Decision Making

and Computer-Supported Decision Making

By Susan Miertschin

Decision Making is Important

To both organizations and individual people

Why?

It’s All About Decisions

• Production decisions
  • How much do we manufacture next week?
  • Which supplier should we use for a certain component?

• Marketing decisions
  • To what market should we pitch this particular drug?
  • Do we sell to doctors or to consumers?
  • Will hard sell work this group of customers, or will another strategy work better?

• Personnel
  • Which people represented by these 10000 resumes should we consider for an interview?
  • Did all the phlebotomists on staff complete the required number of CEUs this past year?
Problem Solving Overlaps with Decision Making

- Structured problems
  - Specified in terms of numerical objectives
  - Model a situation, use computational techniques
  - e.g., re-order point (when to replenish inventory)
- Unstructured problems
  - Objectives difficult to quantify and identify
  - Subjective judgment used and needed
  - Often collaborative solution process

Decision Types

- Decision types
  - Yes/no, evaluating alternatives using rules and criteria, design custom solution
  - Routine decisions
  - Non-routine decisions

Types of Decision-Making by Ken Shah & Prof. Param J. Shah

- Irreversible
  - This are those type of decisions, which, if made once cannot be unmade. Whatever is decided would than have its repercussions for a long time to come. It commits one irreversibly when there is no other satisfactory option to the chosen course. A manager should never use it as an all-or-nothing instant escape from general indecision.
- Reversible
  - This are the decisions that can be changed completely, either before, during or after the agreed action begins. Such types of decisions allows one to acknowledge a mistake early in the process rather than perpetuate it. It can be effectively used for changing circumstances where reversal is necessary.
- Experimental
  - This types of decisions are not final until the first results appear and prove themselves to be satisfactory. It requires positive feedback before one can decide on a course of action. It is useful and effective when correct move is unclear but there is a clarity regarding general direction of action.
Who Makes Decisions in an Organization?
- CEO makes strategic decisions
- People at the next level of the organizational hierarchy implement these decisions
- CFOs, CIOs, VPs, Asst. VPs, Department Mgrs
- How to implement
- Implementation timeframe
- Who to employ for different implementation phases
- Lots of places for the implementation to go awry due to not-so-effective decision making
- Implementation establishes new business processes
- Operational people carry out business process steps – often they, too, have to make decisions

Decision Making Occurs at Many Levels
Different types of information are needed depending on the level of the decision

