CHAPTER THREE

The Analysis Phase

INTRODUCTION

What This Chapter Is About

All managers solve some sorts of problems and make some sorts of decisions. Most managers formulate some goals and plans. A few, however, do not really analyze the situation first. And according to Richard A. Swanson (1996), most of those who do tend not to analyze it as correctly and completely as they should. Through working in or for more than 120 organizations over many years, we have concluded that analyzing tends to be the least effectively performed, if not the least often performed integrative function. Why? Because analyzing situations well is not easy. While some might believe that anyone can analyze anything, being highly analytical is not really natural. Indeed, C. S. Fleisher (2002) found that analyzing properly must be learned through training, experience, and repetition. Consequently, this book will give analysis somewhat more attention than other functions.

The basics section of this chapter defines analysis, outlines the major analytic steps, gives four major reasons for thoroughly analyzing situations, and provides several basic rules for analyzing situations.

Going beyond the basics, this chapter then discusses human thinking limitations and how to compensate for them. These limitations include (a) lack of knowledge of factors to analyze; (b) filters and biases associated with personal values, interests, and goals; (c) limited knowledge of facts; (d) limited time; (e) the mind's oversimplification of information; and (f) a cultural limitation.

The chapter then describes analytic and knowledge management tools that help personnel think about situations in greater depth and breadth but still deal with the many details involved. It discusses tools such as (a) checklists of variables to consider, (b) qualitative information bases, and (c) diagrammatic knowledge bases for helping our minds visually handle the details inherent in complex global markets and modern organizations.

What Consultants, Trainers, and Facilitators Can Get Out of This Chapter

Why is the analysis phase of the managerial process so important? How are planning, problem solving, and decision making related? These key questions are focal points for this chapter.

After studying the chapter, consultants, trainers, and facilitators should be able to help participants consider ways to

- Improve analytic activities involved in organizational think-work processes
- Improve decision making in the organization
- Detect and avoid obstacles to effective thinking

What Practicing Managers, Participants, or Students Can Get Out of This Chapter

After studying and discussing this chapter, the student or seminar participant should be able to

- Analyze planning, problem-solving, and decision-making situations more effectively (with greater depth, breadth, and insight)
- Better structure planning, problem-solving, and decision-making processes in order to compensate for various mental and other limitations, deal with obstacles to effective thought, and increase think-work effectiveness

How Instructors and Participants Can Use the CD-ROM's Supplementary Materials

The accompanying CD-ROM contains these materials for Chapter Three:

- *Chapter Three Study Guide.* This class or seminar session preparation guide should be completed by students and seminar participants. It asks them to think about (a) what they are reading; (b) how it applies to themselves, their unit, or their organization, and (c) how the task-related, organizational, individual, social, and external socio-technical factors being discussed may be influencing their motivation, attitudes, capabilities, practices, behavior, interpersonal interactions, and performance. Thinking about these phenomena and issues prepares participants for the superior-subordinates discussion, OD application, and team-building sessions that should be conducted once all participants in an organizational MD/OD program have completed the educational and developmental materials in Module 1, which corresponds to Part One of this book (Chapters Two through Seven).
- *Checklist of Socio-Technical Factors that Influence Organizational Behavior.* This index of organizational behavior factors, which is also Table 3.1 in the text, lists about 150 socio-technical variables, divided into five major categories: task-related, organizational, individual, social, and external. The table and many of the factors that it lists are referred to throughout the book in various contexts.

THE BASICS

Definitions

The following is a synthesis of definitions of "analysis" and "analyzing" from *Merriam-Webster's Collegiate Dictionary* (Merriam-Webster, 2003): "separation of a whole into its component parts"

(or constituent elements); examining a complex, its elements, and their relationships; studying or determining the nature of the whole and the natures and relationships of the parts with respect to each other and the whole. Here is a more management-related definition: identifying factors or variables both inside and outside an organization that are currently affecting or will affect its operational success, and then determining (a) causes and effects and (b) which variables should and can be corrected, changed, improved, or otherwise beneficially influenced.

Basic Analytic Steps

Although many analytic steps may be involved in planning and problem-solving situations, these are the most basic ones:

1. In a *problem-solving situation,* describe the events or phenomena that have signaled the existence of a problem situation because they were not expected, intended, or desired. In a *goal-setting and planning context,* identify the task-related, individual, social, organizational, and external factors or variables that could influence the viability and success of the organization over time.
2. Conceptualize and draw an analytic model of the situation—that is, a diagram of the possible variables involved and their relationships. This step is generally the most important but usually the least well done.
3. Gather any pertinent facts and data that are related to the variables identified.
4. On the analytic diagram, write next to the factors or their relationships any appropriate facts or data relating to them.
5. Analyze the qualitative (subjective) and quantitative (numeric) information in the diagram (and also in appropriate databases), and identify significant cause-effect, sequential, or otherwise systemic relationships among variables. In *problem-solving situations,* identify the causal or influential factors that have somehow worked together to bring about the problem situation. In *goal-setting and planning situations,* identify the key variables that must be changed or improved in order to meet goals.
6. Choose criteria that will be used to evaluate and compare alternative solutions (or goals and plans) when making a decision—for example, profitability, return on investment, time to results, payback period, units of output, number of product defects, number of customer complaints, turnover and absenteeism rates, and environmental consequences. (See Table 5.1 on page 106 for many more examples.)

Four Major Reasons for Thoroughly Analyzing a Situation

As asserted in Chapter Two, analyzing is the key think-work function and, therefore, the most important of all the integrative functions. The following are four reasons why thorough analysis is so important.

First, analyzing a situation enables managers to create a diagram (of variables, their relationships, and associated facts) that enables them to gain important insights into how systems of factors both inside and outside the organization are influencing each other. Keep in mind that all issues, problems, questions, answers, and phenomena revolve around general or more specific, finite factors. A list of such factors will be provided later in this chapter.

Second, the analysis function identifies bases and inputs for effective goal setting. Identifying important variables makes the following rather obvious: (a) the variables that goals should

be aimed at changing or improving and (b) the most appropriate measurement parameters or criteria to use for evaluating performance.

Third, thorough analysis identifies the bases and inputs for effective planning (or for formulating alternative solutions). Identifying sequences of causes and effects makes the following rather obvious: (a) how affecting each factor (or group of factors) tends to affect others; (b) which factors must be changed or improved in order to change or improve others; and (c) the sequences of steps that should be incorporated into plans in order to deal with various factors successfully.

Fourth, analysis helps establish bases and inputs for effective decision making. Fully analyzing systems of causes and effects usually makes the following more apparent: (a) what criteria should be used to evaluate and choose among alternatives; (b) various scenarios involving alternative actions and possible resulting events or consequences; and (c) comparative advantages and disadvantages of alternatives.

