

State of the Art

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5 Reasons to Use Decision Support Models in Your Business

Even though Decision Support technologies have evolved significantly in recent years, many decision makers cannot see beyond their familiar field of view and their customary way of operating; they are unaware of the advantages that new technology may offer and unconvinced of its merit for them. This article spells out 5 considerations that you can use to evaluate the usefulness of using decision support technologies in your business.

Introduction

Developments in computational technology (hardware and software) in the 1990s significantly enhanced business management and operations with regard to productivity especially by improving timeliness and availability of information to drive decisions. The value of information as a corporate asset became widely recognized, while at the same time it became apparent that “optimal” information, that is to say accurate and timely, used efficiently could foster competitive advantages and differentiation in the marketplace.

In the decade that has passed since then, markets have grown both in their complexity and rate of activity. As a consequence, business decisions require data analysis capabilities that exceed human faculties. Today decision-makers confront problems such as how to schedule the production of hundreds of products at plants situated in different cities from which they must supply geographically dispersed consumers, meeting their customers’ service expectations while maximizing profit for the enterprise. This is a complicated problem entailing planning for provisioning, production, distribution and inventory across the entire supply chain, ensuring the practical feasibility of all plan details and the achievement of business goals. Without computer assistance, a mere human can achieve only an approximate solution based on simplifying assumptions.

Problems like this have given impetus to Decision Support Systems (DSS), computing tools that are designed to assist people in making decisions through the exploration of alternatives. The more commonly used computational tools such as databases, spreadsheets and graphical displays are not well-suited to the

needs of deciding ever more complex and dynamic problems although they can be useful for storing and displaying information.

These newer, specialized tools for decision support, in contrast, are based on mathematical computational methods such as models, algorithms, business rules and inference engines, simulators and multidimensional statistical models. Techniques like these empower the user to analyze problems from a different perspective, adding maximization, minimization and the balancing of different competing objectives to the decision-making mix.

A model is a software representation of a real problem that contains all the necessary and relevant elements to support practical and effective decisions, whereas the algorithm is a mathematical technique that is used to find solutions to the model. In this way, by solving the model, you can reach superior results for the problem at hand.

At the same time, the technique of rules and inference engines, enable you to continuously and consistently monitor ongoing conditions that may call for decisions and act upon them.

In conjunction, these techniques empower you to make anticipatory decisions about possible future events and to respond opportunely when changing conditions diverge significantly from what had been expected.

DSS technology has evolved significantly in the past 15 years to the point that some problems whose solutions were considered topics of esoteric academic research 30 years ago can today be resolved in a way that is easy, practical and accessible to most companies.

Armed with these powerful technologies, businesses are better prepared to deal with today's market environment in which global competition and social environmental pressures are prevalent.

The use of these decision support tools in complex environments has become as much an organizational necessity as were corporate information systems twenty years ago.

Unfortunately, many businesses are still doubtful that the time has arrived to improve their decision support processes and skeptical that the benefits that can be achieved from software tools surpass the results obtained from traditional methods that are more intuitive and subjective.

The 5 incentives

Here are 5 considerations that argue for the use of decision support technology to your company's advantage:

1. Effectiveness and consistency in making decisions

A sound, model-based, decision support methodology will enable you to make better decisions based on your existing best practices and business rules while promoting the decision-maker's subjectivity and sensitivity. Used appropriately, models can detect risk and opportunities in advance, allowing time to minimize the impact or seize the advantage.

The dynamics of business processes themselves create operating conditions that change continuously and therefore operations need to be undertaken each time from different starting conditions.

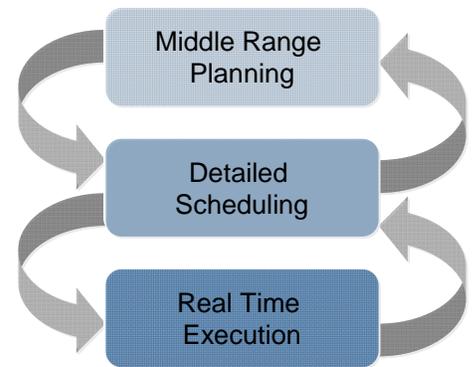
Solutions generated from models are, in general, similar to those that the user would create by hand but they differ in terms of quantitative refinement because the computer can take into account many more numeric details than a human can. In that respect they are better than manual solutions.

One source of doubt voiced by some users is that they expect to find that the model will derive solutions radically different from what their customary solutions. That's an unrealistic expectation unless their existing operations are truly chaotic. The best solutions obtained from models should be generally familiar to the user; that is to say that in the large majority of cases the model generated solutions will fit comfortably with the user's knowledge and manual methods. The difference lies in the articulation of details and, in particular, foreseeing the implications of many interrelated actions and conditions which can easily run into the thousands. At this elaboration of detail the computer model excels and it constitutes the differentiator that creates competitiveness and profitability for the enterprise.