Type of Information Needed for Top Level Decisions

<table>
<thead>
<tr>
<th>Top Level Decisions</th>
<th>Information Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term goals</td>
<td>Measures based on highly summarized data</td>
</tr>
<tr>
<td>Long-term planning</td>
<td>Sometime represented by a flag: within range/out of range</td>
</tr>
<tr>
<td>Occur in upper management</td>
<td>Key performance indicators</td>
</tr>
<tr>
<td>Need a broad overview of information for the area of responsibility</td>
<td>Don’t get caught up in the details</td>
</tr>
<tr>
<td>Type of Information Needed for Middle Level Decisions</td>
<td>Information Needed</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Middle Level Decisions</strong></td>
<td><strong>Information Needed</strong></td>
</tr>
<tr>
<td>• Short-term goals</td>
<td>• Measures based on summarized data</td>
</tr>
<tr>
<td>• Occur in management of departments and other units</td>
<td>• May need to drill-down to find out the &quot;why&quot; for solving a problem</td>
</tr>
<tr>
<td>• Need an overview of information for the area of responsibility (limited)</td>
<td>• Some latency is acceptable</td>
</tr>
<tr>
<td>• Don’t get caught up in the details</td>
<td>• Amount of latency depends on the indicator</td>
</tr>
<tr>
<td></td>
<td>• For some – daily updates, for others – weekly, monthly ok</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types of Information Needed for Lower Level Decisions</th>
<th>Information Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Level Decisions</strong></td>
<td><strong>Information Needed</strong></td>
</tr>
<tr>
<td>• Foremen, managers, team leaders – all involved in day-to-day operations</td>
<td>• Must be highly available – anytime &amp; anywhere</td>
</tr>
<tr>
<td>• Shorter term decisions</td>
<td>• Need operational details</td>
</tr>
<tr>
<td>• next shift impact</td>
<td>• Need drill down to most granular level</td>
</tr>
<tr>
<td>• next day impact</td>
<td>• Some summarization needed – possibly</td>
</tr>
<tr>
<td>• next week impact</td>
<td>• Low tolerance for latency</td>
</tr>
<tr>
<td>• next month impact</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Levels and Categories of Organizational Decisions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic - Planning</strong></td>
<td></td>
</tr>
<tr>
<td>• How to allocate resources, long term plans, evaluating investment opportunities, assessing merger proposals</td>
<td></td>
</tr>
<tr>
<td><strong>Management - Control</strong></td>
<td></td>
</tr>
<tr>
<td>• Acquisition of resources for operational unit, allocating resources within unit, causes of buyer behavior, negotiating supplier contracts</td>
<td></td>
</tr>
<tr>
<td><strong>Operational - Control</strong></td>
<td></td>
</tr>
<tr>
<td>• Implement organizational actions, monitor quality of product or process, assess product success, assess service needs</td>
<td></td>
</tr>
<tr>
<td><strong>Operational - Performance</strong></td>
<td></td>
</tr>
<tr>
<td>• Day-to-day decisions, occur in functional units</td>
<td></td>
</tr>
</tbody>
</table>
There Are ...

### Good Decisions
- Positive end results
- Greater sales
- Cheaper product
- Safer hospital stay
- Treatments that cure the problem
- Employees who work well together

### Bad Decisions
- Change
  - Sometimes – decision not to change is a decision, too
- Consistently good decisions contribute to success

---

**Effective Decisions**

“Effective decisions are choices that move an organization closer to an agreed-on set of goals in a timely manner.”

Making “Good” Decisions

- How do you increase the probability of a “good” decision?
- All decisions are made by a decision-making process
- Adopt effective decision-making processes

Decision Processes

Effective Processes Produce Higher Quality Decisions

Contributors to Effective Decision Making Process

- Specific goals
- Measures to assess progress toward goals
  - Specific — not vague
  - Able to implement
- Information from feedback
  - Based on implemented measures
  - Used as basis for decision making
  - Used to evaluate a decision made

Business Decision Processes

- Decision making
  - Important part of every job
  - Especially true for managers (all levels)
- Understanding decision making processes can help
  - What are the steps in decision making?

Decision-Making Process

- Three stages of a sequential decision-making process (Simon, 1965)
  - Intelligence – find occasions for making decisions
  - Design – find or invent alternative courses of action
  - Choice – select a course of action

General Decision Process Model
General Decision Process Model

- Define problem
  - How a problem is framed influences how it is solved
  - Important to go beyond symptoms and identify real problems
- Identify decision maker (Vroom and Yetton, 1973)
  - Individual (Autocratic), through consultation (Consultative), or group decisions (Group)
- Selection criteria: need for acceptance, adequacy of available information, subordinate acceptance of organizational goals, likelihood of conflict among subordinates about a preferred solution
- Collect information
  - Balance cost and benefit of gathering data
  - Information systems can help collect data

General Decision Process Model

- Identify alternatives
  - Brainstorming
  - Information systems can support idea generation process especially group systems
- Decide
  - Delineate decision criteria
  - Weight and structure decision criteria
- Implement
  - Communicate decision
  - Design or re-design processes
- Follow-up
  - Monitor, follow-up, measure for assessment

Information and Decision Making

- Foundation information
  - Serves as the basis for making a particular decision
  - Used while alternatives are being considered and sometimes at the define the problem phase
- Feedback information
  - Used to evaluate effectiveness of a decision once it's been made and is being implemented
  - Used in implementation and follow-up and assessment phases
Things that Thwart Decision Making

- Tradition and Status Quo Bias
  - Inertia, resistance to change
- Lack of Knowledge
  - Absence of information in non-routine situations
- Improper use of Decision Aids or Tools

Decision Support Systems

Can help with effective decision making

- DSS
- “… are computer technology solutions that can be used to support complex decision making and problem solving.”