Basic Rules for Effectively Analyzing a Situation

Here are three major rules for analyzing situations effectively:

1. *Analyze the situation* thoroughly *first*—before going on to the second and third phases of the analytic approach (formulating alternative solutions and decision making) or before going on to goal setting and planning. Many individuals are aware of this tenet but still cannot break the bad habit of jumping around among these phases. *The most chaotic group planning, problem-solving, and decision-making sessions tend to occur when participants jump around among the major phases.*

That said, it should be acknowledged that taking a very organized, orderly, and systematic approach is not necessarily most appropriate for brainstorming sessions, which are generally aimed at developing new ideas, products, methods, and so forth. Brainstorming a situation involves free-wheeling, freely associative, creative mental processes.

2. *Do a qualitative analysis initially,* before doing a quantitative analysis. In other words, it is not wise to start working with numbers right away. It is necessary to first *explore* the situation and identify possibly significant causal or influential variables involved. This helps ensure that you will collect and use the right numbers. The right numbers are those that correspond to the most influential variables or to the real, underlying causal factors. A thorough qualitative analysis involves the following:

- Reviewing checklists of relevant factors, making sure that you have covered all the bases—that is, identified all the significant, potentially causal or influential factors involved.
- Analyzing the factors to determine which are significant enough to warrant researching, collecting, and massaging the data that relate to them. Keep in mind the principle of *multicausality.* There is no single cause for anything that's happening. In a given situation, there might be hundreds or possibly even thousands of factors that somehow influenced what occurred. And tens or even hundreds of those factors may need correcting or improving in order to not only solve a problem but prevent it from ever happening again.

  Here is an example: Figure 3.1 shows a problem situation (J) that involves several symptomatic effects (J1, J2, and J3). This might be a situation in which, for example, two employees are having an argument. Underlying the situation itself are immediate and obvious, superficial causal factors F, G, H, and I. But behind them, earlier in

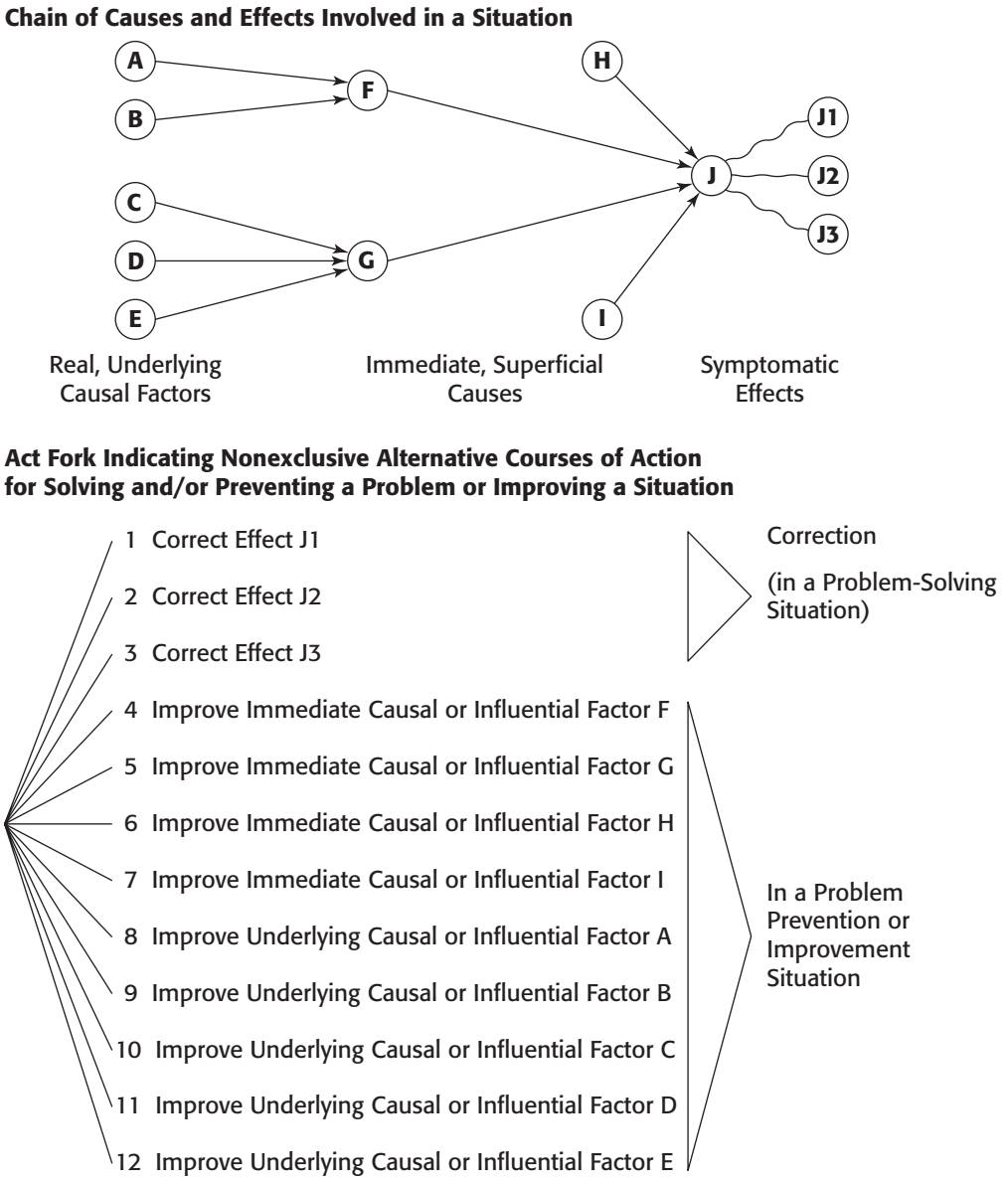

Figure 3.1. Example of a Multiple-Choice Decision in a Problem-Solving, Problem Prevention, or Improvement Situation

the cause-and-effect sequence, are the real, underlying, not-so-obvious causal factors A, B, C, D, and E. This is a case where one has a *multiple-choice decision,* because there are numerous causal or influential factors involved. To resolve the problem situation, one must perform both corrective and preventive actions. First, to correct or stabilize the situation, one would take at least three courses of action to remedy effects J1, J2, and J3. Then, to prevent the situation from occurring again, one would take several courses of action to deal with (solve, correct, or improve) immediate causal or influential factors F

through I, and also take several courses of action to correct or improve underlying causal or influential factors A through E. If all the factors—F, G, H, I, A, B, C, D, and E (and perhaps many others)—are not changed or improved, the situation may redevelop and resurface, perhaps in a variety of guises.

In other words, in a problem-solving situation, one should not necessarily be asking, "Should I do something concerning A or not do something concerning A, or should I do something concerning A, or B, or C?" Rather, one should normally be asking, "Should I be doing several or even all of the above?" In many cases, the answer should be "Do all of the above" (taking into account constraints such as available people, time, and money). In other words, *solving a problem situation calls for a system of solutions for dealing with a system of underlying causes.* Put another way, multiple causes call for multiple solutions.

This fact explains why so many managers are constantly "fighting fires." They fail to deal with enough of the real, underlying causes, so the same (or very similar) problems keep coming back time after time.

