Systems ~n~ Practice

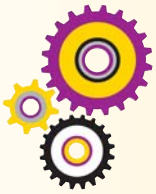
R K M M , S H A R O N D A S 9 5 7 B U

Unit V

Equifinality

Introduction to Equifinality

The second principle of systems theory is the concept of equifinality.



Organizations are open systems.
Equifinality proposes that, in an open system, multiple paths are available to reach the same end.

An organization should first design its system, then build the structure to support it.

Understanding the Definition of a Closed System

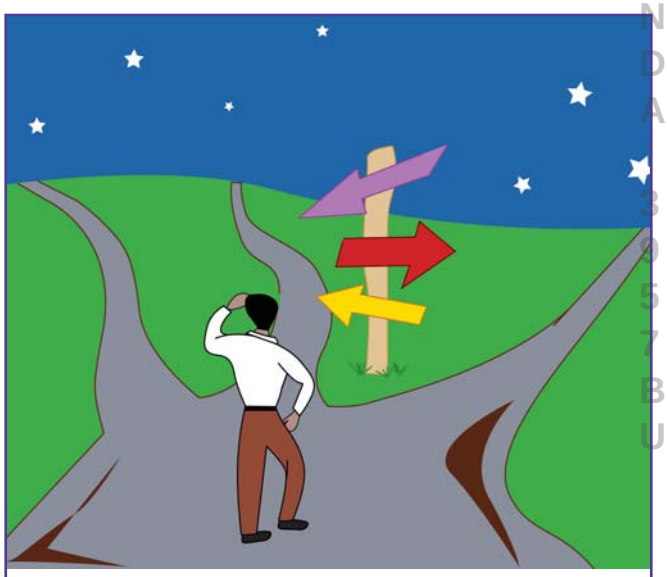
In a closed system, as Bertalanffy (1968) notes, "the final state is unequivocally determined by the initial conditions: e.g., the motion in a planetary system where the positions of the planets at a time *t* are unequivocally determined by their positions at time t_0." (p.40). In other words, closed systems are basically mere formulas and do not truly exist. **In a closed system, once relationships are defined and identified, future responses can be exactly predicted. This is because closed systems are made distinct by their inaccessibility to external influences.** Truly closed systems do not occur naturally. Intervention is necessary in order to exclude or prevent the external influences or forces from affecting internal structures. Whoever controls the system is able to exclude external forces and therefore artificially limit the options available. In closed systems, there are no real choices or decisions; the limitation of alternatives is part of the definition of the closed system. The inputs are controlled and the relationships are defined by the limited range of inputs. Therefore, the outputs of the system are determined as well. The sidebar on this page gives an example of mathematics as a closed system.

Modern Organizations as Open Systems

Realistically, modern organizations are open systems that influence, and are influenced by, their environments. In open systems, Bertalanffy states that "the same final state may be reached from different initial conditions and in different ways" (p. 40). From an organizational standpoint, in order to be effective, the organization must have the ability to evaluate the relative opportunities available to reach organizational goals (Drazin & Gresov, 1997).

Efficiency presupposes effectiveness; efficiency is the accomplishment of objectives using the minimum number of resources.

Alternatives exist in open systems. **Because the range of influences is not controlled, the actors within the system have the opportunity to make choices.** The choices the actors (managers) within the system have the opportunity to make vary depending upon the ability of the actors to manipulate the inputs to the system and the external forces acting upon the transformation process.



A key element in the determination of the alternatives available is the ability of managers to identify a range of possible options ***within the context of the mission.***

The ability of managers to manipulate the outputs of the system is a function of the inputs available, the extent to which the managers have control over the inputs, and the knowledge, skills and abilities of the mangers.

