process, along with the available data to make sound business decisions. Different opinions can lead to a wide variety of approaches in solving problems and accomplishing the company's strategic goals. Quantifiable measures, however, should be used to support and justify decisions whenever available.

Data can show the condition of the organization and the efficiency of the operating environment. Making decisions without supporting facts and information can lead to less than optimal decisions that may not be justified when looking at the company's bottom line. It is critical to support experience, expert opinion, and judgment with factual data. It is much easier to justify a course of action with "the data shows" instead of "I think or believe." Unfounded opinions can more easily be dispelled with facts rather than succumbing to the power of strong-willed individuals arguing for their solution.

A clear understanding of organizational objectives provides direction and focus for the corporation. Typically, there are many different areas of opportunity to pursue with limited resources. A clear picture and evaluation of the organization environment and the interaction between functions provides a framework to understand and evaluate the issues facing the corporation. A sound assessment of the issues within the company is critical to pinpointing

key issues and opportunity areas. Measuring these key issues provides an understanding of the progress and success in improvement efforts.

Steps to Assist in Building Robust Analytical Models for Decisions

High-level steps and methods are discussed below to walk you through the process to identify corporate issues and develop solutions that can direct the corporation to achieve its goals. A structured thought process and a solid evaluation of corporate functions and issues can drive a corporation to improvement as measured by key performance metrics. This provides a roadmap to identify the key areas in which improvements are required that can best impact the bottom line. For a more detailed treatment of these topics, please refer to the book, "A Professional's Guide to Problem Solving with Decision Science," by Frank A. Tillman and Deandra T. Cassone, 2018.

Define the Objectives and Identify Metrics

You need to clearly articulate and document the objectives of a corporation. Each of the multiple functions within a company has different objectives with varying importance, and many of the high-level objectives of the corporation may conflict. It is vital for senior management to articulate these objectives and reach an overall consensus of the weighted importance so that these objectives can be included in the corporate decision process at all levels.

Key points surrounding this process are listed below:

- Groundwork in understanding and defining the problems facing a corporation is essential to bring to light, functional areas requiring improvement.
- You need to determine the scope of functional areas that may be impacted.
- It is necessary to establish corporate objectives to strategically define the direction of a company. This requires consensus among decision-makers.
- A corporation has multiple conflicting objectives that require the balancing of cross-function activities.
- Decision criteria and metrics provide quantifiable measures that can be driven down into the corporate decisions so that activities meet the corporate objectives.
- Understanding the data required and data available to support corporate metrics facilitates the measurement of the key metrics and contribution to accomplishing corporate objectives.
- Subjective data or opinions provide insights into a subjective assessment of a

metric. Subjective data and expert opinions are typically forward-looking in nature, trying to predict what will happen in the future as opposed to statistical analysis that deals with historical data.

- It is important to weight the objectives and metrics across all executives to gain a consensus in the direction of the company.
- Senior executives must be involved in this process to establish the corporate objectives that can drive the cross-functional problem-solving effort.

Explore the Environment

Explore the environment with integrated corporate planning. Assessments are made with key corporate functions to determine the closeness or dependence of the functional relationships that you can use as a guide to identifying the scope of functional areas for improvement. Additionally, benchmarking, variability analysis, and budget contributions are assessed to expand beyond the relationships to evaluate how well these functions perform against industry competitors.

Key points about this process are listed below:

- To assess the scope of the problem and opportunities, you need to identify key corporate functional areas to include in the analysis.
- To develop a comprehensive view of corporate performance, you need to identify the interactions, relationships, and impacts between corporate functions.
- Quantifying performance with industry benchmarks and variability analysis provides a measure of the performance of each of the functional areas.
- You can use functional performance along with functional relationships to develop an integrated diagram of corporate performance.
- You can use relationship diagrams to focus performance improvement efforts on the real problems and their scope.

Explore the Scope of the Problem and Its Importance

Critical in this analysis is not only identifying the corporate issues but also determining the upstream and downstream process and operational impact associated with improving these processes. High-level business process modeling is recommended. Often fixing one problem can

cause an issue in another area, and this step ensures that you address the various operational impacts in the analysis.

