7 Holistic Problem Solving

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7.1 Existing Challenges and Deficiencies

Today's management practice tends to reduce every problem to the *technical dimension*. This often results in the "Error of the Third Kind" (E3), which means *solving the wrong problem precisely* (Mitroff 1998). The controversial case of the World Bank, which encouraged polluting industries to move into Third World countries, is an insightful illustration of this point (Box 7.1).

Box 7.1 *The World Bank Environmental Policy Proposal*

In the early 1990s, some economic advisors of the World Bank were proposing that the organization should encourage increased migration of dirty industries to less-developed countries. The argument was as follows: "The measurement of the costs of health-impairing pollution depends on the foregone earnings from increased morbidity and mortality. From this point of view a given amount of health-impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages. (...) The costs of pollution are likely to be non-linear as the initial increments of pollution probably have very low cost. (...) The demand for a clean environment for aesthetic and health reasons is likely to have very high income-elasticity. The concern over an agent that causes a one-in-a-million in the odds of the prostate cancer is obviously going to be much higher in a country where people survive to get prostate cancer than in a country where under-5 mortality is 200 per thousand. Also, much of the concern over industrial atmospheric discharge is about visibility-impairing particulates. These discharges may have very little health impact. Clearly, trade in goods that embody aesthetic pollution concerns could be welfare enhancing" (*The Economist* 1992, p. 66.).

We take a broad perspective on problem solving in order to avoid the strong tendency to solve economic and organizational problems *as if* they were technical. The tendency is mostly due to the bias of disengagement in people's real needs, which also leads to abstract knowledge, theories and principles. Theories, models and beliefs are deeply held,

as long as nobody challenges them. The bias toward technical solutions in management is partly explained by professional training and experience.

Crucial in problem solving is who defines the problem and what kind of professional training he or she has. The professional training colors the values of the decision-maker and unconsciously influences the formulation of problems. When dealing with important problems, one should take different perspectives on the same problem in order to evaluate the fruitfulness and relevance of different problem formulations.

Referring to a vast body of literature we argue that human beings and organizations have serious limitations in their capacity to operate in a complex way within an environment dominated by dynamic changes. As a frame of reference we draw upon the insights of the Carnegie School, whose prominent scholars were Herbert A. Simon, James March and Johan P. Olsen.

7.1.1 Bounded Rationality

Our purpose is to make suggestions on how organizations operating in dynamic environments might be viewed in order to help them perform their functions with improved efficiency. More precisely our purpose is to indicate under what conditions the organization might attain its goals in an efficient way, given that the organization has to work in a manner deviating from objective rationality. We take an empirical point of departure, focusing on the limits that characterize humans and organizations as decision-making units – contrasted against the ideal type of objective rationality, which clings to an idealistic picture and an omniscient view of the rational man. The idealized picture of rational economic man requires a stable, closed system of variables that we seldom find in actual business situations, where significant indirect effects are always present (Simon 1976).

The view represented by Simon and others is called *bounded rationality*. We maintain that human limitations are controllable in the sense that awareness of the limits may lead to transcending and altering those limits. If one knows, for example, that he or she employs a technical bias in searching for information, the behavior may be altered by broadening the search in the direction, say, of existential aspects of the situation.

A vast body of documented evidence indicates that there are a number of limits on each member of the organization. These include limits of (i) skills, habits and reflexes, which are not in the realm of consciousness; (ii) values and conceptions of purpose, which influence decision making; and (iii) knowledge relevant to the given situation (Simon 1976, p 40). For example, decision makers have only an imperfect and incomplete knowledge about the consequences of their decisions, which may cause serious systemic effects to unfold in the future. The values of different alternatives can also only be anticipated in an imperfect manner. Bounded rationality tells us that we should be focusing on those factors that are most "closely connected with the decision in cause and time" (Simon 1976, p 82).

Traditional economic theory postulates an "economic man" who in the course of being "economic" also is "rational." This man is assumed to have knowledge of the relevant aspects of his environment which, if not absolutely complete, is at least impressively clear and voluminous. He is assumed also to have a well-organized and stable system of preferences, and a skill in computation that enables him to calculate, for the alternative courses of action that are available to him, which of these will permit him to reach the highest attainable point on his preference scale. (Simon 1955)

A firm is not an omniscient system. It is a system of units in which organizational members come from different professions with different goals. Each profession has its own learned incapacity to see, define, understand and solve problems. Differing professionals will see one situation in different ways, because they each see through conceptual lenses that are colored by a special language appropriated through professional training. Professionals have to make decisions, and therefore they have to collect, interpret, analyze and use information that concerns the problems to be solved. It may be appropriate to distinguish between the *primary decision* – the decision that has to be made – and the *secondary decision* that concerns which information sources are appropriate. In order to make reasonable decisions, we have to acquire adequate information. This is evident in important investment decisions or in public policy decisions, which require impact analysis in order to take into consideration aspects that otherwise might have been ignored. If rational decision making requires adequate

information, then a rational decision maker has to be conscious of the way he or she searches for information.