Managers are usually able to identify one or two possible courses of action. In many cases, that is as far as they progress. There may be many other options available and some of those options may well be superior to the option first identified. **Managers must use creative thinking to identify as many possible options in the time available.** In most cases, it is

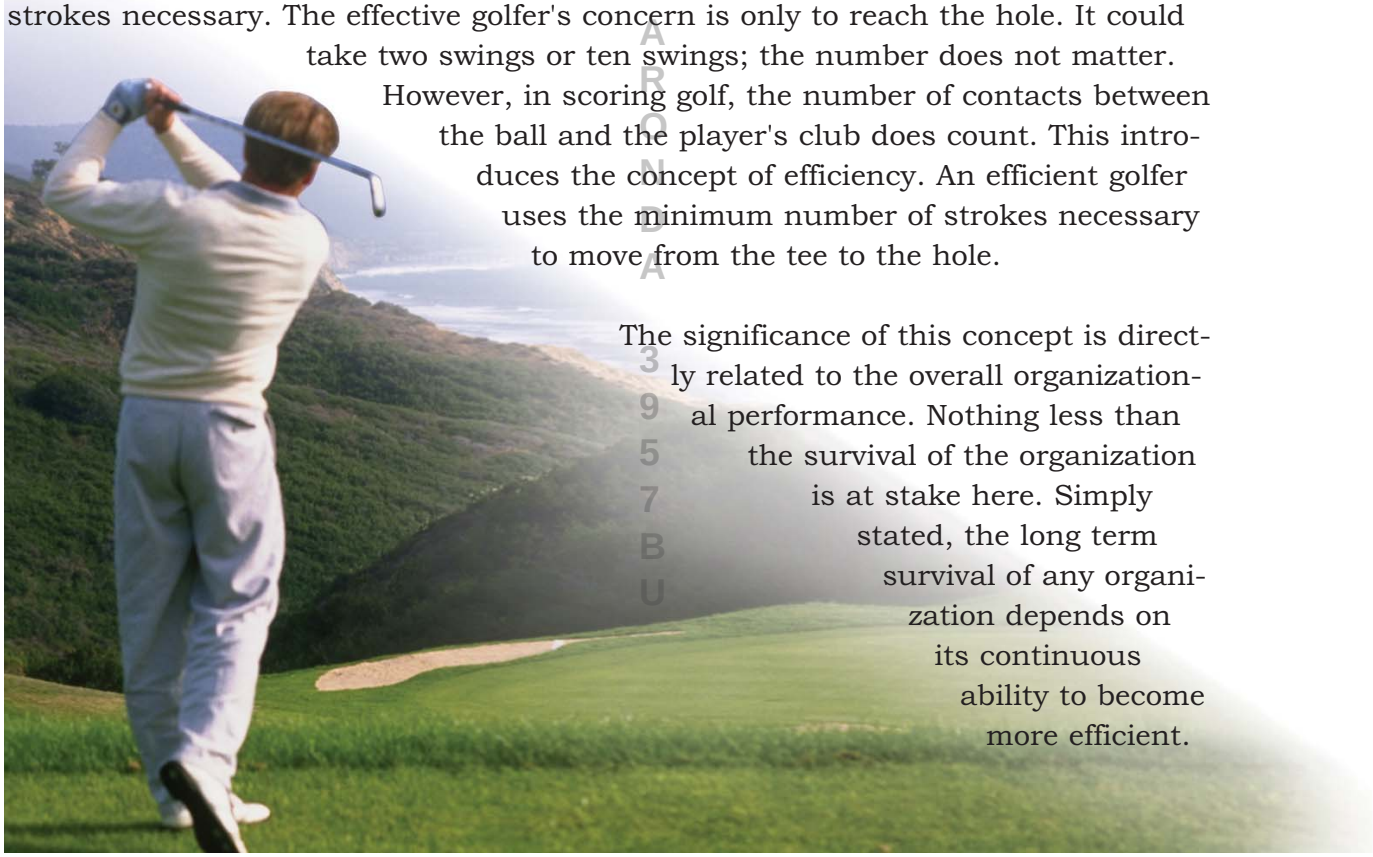
impossible to identify all of the possible alternatives. Further, it is not necessary to develop a list of alternatives so lengthy as to be impossible to evaluate. The manager must be *efficient* and *effective* in the evaluation of how resources are used in order to achieve the organization's objectives.