Decision Support Systems
- Another Definition
  - "interactive computer-based systems that help people use computer communications, data, documents, knowledge, and models to solve problems and make decisions"
- Key components of an organization’s IT infrastructure
- Enable increased productivity
- Provide competitive advantage
- Ancillary systems that support human decision-making

DSS Types
- Data-driven DSS
  - Manipulation of large databases of structured data
  - OLAP, BI
- Model-driven DSS
  - Emphasize access to and manipulation of models
  - Financial, representational, optimization models
  - Use data and parameters, not data intensive
- Knowledge-driven DSS
  - Recommend action to managers
  - Use business rules, knowledge-bases
  - Expert systems, data-mining systems

DSS Types (cont.)
- Document-driven DSS
  - Storage and retrieval of documents
  - Search engines, clustering & visualization systems
- Communication-driven DSS & GDSS
  - Integrates collaboration, communication and decision support technologies
  - A hybrid DSS that emphasizes use of communication technologies and decision process models
  - Chat and Email based systems, white board, bulletin board etc.
Business Intelligence

- "is the delivery of accurate, useful information to the appropriate decision makers within the necessary timeframe to support effective decision making."

Data Mining

- Uses mathematical algorithms to examine data for
  - Patterns
  - Correlations
  - Clusters
- Operates on detail data, as opposed to statistically summarized data, generally speaking
- A type of DSS

DSS Suitability to Different Decision Situations

- Data-driven DSS
  - Managers need frequent access to conduct ad-hoc analysis of large sets of data
- Model-driven DSS
  - Recurring, semi-structured decision situations where quantitative models can support analysis
- Knowledge-driven DSS
  - Narrow domain of expertise can be defined, experts identified and knowledge can be codified
- Communication-driven DSS
  - Two or more people are involved in ad hoc decision processes
- Document-driven DSS
More DSS Types
- Inter-organizational or Intra-organizational
- Function-specific or General
- Web-Based

Competitive Advantage with DSS
- Competitive advantage
  * Do something better than competitors
- "IT doesn’t matter?" – Nicholas Carr
  * IT has been commoditized
  * IT does not provide competitive advantage
- IT does matter
  * Extracting value from IT requires innovation in business practices

Gaining Competitive Advantage
- Identify IT opportunities that can provide strategic advantages
- DSS must be used once implemented
- Unique, proprietary DSS can produce competitive advantage
- For awhile, until competitors catch up
  * Look for investments that can provide an "edge" for at least 3 years
Strategic Impact of DSS

- "Wal-mart's most significant investment for increasing its efficiency is its Information Technology."
- "At any moment, executives and store managers can pin point the exact date an item was bought, the quantity purchased, number sold and days it took to turn..."
- "By all accounts, technology and scale are at the core of Wal-Mart’s advantages over its rivals."
- "Wal-Mart's aggressive adoption of information technology to improve logistics and back-office efficiency has been a major driver of productivity."

Wal-Mart’s IT Investment

- Wal-Mart creates RetailLink to share data with suppliers (1991)
- Wal-Mart invests $700 million in IT (1992)
- Wal-Mart announces Collaborative Forecasting System (1996)
- Wal-Mart creates world's largest data warehouse (1997)
- Competitor K-Mart falls due to under investment in IT, announces $1 billion IT infrastructure plan (Forbes, "How K-Mart blew it", Jan 18, 2002)

Benefits from Successful DSS

- Improve individual productivity
- Improve decision quality and speed up problem solving
- Improve inter-personal communications
- Improve decision making skills
- Increase organizational control
Decision Making

and Computer-Supported Decision Making

By Susan Miertschin