7.1.2 The Administrative Man

The rational model of economic man is strongly attacked by scholars who believe in another kind of model, the so-called "administrative man," The administrative man shows another kind of rationality—*bounded rationality*—which stipulates that members of different units of the organization perceive problems in specialized ways. While the sales department of a company may define a given problem as an underuse of PR, the production department may look upon the "same" problem in technical terms – voicing the need for a new machine to make the parts and parcel stronger.

Organizational problem solving displays many similarities to individual problem solving. For one thing, organizations use individual members of the organizations as instruments. In general organizations give priority to simple search rules in seeking to reduce the stress of handling complexity. This means extensive use of *programmed decisions*—that is, do what you have done before—and it translates into a limited search in a well-structured way to solve the problem. Another characteristic of organizations is that they use "*rule of thumb*" decision rules, even for complex decisions. This deviates sharply from what is prescribed in rational decision models. One example is the making of budgets. When forecasting next year's costs, one adds 10 percent to this year's budget. Another phenomenon is called *local rationality*. Compared with objectively rational behavior, we find that the human mind has a limited capacity to formulate and solve complex problems. Local rationality implies that decision units have limited horizons in problematic situations. In particular, the environment of the decision bodies is viewed as given, even when the environment has undergone important changes.

Another phenomenon seen is that organizations are "*uncertainty avoiders,*" selecting strategies that tend to minimize uncertainties. One well-known strategy is the attempt to stabilize the environment and the practice of the unit through standardization. This means selecting one set practice over another even if a contingency may have worked better in the same situation. Another implication of avoiding uncertainty is that organizations

usually adopt a short-term perspective. This involves short-run solutions to reduce the immediate pressure of problematic situations. For example in an equipment-replacement situation, a one-piece-at-a-time replacement may be made rather than a more holistic renovation even when the latter would be more rewarding in terms of long-run profits.

In organizational as well as individual behavior, problem solving mostly consists of "problemistic search", which means that the search is motivated and stimulated by a problem. It means that the *search* is not proactive but *reactive*. Search is a pragmatic activity; that is, members of the organization search until they believe they have solved the problem rather than because they want a deeper understanding of the phenomena. They want to control the problem, not understand it. Motivated search also means that solutions are searching for problems. Pet projects can look for crisis, and sellers of technical equipment search for opportunities so that their equipment can find commercial opportunities (March & Olsen 1976). Motivated search and bounded rationality encompass the idea that the search stops when it has reached a level of satisfaction. "Good enough" solutions are quite different from maximizing ones. This way of thinking dictates that if you are searching for a needle in a haystack and find one, you stop searching. It may not be cost effective to continue the search for an even sharper needle. The notion of "satisficing" replaces the notion of "maximizing."

Problemistic search assumes that the search starts with a simple model of causality and evolves to a more complex model only if the search does not solve the problem. Two simple rules employed are (i) search in the neighborhood of the problem symptom and (ii) search in the neighborhood of the current alternative. The assumption is that the cause is found close to the effect and the new solution will be similar to the old solution. Thus, problemistic search starts near the symptoms of the problem and typically employs a narrow process that leads to myopic solutions.

A serious weakness of problemistic search is the need to wait until bad things happen. This reactive approach is not always fruitful because it often means only treating the symptoms—resources could have been better used preventing the "fire" and proactively planning for the future. The most important problem with such a "fire station strategy" is the tendency to assume that one solves the problem by extinguishing the fire. It is often more fruitful to think of the fire as a symptom of the real problem, with the important

challenge being to define the core of the problem. Much of the theory of problem solving is about solving predefined problems. However, *problem finding*—the art and skill of apprehending and conceptualizing problems—is more important and more challenging.