Key points about this process are listed below:

- Take a holistic view and understand the cross-functional upstream processes and downstream impacts when developing process improvements.
- High-level business process modeling provides a panoramic view of the interactions and impacts the problem area.
- Understand the corporate objectives and associated metrics so that specific productivity improvement efforts support the corporate goals.
- Understanding a holistic view of the issues and impacted functions provides solutions that support overall corporate objectives.
- High-level business process modeling provides unique insights and benefit to problem understanding and solutions.

Data Mining and Statistical Analysis

Data analysis is critical. Recognizing the problems and determining where improvements should be made is critical. Understanding the information that can quantify and support improvements provides a factual basis for justifying changes to operations and processes. There are numerous methods to analyze data. Selecting the right method with the data available is important to understand.

Key points about this process are listed below:

- Key in data analysis is determining the available information and providing insight into the operation.
- The complexity of the business environment to be modeled, the objectives to be accomplished by the organization, the availability of data, and the time frame for the development of the model will dictate what methods and analyses are required to solve the problem.

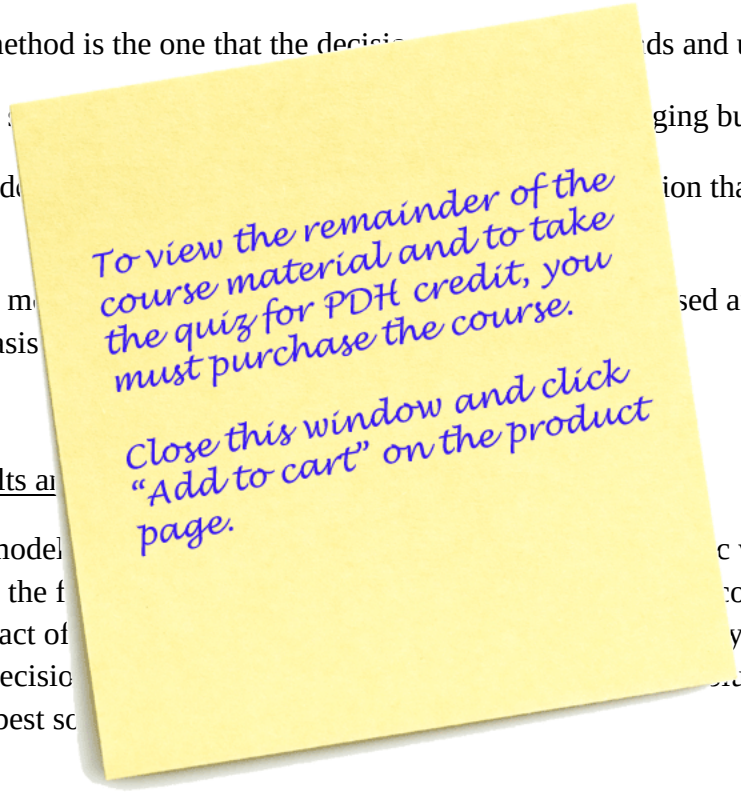
- The decision-maker must understand how the decision process works to feel comfortable with the decisions generated from a decision model.
- Decision methods must be understandable and explainable to the decision-maker.
- The best method is one that the decision-maker feels comfortable with and uses.

Solve the Problem and Measure the Results

After the analysis is performed, the approach to solving the problem is developed. Often, assessing the environment and performing the data analysis can lead to a clear solution. In other cases, you might require computer-based solutions or more sophisticated methods to provide robust analytical solutions.

Key points about this process are listed below:

- Focus on determining the best methods that the data and environment can support.
- The best method is the one that the decisi ds and uses.
- The model ging business conditions.
- The method ion that are readily available.
- A decision m sed and updated on an ongoing basis



Evaluate the Results a

Use the decision model c viability. A well-defined model has the f constraints and determine the impact of ysis is a key ingredient in the decisio ution must be tested to ensure that the best so