3. *Use visually oriented diagrams or models to help perform the initial qualitative analysis of systems of factors.* Cause-effect and sequential relationships among entities, variables, other elements, and process steps can be indicated by lines and arrows. The following are several examples of how to create useful diagrams:

- Develop an industry, marketplace, and business environment model by diagramming these and other factors and their relationships: (a) industry competitors, their segments or specialties, and their strengths and weaknesses; (b) sources of inputs such as labor, materials, services, and information; (c) distribution channels, how they operate, and the consumer segments they serve; (d) various consumer segments, their decision-making behavior, and their purchasing behavior; and (e) external influences on the industry and marketplace, such as government, the economy, technology, society, or other forces or factors.
- Develop a system or process model by creating a time line that depicts the following elements: (a) steps in the process and by whom they are performed; (b) which steps must be completed before others can begin; and (c) the inputs of information, materials, or services to each step or function performed.
- Use maps to indicate geographic relationships involving, for example, sales territories, production and warehousing facilities, competitors' facilities, or distribution systems.
- Develop organization charts that show, for example, line and staff units or jobs, vertical reporting relationships, spans of control, specialized units, and horizontal working relationships.
- Develop work area models or diagrams that show the relative locations of machines, tools, raw materials, work in process, finished goods, materials handling routes, people, desks, office machines, or other elements. Such diagrams help illustrate flows of information, materials, and services.

When you are ready, use mathematical models and tools to perform quantitative analyses of numeric data associated with factors on the diagram. All such analytic tools enable the human mind to do what it is incapable of doing alone: keep track of, juggle, manipulate, and relate an enormous amount of numeric data. Because most managers are already using tools such as

spreadsheets to deal with numbers, we emphasize using visual models or diagrams initially to illustrate possibly significant variables and their interrelationships, then adding the quantitative data to the diagrams later. The resulting integrated diagrams enable individuals to view hundreds of important factors and associated facts at one time. Just as important, because the diagrams free managers' minds from having to juggle large amounts of information on their own, managers can identify phenomena that they have never recognized before: the specific characteristics of organizations, entities, people, and tasks; cause-effect or sequential relationships among the factors; interdependencies and interactions among factors; or complex flows of materials, services, or information among various jobs and units. As a result, managers usually identify previously unrecognized problem situations and their causes; discover opportunities to improve situations; develop insights into how to gain competitive advantages; or identify ways to integrate tasks and people more effectively, thereby contributing to more effective individual, unit, and organizational performance.

BEYOND THE BASICS

Human Limitations and How to Compensate for Them

Many of the human limitations discussed in this section involve the factors that people are inclined to analyze and how effectively they do so. To discuss these phenomena understandably, we first introduce a model—an analytic frame of reference—that encompasses the numerous factors that could be analyzed (see Figure 3.2). Called the socio-technical model (or system), it was developed at London's Tavistock Institute of Human Relations by Eric L. Trist (1960). Managers can use it during planning, decision-making, and problem-solving processes to help them better analyze and correct or improve factors that influence their own and others' behavior.

Figure 3.2 illustrates interactions among five categories of factors that can directly or indirectly influence people's motivation, attitudes, behavior, interactions, and performance: task-related or technological; organizational; individual; social; and external. Each of the five categories can be thought of as a separate construct, because it involves a group of terms, concepts, principles, and phenomena that are closely related. Trist's model is a meta-construct,

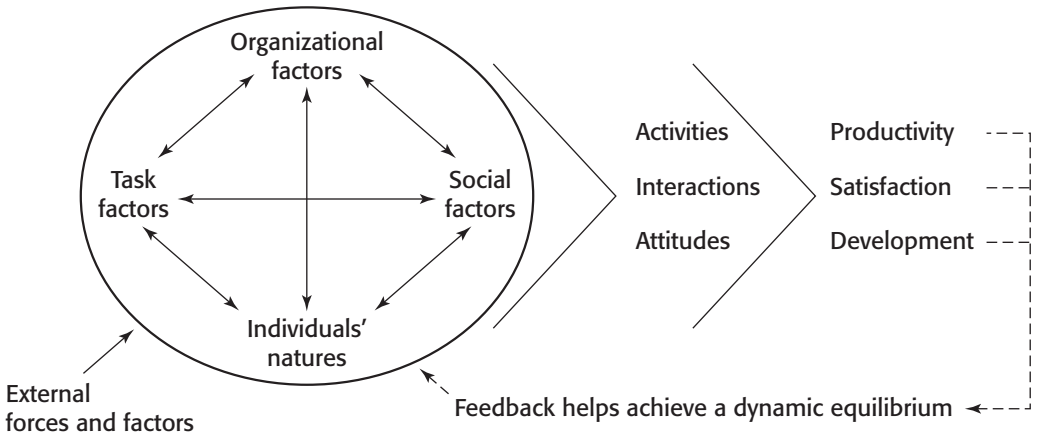

Figure 3.2. The Socio-Technical System: A Model

because it integrates separate technological or engineering constructs, organizational phenomena constructs, individual trait and behavior constructs, social phenomena constructs, and business environment constructs into an all-encompassing construct.

About 150 specific socio-technical factors are listed in Table 3.1 (another analytic frame of reference and tool). These factors will not be defined and discussed until Chapters Eight through Ten, but it is not necessary for the reader to understand them all now in order to comprehend the points made in this section.

As Figure 3.2 shows, factors in each of the five groups can affect factors in all of the other groups. For example, an individual's characteristics can influence task factors (such as job descriptions and skill requirements) and social phenomena (such as the formation and norms of social groups). Task factors can influence individual factors (such as the characteristics of people placed in jobs) and social factors (such as whether or not several people are seated near enough to one another to communicate and establish a social group). Social factors can influence task factors (such as whether or not people in two interdependent jobs communicate and cooperate with each other) or organizational factors (such as how much power or influence a supervisor or manager actually has).

As all of these factors interact with and on each other, the results are people's attitudes, activities, and interactions. For example, what is going on around managers—subordinates', superiors', and colleagues' behavior—affects their managerial behavior, and their behavior, in turn, can affect the attitudes, activities, and interactions of those other people.

Since most of the factors in Table 3.1 can be broken down into many more finite factors, what we are looking at are *extraordinarily complex systems of interacting factors or variables.* All these factors are operating in or on every organization. The facts or information associated with each factor differ from person to person, group to group, company to company, or industry to industry, but they are all operating.

Now look at the top of Table 3.2, which helps illustrate what human beings are actually inclined to do in most thinking situations. The following sections describe how various limitations tend to eliminate one chunk of factors after another from people's consideration.

Limited Knowledge of Factors to Be Considered. Say that a problem could involve the 150 factors on the checklist in Table 3.1. Most people are not necessarily going to know all 150 factors, although they might understand or at least recognize many of them. As Will Rogers said, "We're all ignorant, just on different subjects." In fact, no one can possibly know all the variables that may be involved in any given situation.

One's knowledge of factors is a function of education and experience concerning various subjects. One's "knowledge and experience field" is like the "box" managers hear about in management seminars. For example, a plant engineer's "box" would include considerable knowledge of engineering principles, machine capabilities, equipment layout, and materials flows but might contain relatively less knowledge of organizational factors, individual factors, and so on. A salesperson's box would include considerable knowledge of factors relating to products, customers, and production schedules but might include less knowledge of factors involving plant and equipment. A human resource manager's box would include considerable knowledge of behavioral concepts, pay and benefits, organizational structures, and job descriptions but is likely to include considerably less knowledge of factors relating to financial matters, marketing practices, and so forth.