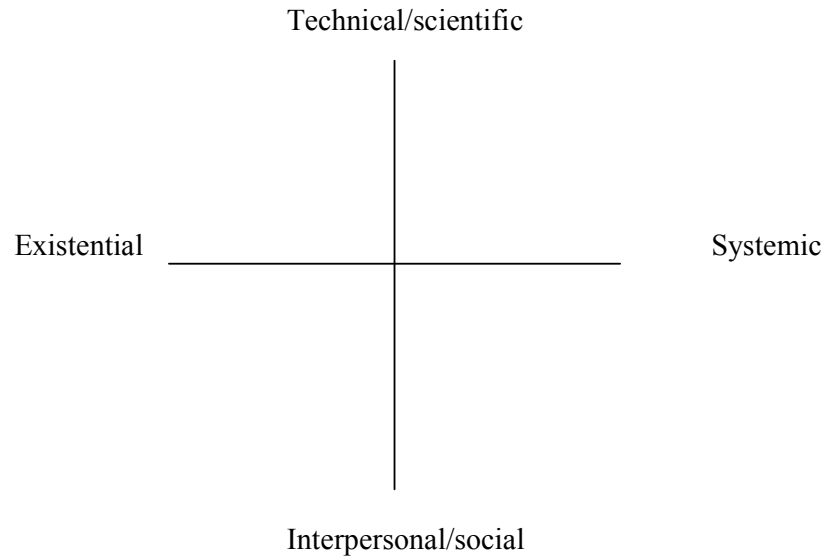## 7.2   New Approaches and Good Practices

What is a problem? A problem is a gap between an "ought" and an "is," the difference between an ideal—something which is desired—and the actual situation as it is perceived. The problem is solved when one perceives that the gap has disappeared. The gap may be closed either through adaption, which leads to a reduction of the aspiration level towards the existing situation, or through action that brings the situation closer to the ideal.

Important problems typically appear as "messes," which present themselves with no clear indication on how to solve them. It is neither easy to know what the ideal is nor easy to state what the actual situation is. Human feeling and intuition are then called upon to begin the process of apprehending and conceptualizing the problem. We believe that this intuition is to a large extent a product of professional training. In the following we will present a framework that will help in taking a more holistic view on problems. We think that the formulation of problems, and ultimately the decisions we make, depend in part upon the questions asked.

7.2.1   Perspectives of the Problem

As a frame of reference we present a model developed by *Ian Mitroff*, which shows the four dimensions of any problem: scientific/technical, interpersonal/social, systemic, and existential (Figure 7.1).

Figure 7.1   *Four perspectives in problem-solving*

Technical/scientific

Existential _____|_____ Systemic

Interpersonal/social

Source: Mitroff 1998, p 59.

The *technical/scientific* perspective is the dominant perspective in today's Western culture and favors technical solutions to most problems, even when other solutions are more appropriate. This *technocentric bias* is partly explained by the status and prestige that engineers and economists enjoy in our culture.

The *interpersonal/social* perspective concerns the way the problem might be looked upon from a social, group, and family point of view.

The *systemic* perspective takes into consideration the long-term consequences of how the problem is solved. It assumes that all things are interconnected. We will define this kind of thinking as involving the perspective of future generations and nature as well as those of other stakeholders – even if they are not heard or seen. This perspective goes beyond geographic borders and narrowly defined time limits. It also takes into account dysfunctional or boomerang effects caused by decisions.

The *existential* perspective emphasizes the lives and fates of individual human beings and their life-worlds. Human feelings, dignity and meaning are important aspects in this perspective. The important existential questions asked are as follows: Who am I? Whom do I want to be? How do my actions influence my life project, which gives meaning and purpose to my life? Ultimately all important decisions and acts influence the self of the decision maker, and reasonable beings as such should care about themselves.

It is important to emphasize the existential perspective because it is usually ignored or even denied in management literature and thinking. However, when we take this perspective seriously, we get a new and different view of many business problems. For example, it may explain why conventional reward systems based upon the doctrine that "more money is better than less money" do not always work.

Familiar examples showing the importance of the existential dimension of problems are blood donation and garbage handling in Denmark. Research found that by offering blood donors money for their blood contributions, a new pattern developed. Relatively poor people, like drug users, increased their donor frequency, and even more people were recruited from this population. In contrast, among people who had a higher socioeconomic status, the donor frequencies decreased, and some of these people stopped their donations altogether.

In a community in Denmark a garbage-handling project by the locals was successful, and the municipality realized that they could make a profit by recycling the garbage. Therefore they decided to pay the locals for their garbage-handling efforts. But then the municipality got a surprise. The collection of garbage was reduced, not increased, due to the money involved. An activity based upon the conviction that doing the right thing has a value in itself was transformed into a market transaction, and then many of the locals lost their willingness to contribute to the common good.