Speaking from experience, companies that have implemented decision support models find that just one good decision justified the cost and effort that went into building the model and, moreover, that their decisions over time, assisted by the model-based technology, produce results that exceed their expectations.

2. Improve interdepartmental communication

Used correctly, model-based optimization enables you to achieve a balance between competing objectives, a difficult task to achieve by hand because it requires not only timely information and conflicting criteria but also the decision must be reached within deadline constraints involving the diverse interests of several departments within the organization. In truth, faced with the urgency to get the job done, manual decisions are often made for non-optimal reasons, for example, who holds immediate control over the operation or who argues most forcefully for their opinion.



By projecting a corporate-wide, comprehensive view, the model takes into account the interdependencies of different functional areas and orders collaboration and commitment to corporate objectives and goals from each department.

Because departmental interdependencies permeate operations, there are many business problems that can benefit from the use of models and optimization tools: they can facilitate communication, understanding and coordination.

3. Institutionalize the process

A model generates solutions that comply with the business criteria and best practices of the company, ensuring that they are advantageous for operations and appropriate from the commercial point of view.

A model will not change the company's business rules; instead it incorporates and employs those rules to evaluate future operations, identify risks and opportunities, generate valid plans and schedules in accordance with priorities, constraints and best business practices. Moreover, the model offers the capability to explore the potential benefits of new business rules for future market conditions and commercial opportunities. This capability to project and simulate the model adds considerable value to the company's evolving intelligence with regard to future operations.

Being able to rely on models that comprehensively represent all the rules and conditions of the business enable you to explore innovative approaches that could not be considered heretofore, while at the same time providing a level of deep understanding of those plans and schedules that can only be achieved by analyzing the interdependencies and concurrent effects of multiple, interacting operations.

Moreover, while it is true that companies can operate profitably and sometimes even competitively without the use of software models, it's also true that only through the use of models and algorithms can the company obtain the highest levels of profitability and competitiveness while at the same time identifying opportunities to evolve and adapt to changing conditions in the environment that comprises "market + enterprise + competition."

4. Simplifies operations

Many business processes confront operational situations that are complex in terms of their dynamics as well as the structure and dimensions of the problem to be handled. Perception of the requirements to be met is unclear and changes over time so it is difficult to predict exactly what will occur. Situations like this are stressful for the organization, obliging it to marshal forces and concentrate them on resolving the immediate problem – a reactive response which is inevitably exhausting.

In contrast, by using models to analyze information and make anticipatory decisions to resolve problems before they can impact operations will make the organization proactive thereby allowing time to think, plan, measure, evaluate and act.

Granted, it is possible to carry out risk analysis manually (using spreadsheets, for example); in practice, however, people rarely take the time from their daily tasks to carry out this kind of exploration until a crisis appears imminent. The manual approach, moreover, has other limitations:

- The manual approach tends to be one-dimensional due to the complexity of balancing multiple, simultaneous objectives.
- We human beings are creatures of habit; we tend to repeat past choices and therefore overlook advantageous opportunities.
- The urgency of responding quickly to crises entails costs and detrimental impact on service.

- Manual solutions decided under urgent circumstances tend to be quick fixes; they may resolve the problem at hand but don't take account of future needs.

5. Promote learning about the behavior and evolution of the enterprise and its place in the market

The best way to measure changes in the company's behavior and its market conditions is to compare what actually happens against what was expected to happen; this is precisely the calculation made by a decision support model.

Business rules imply consequences that may not be apparent until real problems occur. The ability to visualize the impact on operations ahead of time allows you to act to minimize detrimental effects and derive within the company courses of action that might not otherwise be considered based on objective, quantifiable information.

Some important considerations regarding the use of Models and Algorithms

While it can readily be concluded that models and algorithms can produce important rewards for many challenging problems in industry and commerce, the quality and usefulness of the results depend on adequate understanding of the concepts, correct formulation of the problem, proper definition of the models and the right methodology. All of these elements need to be taken into account in order to obtain the desired results. As is true of many technologies, incorrectly applying Models and Algorithms may produce disappointing results and engender a high level of frustration among users who have neglected one or more of the critical elements.

Conclusion

The proper use of mathematic technologies always generates significant rewards. This can be achieved by taking into consideration all the concepts and methodological elements explained by this document which warranty the correct use of techniques and technology.

The use of Models and Algorithms to support business decisions enables organizations to be more proactive, agile, and adaptive.

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For us,
innovation is nothing new.