Since everyone is "boxed in" by their lack of knowledge of variables across the breadth of possible knowledge, management gurus exhort managers to "think outside the box." But that is

Table 3.1. Checklist of Socio-Technical Factors That Influence Organizational Behavior

TASK FACTORS
Job descriptions
- Objectives
- Activities
  - Technical, functional
  - Managerial, supervisory
    - Analyzing, goal setting
    - Planning, budgeting
    - Problem solving
    - Decision making
    - Organizing, staffing
    - Directing, coordinating
    - Reporting, evaluating
- Equipment or tools
- Inputs and outputs
  - Information
  - Materials
  - Services

Workload and work flow
Communication facilities
Working conditions
Task interrelationships
Technology
Job qualifications
- General, basic abilities
- Specialized skills
- Knowledge and experience
- Other behavior patterns

General nature
(mechanistic or organic)
- Complexity
- Variability
- Clarity of definition
- Amount of change
- Certainty of information
- Time to outputs or results
- Tangibility and measurability of activities, outputs, results

ENVIRONMENTAL INPUTS
Business-oriented factors
- Customers, suppliers
- Competitors
- Industry associations
- Worker unions

Institutions
- Government agencies
- Religions
- Capital markets
- International institutions

People-oriented factors
- Families, peers
- General public, community
- Social norms and customs
- Religious affiliations
- Social and recreational groups
- Interest groups

Other
- Technology, economy
- Transportation facilities
- Nature, weather, energy
- Goods and services

INDIVIDUALS' CHARACTERISTICS
Motivators
- **Basic needs or drives**
  - Physiological, Safety
  - Social, Self-image
  - Self-actualization
- **Values**
  - Intellectual, Economic
  - Social, Political
  - Aesthetic, Religious,
  - Practicality, Achievement
  - Variety, Goal-orientedness
  - Orderliness, Decisiveness
  - Support, Conformity
  - Recognition, Independence
  - Benevolence, Leadership
- **Interests (occupational)**
  - Mechanical, Outdoor
  - Computational, Scientific
  - Clerical, Persuasive
  - Artistic, Musical, Literary
  - Social service
- **Goals and expectations**

Capabilities
- **Abilities**
  - Academic intelligence
  - Vocabulary
  - Social insight
  - Mechanical visualization
  - Mechanical intelligence
  - Clerical speed and accuracy
  - Physical coordination
  - Reading
  - Communication
- **Specialized job skills**
- **Knowledge and experience**
- **Physical traits**

Personality traits
- Self-confidence
- Dominance, Sociability
- Social conscientiousness
- Adaptability, Maturity
- Original thinking, Vigor
- Responsibility, Self-control
- Emotional stability

SOCIAL VARIABLES
Group formation
- People's needs or drives
- Tasks' interdependence
- Proximity and work flow
- Frequency of interactions
- Members' characteristics
- Valued or shared traits

Intragroup relationships
- Group norms and customs
- Members' status and roles

Group maintenance
- Enforcing sanctions
- Conflict resolution
- Image reinforcement
- Membership norms

Sources and frequency of conflict
Interaction with other groups
Influence on organization

ORGANIZATIONAL INPUTS
History and traditions
Key elements of success
Objectives and strategies
Resources
Structures
- Key integrative points
- Key decision-making points
- Formal structure
  - Units and departments
  - Vertical relationships
  - Horizontal relationships
  - Levels and spans of control
- Informal structure

Policies, rules, and procedures
- Formal
- Informal

Interunit interactions
- Sources of conflicts

Contacts with environment
Systems
- Information systems
- Control systems

Practices
- Performance evaluation
- Wages, salaries, benefits
- Hiring, selection, promotion
- Training and development

Natures of tasks
Natures of people
Managerial and leadership styles and practices
- Authority base (position vs. expertise)
- Formality to subordinates
- Nature of communications
  - Advice and information
  - Instructions and decisions
- Degree of control
- Specificity of subordinates' responsibilities and authority
- Conflict resolution
- Subordinates' participation
  - Goal setting and planning
  - Problem solving
  - Decision making
  - Development of methods, procedures, policies
- Assumptions or facts about subordinates
- Task orientation
- People orientation

General nature of organization
(mechanistic to organic)

Table 3.2. Mental Constraints and Their Effects on Think-Work

	150 major factors or variables actually operating
−	50 **unknown** factors
=	100 factors left to consider
−	50 factors thought **unimportant** (due to values, interests, goals)
=	50 factors left to consider
−	25 factors for which **facts are unknown** or **unavailable**
=	25 factors left to consider
−	15 factors for which there is not enough **time** to consider
=	10 factors left to consider
−	5 factors that the **mind cannot handle** at once
=	5 factors left to consider
−	4 factors eliminated due to cultural tendency toward **single causality**
=	1 factor actually considered

not so easy to do, because many human beings have little idea of what they do not know. Thus, it is difficult for them to think outside their own box without help. That is why checklists of factors, including many that are not in one's box, are so useful. It is also a reason why group think-work processes are so useful. When more people are involved there are more "boxes of information" available for consideration.

So, as shown at the top level of Table 3.2, let us say—rather conservatively—that Person A does not know 50 of the 150 variables. That leaves 100 that he or she is able to consider.

Limitations Due to Values, Interests, and Goals. For examples of these limitations, consider two different types of managers.

As discussed in detail in later chapters, very authoritarian or "high task, low people" managers tend to be highest in the following values: the economic value (concern for money, material things, career success, and practical-mindedness) and the political value (concern for power, authority, and influence over others). Because of these values, which groups of variables in Table 3.1 do you think authoritarians are most likely to consider? If you said the task or technological factors and the organizational factors, you are correct. As shown in Figure 3.3, such managers will think about task-related factors inside the shaded box—for example, the mechanical aspects of their operations and how to integrate tasks with tasks. They will also think about the political implications of their decisions—for example, what their boss will think about the decision they're making. However, because they are much lower in people-related values such as the social or altruistic value (concern for or love of people) and related values, they are generally much less concerned about and therefore usually give much less thought to individuals and their social relationships. Thus, authoritarian managers pay less attention to people; often do not recognize motivational, attitudinal, behavioral, and interpersonal problems; and do not resolve people problems very well even when they do recognize them. As shown in Figure 3.3, these factors are essentially "outside their box," but for attitudinal rather than knowledge-related reasons.