Both examples show that "material incentives destroy rather than supplement moral incentives" (Goodin 1980). There are some little known "interaction effects" between economic and normative input. We argue that this phenomenon is strongly connected with the existential aspect of life. People often oppose financial incentives when their

primary motive is to be a person in possession of dignity and self-worth. They do not want to look upon themselves as greedy sharks. Having self-respect, one does not enter into actions that may cripple self-esteem.

We illustrate the multidimensionality of business decisions with the complex case of downsizing and focus on "survivor's sickness" (Box 7.2).

Box 7.2 *Survivor's Sickness in Downsizing*

Downsizing is a problem that is usually understood and solved within the technical/scientific perspective. The main reason for downsizing is that the company does not generate enough profit. Managers assume that profit can be increased by moving parts of the company from a high-cost country to a low-cost country, so typically some production plants are moved to Third World countries. However, after a certain period of time (9 – 12 months), data shows that the "scorecard of downsizing is negative" (Karake-Shalhoub 1999). In some situations downsizing might be seen as a case of solving the wrong problem precisely.

By the term "downsizing" we mean the reduction of the workforce through either voluntary or involuntary means or a combination of the two. The fundamental purpose is to reduce costs, and the most obvious factor to be reduced is the number of employees. This implies that people who do not want to leave the company are forced to leave. Without work they become depressed, because they miss the opportunity to work and they miss the daily company of their colleagues. Such a change for the now unemployed is expected. However there are also unexpected changes. The motivation of the remaining employees is reduced, so the impact of downsizing within the company goes beyond immediate economic considerations. It not only affects the organization in economic terms, it also affects the achievement of the surviving workforce. In short, morale amongst the survivors does not increase, but decreases. *Existential dimension:* The still employed suffer from a loss of meaning and dignity and reduced self-esteem. In a sense they have taken the situation of their colleagues into themselves and blame the

managers for the treatment of those who have lost their jobs. Those who still have jobs become alienated and feel emotionally uneasy.

Social dimension: A downsizing usually breaks up social relations—informal friendships and networks. It impacts the lives of the families by contributing to economic uncertainty and forced relocations, which means that children may end up changing schools and environments.

Systemic consequences: One typical consequence is less innovation because the problems are moved to a foreign country, typically a Third World country where the laws are less demanding in terms of taxation, environmental protection and human rights. So, one ultimate result is environmental dumping, which in turn results in a boomerang effect. The weaker environmental laws mean for some industries use of more pesticides and more dangerous emissions. The systemic consequences in turn have effects on social factors, such as the creation of mistrust and anguish amongst the workers who are spared by the first round of downsizing. This negatively impacts productivity, and the company reacts with still more downsizing. Finally the company in the rich country is gone and it is fully operating in the third world, creating new problems for the vulnerable stakeholders without a strong voice.

There are also systemic influences on the local community. When workers lose their jobs due to downsizing, they move to new places and housing prices fall. This creates a difficult financial situation for families when they have to re-establish themselves in a new place. That fewer families remain in the local community also means a reduction of welfare institutions like schools and kindergartens. When worker morale is weakened due to feelings of guilt, stress and overwork, the costs within the downsized company are not really cut, because many of the same persons are hired back as consultants at a higher salary.

The main problem with downsizing as typically exercised is that it does not focus on the critical issue – which structures have to be changed? A one-dimensional outlook is required to believe that a reduction in one factor, the size of the company, is in itself the problem and that changing one variable does not have effects on other dimensions such as social, existential and systemic aspects.

7.2.2 Critical Thinking Is Needed

Managers need critical thinking to solve the right problem. Even an approximate solution to the right problem is better than an elegant solution to the wrong one. Assumptions managers hold about their stakeholders should be scrutinized. They should pick the right stakeholders, and this generally means expanding the set of existing stakeholders. To manage the important problems in a fruitful way, holistic thinking—that is, the use of systems methodology—is indispensable to avoiding the "Error of the Third Kind" (E3) - solving the wrong problem precisely.

The systems methodology developed by *Russell Ackoff* and his colleagues at *The Wharton School* states that as long as the assumptions underlying the management-action are explicit, there exists the chance to learn from experience and improve the quality of our practice. This is the way to produce, and successively improve, informed choices. No problem or solution is context free. Context itself changes continuously, rendering a solution obsolete in time. Therefore, managers should be empowered with the systems methodology, and the "why questions," so they can redefine the problem and redesign the solution if need be (Ackoff Center Guiding Principles 2004).