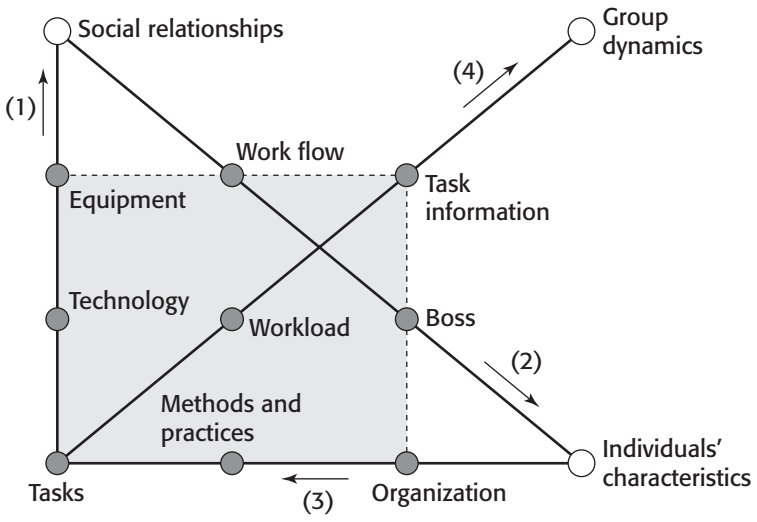

Figure 3.3. An Authoritarian Manager's "Box" of Considerations

On the other hand, very permissive or "low task, high people" managers are just the opposite. Being high in the social value and related values, they think that individual and social phenomena are important to consider and therefore tend to integrate people with people. However, being much lower in the economic and political values, they tend to discount task-related and organizational factors. Thus, permissive managers pay less attention to the mechanics of operations and do not recognize and solve problems in those areas very well.

Thus, both types of individuals' "boxes" are limited by the motives, attitudes, or interests in which they are relatively lower. Is it any wonder, then, that in organizations in which all managers are not taking all four socio-technical areas into account, they do not behave in a "high task, high people," participative, developmental, or team-oriented manner? Or that personnel are not being fully integrated with their jobs and the organization? Or that people-related problems seem to occur over and over again? Or that plans for dealing with people's motivation, attitudes, behavior, interactions, and performance seldom seem to maximize them?

As a result of motive and attitudinal constraints, many managers might think that, say, 50 particular factors are not important enough to consider. That would leave 50 factors (out of the original 150) that they will think about.

Here again, checklists of variables are useful because they get people thinking about factors that they might not otherwise consider because of their lower levels of certain values or interests.

Limited Knowledge of Associated Facts. It is highly unlikely that anyone could have all the facts or information that relate to the remaining 50 factors. This lack of complete information can hamper analyses in several ways. First, people may not bother to analyze the factors for which they have no information. Second, if they do not bother to obtain information relating to particular factors, they will not be able to analyze them. Therefore, let us say that, for these reasons, the person in our example skips over another 25 factors. That leaves him or her with only 25 factors that can be analyzed effectively.

Limited Time. Time is almost always a problem. With so many other things to do, let us say that our manager is unwilling to take the time to consider, say, another 15 factors. So now he or she is down to 10 factors.

The Mind's Oversimplification. As mentioned earlier, research by Miller (1994) showed that human beings can mentally handle only five to nine bits of information (or variables) at a time. As a result, *we very often consider only four or five factors at the most—regardless of how much we know and could otherwise consider.* So now our manager is down to considering just five factors.

A Cultural Limitation. Then there is the inclination to identify only one cause rather than many causes (single causality rather than multicausality). This is both a cultural phenomenon and a human phenomenon. Have you noticed that in business and social situations, we are inclined to say, "I think the problem is _____, and here's what we ought to do about it." In other words, we cite *one single cause.* Another person might disagree, saying, "No, I think the problem is _____, and this is what should be done to correct it." The second person has also cited a single cause. The irony? Both are probably right. Both causes could easily be involved. But the individuals will probably argue back and forth about who's right rather than what's right. However, they are also both wrong to the extent that they did not identify the other possible causes of the situation (that is, they did not consider the other 148 possibilities). It could very well be that a number of factors could stand some correction or improvement in order to *maximize* the motivation, attitudes, behavior, interactions, performance, and ultimate results of the people involved.

The bottom line? What is likely to happen when we deal with even four or five factors involved in a situation? If there are actually another twenty or thirty significant variables also involved and we do not take action to correct them, even though their influences may be relatively slight, then the solutions we do implement with respect to the four or five factors we chose to address may be overwhelmed or contravened by the operation of those we did not address. That is exactly what is constantly happening in many organizations. Managers quite often are *satisficing* rather than *optimizing.* One result is constant "fire fighting." Too many managers are constantly busy re-fighting the fires that they never entirely put out, because they seldom use a system of solutions to deal with a complex system of causes. Thus, if all of the most significant factors affecting personnel's motivation, attitudes, activities, interactions, and performance are not corrected or improved, an organization can never maximize its viability and success over time. And it will always have serious problems, many of which will keep coming back over and over again.

Analytic and Knowledge Management Tools

Several management tools are available to help managers overcome the limitations detailed in the preceding sections and analyze situations more effectively. In order to describe these tools well, it will first be useful to introduce frames of reference (checklists of variables) for analyzing industries, their marketplaces, and their external environments during strategic planning processes.

Marketplace and Environment Analysis Tools. Table 3.3 lists many major industry, marketplace, and marketing mix variables. Table 3.4 lists many significant external forces and factors that can affect organizations over time. (These tables list much more specific or finite

Table 3.3. Major Industry and Marketplace Variables

Industry or Market Definition and Scope
- Type of industry or business (SICs)
- Types or classes of goods and services
- Size and scope of total market
  - Total sales
  - Geographic area
- State of market segmentation
- Stage in life cycle of market
- Basic cost structure

Structure of Industry
- Types and classes of competitors
- Number of competitors
- Extent of horizontal and vertical integration
- Competitors' product mixes
- Competitors' shares of market
- Basic traditions and practices
- Entry (requirements, barriers)

Consumer or User Profiles
- Demographics
- Reasons for purchasing or consuming
- Consumption or usage patterns
- Purchasing patterns
- Information needs
- Influences on purchase decisions
- Influencers of purchase decisions

Competitive Marketing Phenomena
- Product or service groupings
- Product or service descriptions
- Basic marketing strategies
- Basic marketing tactics

Marketing Mix Factors
- Products or services
  - Descriptions
  - Product mixes
  - Features
  - Technical sophistication
  - Performance
  - Usage benefits or advantages
  - Bases of product differentiation
  - Bases of brand differentiation
  - Substitutability of other products
  - Patents, trademarks, or copyrights
- Channels of distribution
  - Types of channels
  - Services provided by channels
    - Warehousing
    - Sales
    - Physical distribution
  - Channel practices
  - Channel performance
    - Inventory turnover
    - Delivery
  - Channel risks or needs
  - Incentives to channels
- Promotion
  - Promotional strategies and tactics
  - Pull (advertising) media used
  - Push (sales) media used
  - Promotability of products
  - Promotability of brands
  - Pull media practices
  - Push media practices
    - Sales force practices
    - Point-of-sale practices
  - Push and pull media costs
- Pricing
  - Supply and demand situation
  - Consumer price sensitivity
  - Life cycle of product
  - Costs and break-even points
  - Profit margins
  - Pricing strategies and tactics
  - Pricing structures
  - Pricing practices and policies
  - Contract pricing practices
- Packaging
  - Design and materials
  - Costs
- Market research practices

R&D and Engineering
- Technological sophistication
- Patents
- Facilities and equipment
- Coordination with production

Production
- Productive capacity
- Technology involved
- Processes involved
- Capital vs. labor intensity
- Facilities
  - Plant and warehouse capabilities
  - Plant and warehouse locations
- Machinery and equipment
  - Capabilities
  - Flexibility
  - Maintenance
- Resources and parts inputs
- Quality and quantity standards
- Productivity
- Production costs
  - Materials and resources
  - Direct labor
  - Indirect labor
  - Allocated costs

Transportation
- Patterns of receipts and shipments
- Modes used
- Rates and costs

Sources and Suppliers
- Locations
- Quality
- Reliability
- Pricing

Financial Considerations
- Operating data and ratios
- Profitability
- Return on investment
- Cash flows and liquidity
- Accounting practices
- Debt and equity structures
- Capital sources
- Capital costs

Organizational Considerations
- Objectives and priorities
- Values
- Traditions
- Structures
  - Degree of centralization
  - Unit or departmental structure
  - Levels and spans of control
- Managerial styles
- Management systems
  - Goal setting and planning
  - Decision making
  - Information and control
  - Evaluation and reward

Human Resources
- Management skills
- R&D skills
- Workforce skills
- Sales force skills
- Salary and wage scales
- Working conditions
- Attitudes and motivation
- Turnover, absenteeism, and grievances

Table 3.4. Significant External Factors Affecting Organizations

Economic
- General
  - Employment
  - Inflation or deflation
- Consumer-related
  - Job market
  - Disposable income
  - Consumer savings
  - Consumer debt
  - Consumer Price Index
  - Consumer spending
    - Durable goods
    - Services
    - Consumables
  - Consumption patterns
- Business and industry
  - Production
  - Shipments
  - Inventories
    - Raw materials
    - Work in process
    - Finished goods
  - Finished goods prices
  - Wholesale prices
  - Distribution markups
  - Profits
  - Dividends
  - Employment
  - Spending on . . .
    - Capital projects
    - Services
    - Labor
    - Raw materials
    - Energy
- Financial
  - Interest rates
    - Discount rate (Fed)
    - Mortgage rates
    - Prime rate
    - Consumer loan rates
  - Money supply
  - Velocity of money
  - Multiplier effect
  - Markets
    - Stocks and bonds prices
    - Commodities prices
    - Foreign exchange rates
- Government-related
  - Monetary policies
  - Fiscal policies
  - Trade policies
  - Taxes
  - Government spending
    - Defense
    - Social welfare
  - Revenue shared with states
  - Budget deficit or surplus

Political and Governmental
- (federal, state, local)
- Executive branch
  - Departments and agencies
  - Department and agency codes and regulations
    - IRS, OSHA, EPA, EEO
    - Federal Trade Commission
    - Interstate Commerce Commission
  - International relations
    - Treaties and agreements
- Legislative branch
  - Legislation
    - Incorporation
    - Antitrust
    - Unions
    - Taxation
- Judicial branch
- Political parties

Technological
- Agricultural
- Medical
- Engineering
- Aviation
- Computers and information systems
- Robotics
- Materials
  - Catalysis
  - Semiconductors
  - Plastics
  - Fiber optics
  - Nanotubes
- Mathematics
- Sciences
  - Physics
  - Chemistry
  - Bioengineering
  - Biology
  - Biophysics
  - Neurophysics
  - Astrophysics
  - Electronics
  - Genetics
  - Climatology
  - Mechanics
  - Metallurgy
  - Optics
  - Psychology

Resources
- Raw materials
  - Reserves
- Energy
  - Petroleum and gas reserves
  - Refining capacity
  - Production capacity
  - Nuclear
  - Alternative fuels

Social and Cultural
- Population demographics
- Population growth
- Population migration
- Social norms and customs
  - Morality and ethics
  - Work ethic
  - Socialization of the young

Other
- Foreign entities
  - Governments
    - Domestic policies
      - Monetary policies
      - Fiscal policies
    - Trade policies
  - Competitors
    - Products
    - Marketing practices
    - Costs and prices
- Sources and suppliers
- Transportation
  - Modes
  - Facilities
- Communications
  - Modes
  - Facilities
- Labor
  - Workforce (number, skills)
  - Unions
- Industry associations
- Special interest groups
  - Environmental
  - Political action
- Natural phenomena
  - Weather
  - Geography

factors than those listed in Table 3.1 under "Environmental Inputs.") They are provided here to give readers a basic idea of the extraordinary degree of complexity that can actually be involved in strategic planning processes (and in analyzing organizational behavior during those processes).

Figure 3.4 visually summarizes many of the countless variables ("trees") in a "planning forest"—entities, groups, phenomena, issues, problems, and other variables listed in Tables 3.3 and 3.4. First, notice the path near the edge of the forest. It is the "familiar path of factors, plans, and solutions"—the path that managers travel all the time. They are accustomed to analyzing many of the factors associated with consumers, suppliers, the economy, government regulation, domestic competitors, foreign competitors, important internal problems, and the really big and often-discussed industry problems and issues. Most managers are inclined to consider the more