A system performance is determined by the adequateness of the basic assumptions on which it functions and on the way the system is capable of pursuing its objectives. Problems indicate that the basic assumptions are inadequate and/or the system is incapable of performing adequately.

Managers should *dissolve* rather than solve problems by redesigning the relevant systems to eliminate the problems and preclude their reappearance. They should conceptualize problems and opportunities in the largest context over which they may have some control. They should take into account the effects of any proposed actions on all of the relevant stakeholders. Finally, managers are responsible for providing their organizations with an increased ability to do the *right things* as well as do *things right*. (Box 7.3)

Box 7.3   *The Interface Corporation*

The Interface Corporation in Atlanta is a leading innovator in the carpet industry. The traditional, old-fashioned broadloom carpet is environmentally damaging and produces a lot of waste. In the late 1990s Interface launched a transition from selling carpeting to leasing floor-covering and providing the respective maintenance services. Contrary to the traditional solution, Interface, not the customers, owns the carpeting and maintains responsibility for keeping it clean and fresh, for a monthly fee. Whenever needed Interface replaces 10-20 percent of the carpet tiles that show 80-90 percent of the wear. This reduces the amount of carpet material required by about 80 percent, because the unworn part of the carpet is left in place. This solution also provides better service at a reduced life-cycle cost. Because the carpet is laid in the form of tiles, glue fumes are also significantly reduced or possibly eliminated. So far so good: savings in materials, energy and money.

But Interface's technological innovation goes even further by turning waste into savings. Other manufacturers "down-cycle" nylon and PVC-based carpeting into lower-level use, thus losing the embodied energy. Interface has instead made a novel polymeric material called Solenium that can be completely remanufactured back into itself. The production process thus becomes simpler and less wasteful. The new product also provides superior benefits. It is stain resistant, easily cleaned with water, 35 percent less material intensive, and yet four times as durable. It uses sevenfold less mass flow per unit of service than standard carpeting. It is suited to renewable feedstock and is acoustically and aesthetically improved. Compared with standard nylon broadloom carpet, the combination of Solenium's improved physical attributes and service lease encompasses a reduction in the net flow of materials and embodied energy by 97 percent. Its net climate impact is zero.

The Interface Corporation applies a comprehensive, holistic approach to run its business. Its CEO, Ray Anderson, summarizes their philosophy in this way: "At Interface, we are on a quest to become the first sustainable corporation in the world, and then we want to keep going and become the first restorative company. ... It means creating technologies of the future - kinder, gentler technologies that emulate nature.... We look forward to the day when our factories have no smokestacks and no effluents. If successful, we will spend the rest of our days harvesting yesterday's carpet, recycling old petro-chemicals into new materials, and converting sunlight into energy. There will be zero scrap going into landfills and zero emissions into the ecosystem. Literally, it is a company that will grow by cleaning up the world, not by polluting or degrading it."

7.3   The Required Roles and Duties of Managers

Managers need scientific and technical knowledge, but they also need a better understanding of the existential conditions of human beings to avoid the fallacy of defining most problems narrowly and solving them in purely technical ways.

The notion of holistic problem solving does not equate with the kind of omnipotent behavior prescribed in rational choice theories. Our point is that human rationality is bounded. This gives us a less heroic behavior than prescribed in idealized normative theories. We have given some description of the kind of behavior that characterizes human beings in general and organizations in particular.

Given several biases in the sensing, seeing, analyzing and understanding of organizational problematic situations, a number of tools can improve our constrained decision-making processes and thus be helpful in most decision-making situations. We have formulated biases as *practical limits* to *human rationality*, and emphasized that these limits are not static but can be transcended. The manager's task is to increase his or her consciousness about human abilities and develop adequate tools to reduce some of the most significant limits.

We have assumed a description of the world that is consistent with the concepts of administrative man and bounded rationality. We believe that *"satisficing"* behavior is much more characteristic of human beings and organizations than maximizing behavior. This means that we as administrative men and women should be aware of and respect our limited capacities for reasoning and calculation by making some decisions with relatively simple rules of thumb.

These rules should not, however, reduce important problems to consideration of only one stakeholder group or only one dimension of a problem. It is essential that organizations broaden the set of relevant stakeholders, giving particular attention to the impact on

future generations and the environment. In the same vein, the organization has to be conscious of the wise strategy of looking upon important problems as having at least four dimensions. We believe that actual, mundane behavior constitutes a rational platform for using helpful tools and hinting on improvements.

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