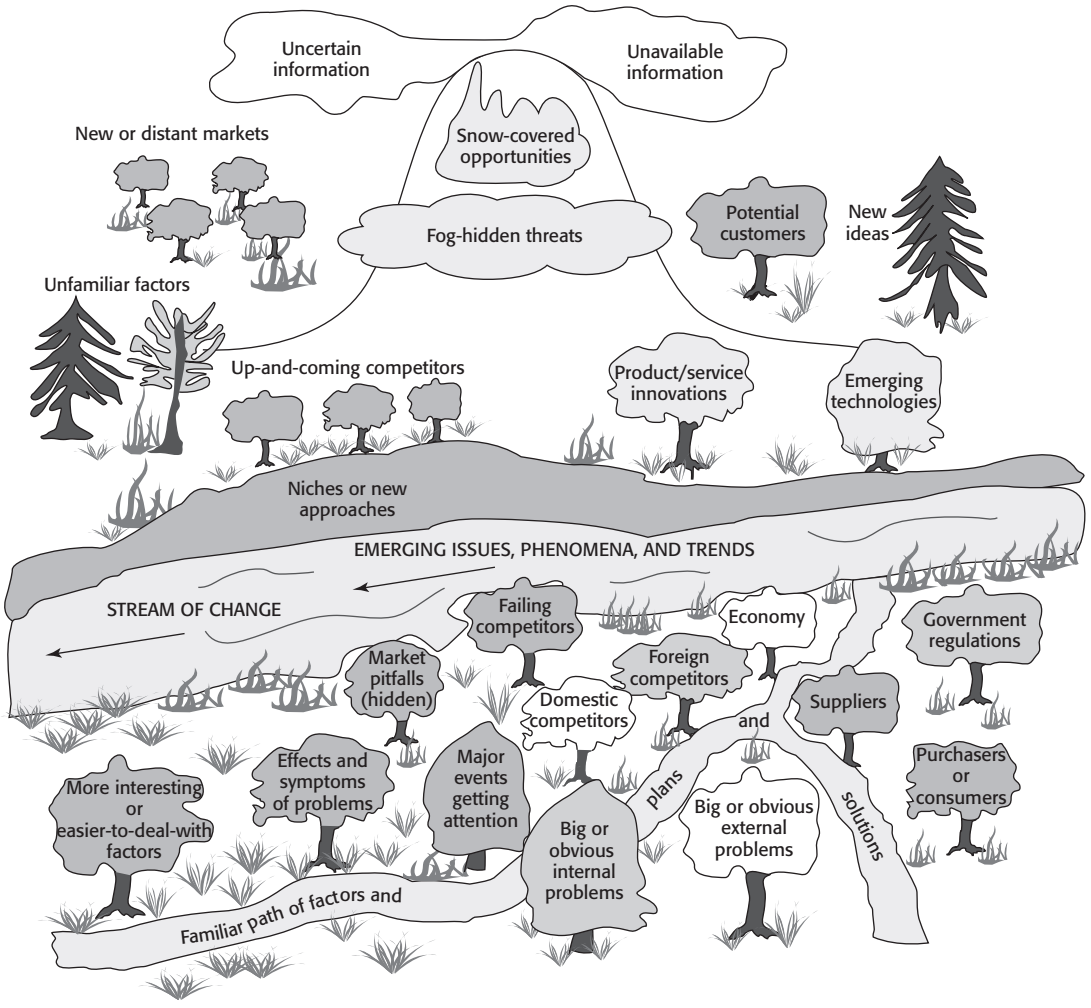

Figure 3.4. A Strategic Planning "Forest" of Variables

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interesting or easier-to-deal-with factors. And they will look at the effects or symptoms of the problems and the major phenomena receiving industry and marketplace attention. These are all foreground factors—the ones that are easy to see. But behind the nearby trees and bushes are a number of not-so-obvious variables and phenomena that need attention. Note the "stream of change" running through the forest. It represents a constant flow of impending or emerging issues, phenomena, and trends that will make themselves felt over the years. Along the near edge of the stream are important elements such as hidden market pitfalls and slowly failing competitors. Across the stream and farther away are other less visible or obvious factors, including emerging technologies, product or service innovations, and up-and-coming competitors who are beginning to stake out niche markets or new approaches in order to gain a foothold in the marketplace. Perhaps many managers also fail to see numerous unfamiliar factors, new or distant markets, potential customers, new ideas, not-so-obvious opportunities, and hidden threats or problems. And perhaps they have available only very uncertain or inaccurate information about the variables to which they actually do give some thought.

If managers are thinking only about the familiar considerations that are easy to see because they are close to the well-worn path, and if they fail to take the path to the edge of the stream so that they can at least try to look beyond the foreground vegetation, they are going to overlook many things that could represent opportunities, threats, and problems. Right now, they may think that the little seedlings and saplings in the background do not look too important. But the bigger trees in the foreground, which seem important now, are someday going to be gone, and the little trees will have become the forest.

The point: You need to deal with more variables, dig deeper into the details, and look much further into the future in order to (a) identify what the competition has not noticed yet (you hope) and (b) more quickly and effectively position your organization to take greater advantage of opportunities and deal more effectively with threats or problems.

How to Develop a Checklist-Based Qualitative Information Base. Checklists of variables help managers supplement their knowledge of factors and deal with other limitations such as the influences of motive and attitudinal traits, the mind's tendency to oversimplify, and the cultural inclination toward single causality. As a result, they enable managers to analyze situations in greater breadth and depth.

It is also extremely beneficial for managers to utilize a checklist in the following organized, orderly, and systematic manner. As a group works category by category through a checklist of variables (preferably printed on wide-format "green-bar" paper), ask the following: (1) Is this category (or subcategory) of factors worth looking at further (should we consider the category's more finite factors and any information associated with them)? (2) What is the unit's or organization's situation with respect to this category of factors or this more finite factor within that category? Participants can each write very brief answers to these questions on their own copy of the checklist, or a recorder can do so on a master version. The answers are essentially qualitative observations, insights, assumptions, and conclusions about the customers, suppliers, competitors, and other entities that exert influences on their business world. Of course, not all the factors on any particular checklist are going to apply to all organizations or all industries. However, even though it may not be necessary for the group to consider all possible factors, they should still make sure that they have not overlooked some finite factor—some "needle in the haystack"—that represents a competitive advantage or opportunity that competitors might not yet have noticed.

Do managers want to analyze things in such detail? Of course not—for all the reasons mentioned toward the end of Chapter Two and in the "Human Limitations" section earlier in this chapter. Nevertheless, using a checklist has important advantages. First, it gets group members to think about a particular situation in an organized, step-by-step manner instead of jumping around from one topic to another. Second, it is designed to take them deeper and deeper into the checklist's details and lead them to insights that they might never have arrived at on their own. Third, a checklist provides a certain discipline, because it keeps participants moving along during a session. Fourth, it helps them think about things that are outside their "boxes."

With respect to the last point, take, for example, the marketing executives of a midsize manufacturing company with which author R. D. Cecil worked. When the group came to a checklist of consumer or customer variables, they balked at starting into it, saying, "We sell through several channels of distribution and don't need to analyze the ultimate purchasers or users." They were asked to take at least fifteen minutes to get into the checklist and then see what they thought. Not only did they finish that factor index, but as a result of the insights they gained, they also significantly modified their marketing strategies and tactics to more effectively utilize their distribution channels for reaching targeted market segments. Furthermore, they said they were glad they had done a very detailed analysis, because it had given them "a better handle on what needed to be done and when and how to do it."

Not only are checklists excellent analytical tools, but they can also be very beneficial learning and knowledge management tools. They can help get tacit information—qualitative, nonnumeric, or subjective information, such as observations, insights, and conclusions—out of people's heads and into some sort of database. Based on a research study, the Delphi Group's Tom Koulopoulos, R. Spinello, Wayne Toms, and Wayne D. Toms (1997) pointed out the importance of doing so, saying, "On average, organizations believe that 42 percent of corporate knowledge is housed exclusively in the brains of employees." That knowledge is usually qualitative rather than quantitative, because numeric data is already in databases (which can store and manipulate it most efficiently). Koulopoulos and his coauthors also mentioned another reason for the importance of qualitative information: about 80 percent of top management decisions are based on qualitative rather than quantitative considerations.

When observations, insights, and other qualitative bits of information are either written on a printout of a spreadsheet-based checklist or entered directly into that spreadsheet, the checklist becomes a searchable qualitative information base (QIB). Developing a QIB has many advantages. First, by writing down brief answers to the question "What is the situation with respect to this variable?" people must crystallize, sort out, and sift what they "know." This, in turn, helps them identify what they actually know and what they may have to learn or even research. Second, getting all this information out of people's heads and into a spreadsheet helps protect it from possible loss through turnover, retirement, or termination. Third, the process itself stimulates participants' mental activity and leads them to many fresh insights and innovative ideas. Fourth, it enables participants to share and verify information among themselves. In other words, the process is a powerful learning experience for everyone involved.

Developing a Diagrammatic Knowledge Base™ to Handle Complexity. One might ask, "If it's such a good idea to use checklists to analyze situations in considerably more detail than ever before, how will we deal with the complexity?" Different groups of people use different approaches, but one approach is far more powerful and beneficial than the others.

First, consider the group that takes the less effective simplistic approach. These people, who essentially want to ignore complexity and not get bogged down in details, advocate the KISS principle ("keep it simple, stupid"). This approach largely stems from a concept called "Occam's razor," which was first proposed in the fourteenth century by William of Occam, an English theologian, who believed that the simplest explanation tends to be the best.

Granted, applying a simplistic approach might sound quite sensible to many harried individuals. However, it would mean, for example, that out of all the possible solutions indicated in Figure 3.1, one simple solution would be best. We could not disagree more, because we are convinced that *it takes a system of solutions to remedy a system of causes.* H. L. Mencken (1949) would certainly also disagree. He is often quoted as saying, "For every complex problem there is a solution that is simple, neat, and wrong." A European consulting firm, ThinkTools AG, would disagree, too. It has run full-page magazine ads that proclaim in huge letters, "Keep It Complex, Stupid." Moreover, based on his research using programs called "machine learning systems," computer scientist Geoffrey Webb (1996) concluded that (a) complex decision-making processes generally yield better decisions and (b) following Occam's concept can cause people to overlook hidden knowledge and draw faulty conclusions.

Nevertheless, while simple analyses are clearly dysfunctional for modern management in a complex world, Occam's razor and KISS are still popular. Why? Many managers are afraid of becoming too enmeshed in details and suffering from "paralysis by analysis." Their theory is that the more information we attempt to consider, the more muddled the decision becomes and the more we hesitate to make a decision. That happens. The phenomenon was once called the "55–45 syndrome" because, for example, 55 percent of an analysis could indicate "do A," but the other 45 percent might augur for "don't do A" (or perhaps "do B"). All too often, managers want much more additional information, hoping that it will make the best decision more apparent and somehow less risky. Nonetheless, it is the job of effective managers to make decisions in the face of complexity and uncertainty.

Here is one recommendation for dealing with this situation: once a decision is made, do not be timid. Shift your mental gears and then run with the ball. Doing otherwise will not help. The complexity of global markets, modern organizations, and world economies is staggering, and that complexity cannot be wished away. In fact, not only is complexity not going away, it is continually increasing. Yelling "KISS! KISS!" while running off the battlefield in the middle of the war with complexity cannot be the answer because it accomplishes nothing.

A more effective way to handle real-world complexity is to use the technological tools at our disposal. The following are some suggestions for developing a management and knowledge tool called a diagrammatic knowledge base.

As participants in, say, a strategic planning process are working their way through a checklist of relevant marketing variables, the group leader (or a facilitator) can diagram the most significant variables under discussion on a very large surface. ("Team-think walls," which are specially constructed for this purpose, can measure 32 feet wide by 8 to 10 feet high—or over 256 square feet.) Such diagrams can contain hundreds of qualitative factors, such as entities, phenomena, and other variables. Lines and arrows are used to indicate cause-effect and sequential relationships among the variables. Relevant quantitative data can be written in beside many of the qualitative objects on the diagram.

Similarly, large wall diagrams can be used to (a) illustrate the ways in which socio-technical factors are affecting motivation, attitudes, behavior, and performance within the major units of an organization, and (b) diagram how those phenomena are influencing job interactions and the

flows of information, materials, and services—both vertically (between organizational levels) and horizontally (between units). Diagrams can also be used to illustrate and analyze facility layouts and other complex situations that lend themselves to visual analysis.

Diagrams are powerful analytic tools because they *visually integrate* the qualitative aspects of the analysis (the variables and their relationships) with the quantitative aspects (the data associated with the variables) right in front of a group. They enable managers to consider both nonnumeric and numeric information in a blended manner that maximizes their ability to gain insight into complex systems and subsystems and make sense of the large amounts of information involved. They also help managers (a) think in a more organized manner, (b) be more insightful and innovative, (c) better grasp the big picture, (d) think more clearly about the future, (e) identify more hidden or previously unrecognized problems, (f) deal with problem situations more completely and permanently, and (g) simply "work smarter."

Computerizing a wall diagram enables managers to update and use it on a continuing basis. (Many types of software can be used, but none are yet capable of performing all aspects of situational diagramming both effectively and efficiently. Each type has advantages and disadvantages.) Once a wall diagram has been computerized, it becomes a *diagrammatic knowledge base*™ (DKB). When designed to do so, a DKB can enable users to click on any object and drill down into either a qualitative information base (QIB) or a strategic planning database. It can also enable them to click on an object and pop up a map or graph of relevant information. Thus, a DKB makes a tremendous executive information system tool, because it enables managers to view almost every internal and external aspect of their organization's "theater of operations."

Using existing software and custom-configured hardware, it is also possible to project a computerized DKB onto a 256-square-foot wall (or screen) seamlessly and in its entirety. It is ideal to have a dedicated "strategic planning warroom" for this purpose. Such a facility enables managers to do real-time strategic planning with an enormous amount of situational information illustrated right in front of them.

The most important advantage is that a DKB—or even an uncomputerized wall model—enables participants in a planning, problem-solving, or decision-making session to *handle 50 to 100 times more strategic information than they have ever been able to handle before.* It enables them to deal with both qualitative and related quantitative information in a visually integrated manner that maximizes their ability to gain insight into and deal more effectively with the complex systems of variables surrounding them.

In fact, that is almost exactly what a strategic planner at a Fortune 5 company said: "We have mountains and mountains of data, but no way to make sense of it all. This is a way to make it more meaningful." The CIO of a major chemical company said, "We are inundating our people with data, but they can't handle it all. These methods and tools can help us make our information more useful." The coordinator of a major computer company's "team focus centers," who is a professional facilitator as well as a manager, said, "Companies need this badly, but they are still just short of the point where they can recognize it."

Once a DKB has been either shown or described to managers, they often ask, "Doesn't it blow people's minds when they come into the room and see a 256-square-foot wall covered with hundreds upon hundreds of bits of information?" The answer is "It depends." The managers who have participated in the step-by-step development of the wall diagram are totally familiar with all the systems and subsystems of variables and the illustrated relationships among them, because they helped identify them. When the diagram is complete and their minds no longer need to juggle so much information on their own, they can sit back, look at the entire diagrammatic

analysis of systems of variables, and identify possible strategies, tactics, solutions, and improvements that have never occurred to them before. When the group is ready to brief top management (or anyone else), the wall can be completely covered initially and then be exposed and discussed one section at a time.

CONCLUDING REMARKS

Whether during planning, problem-solving, or decision-making processes, analyzing situations in greater depth and breadth is key to better goal setting, planning, decision making, organizing, and other managerial or integrative functions. Two major tools that improve mental effectiveness by dealing with mental limitations are (a) checklists of factors that help compensate for limited knowledge and limiting attitudes and (b) situational analysis diagrams that help people's minds handle the complex interrelationships among variables operating in organizational and marketplace situations. Once such situations have been analyzed thoroughly, individuals—and participants in group processes—are better prepared to perform planning functions. These functions, which involve formulating goals, strategies, tactics, programs, projects, action plans, and budgets, are discussed in Chapter Four.