Effectiveness and Efficiency

To be effective is to simply get the job done.

To be efficient is to be effective with the utilization of fewer resources.

A useful example of the difference between effectiveness and efficiency can be found in the game of golf. The objective of the game is to move the golf ball from the tee to the hole using as few swings as possible. An effective golfer gets from the tee to the hole. However, the effective golfer is not concerned about the number of strokes necessary. The effective golfer's concern is only to reach the hole. It could take two swings or ten swings; the number does not matter. However, in scoring golf, the number of contacts between the ball and the player's club does count. This introduces the concept of efficiency. An efficient golfer uses the minimum number of strokes necessary to move from the tee to the hole.



The significance of this concept is directly related to the overall organizational performance. Nothing less than the survival of the organization is at stake here. Simply stated, the long term survival of any organization depends on its continuous ability to become more efficient.

Opportunity Cost

A common definition of economics describes it as a study of scarcity. This view is built around the fact that human wants and needs are unlimited while various resources are limited. Hence, economics is the study of how to best allocate the scarce resources to best satisfy the unlimited wants and needs. One of the foundational concepts in economics is the concept of opportunity cost.

All effective alternatives should be evaluated and the most efficient one implemented.

Selection of the best alternative means that other alternatives are not selected. Economists call this the opportunity cost of the alternative selected. **The opportunity cost is the value that would have been received if the next best alternative were chosen.** To select one alternative, and miss other alternatives, actually does cost the organization money. **The efficiency of the organization can be measured in terms of the opportunity costs it incurs.**

Defining Closed Systems:

What is half of eight?

The most obvious answer is four. This is the answer one would expect within the laws of mathematics.

Mathematics is the ultimate closed system where relationships are defined and outcomes are exactly predicted. External influences artificially limit the options and restrict the chosen path. To follow the applied rules of mathematics means that predictably:

half of eight is four.

Now remove the restrictions of mathematics and consider the question. Look through the lense of spatial relationships. Half of eight can now be

three

or even

zero....

Profiles of Great Organizers of Productivity

Frederick Winslow Taylor

The Search for the Ultimate Efficient Solution

Frederick Winslow Taylor combined several innovative ideas about the creation of efficient work systems into a unique and ultimately revolutionary theory about the mechanism necessary for the identification of the "one best way" to perform a particular task. Taylor termed his revolution "scientific management" and became the leading management consultant of his time.

Taylor, trained as an engineer, began his career as a common laborer at the Midvale Steel Company. He progressed to a management position and began to experiment with different methods of increasing productivity. Taylor concluded, after considerable observation and analysis, that the secret of increasing productivity lay in finding the right challenge for each person, then paying well for increased output. Pay the person, not the job. His most famous experiment involved a worker named "Schmidt" who loaded bars of pig iron onto a car to be transported into the mill. Taylor observed Schmidt as he worked, picking up a bar of iron from a pile, carrying it to the car, and walking back to the pile. He further broke the process into smaller steps: bending to pick up the bar, picking up the bar, walking on level ground to the ramp, walking up the ramp, and dropping the iron into the car. As Taylor analyzed Schmidt, he realized that the process could be refined to move more iron with less effort. Initially, Schmidt was reluctant to cooperate with Taylor's suggestions. Then Taylor hit upon the second component of his revolutionary theory: workers must be motivated to improve productivity through a paradigm shift in their perception of management's role in the work process from adversary to fellow collaborator. In order to accomplish this shift, he used an existing idea, piecework (payment per unit produced) to motivate workers. Schmidt's initial resistance faded when he realized that he could make more money with less effort using Taylor's improvements in the work process.

Taylor's emphasis on observation, analysis, and redesign of the work process became an essential part of modern quality improvement processes. Taylor was the first to present a systematic study of interactions among job requirement, tool, methods, and human skill, to match people and jobs both psychologically and physically. In so doing, he let data and facts do the talking. The basic ideas incorporated in total quality management and Six Sigma programs trace back to Taylor's work in scientific management.

HEWLETT PACKARD

In 1939, Hewlett-Packard was a tiny California company operating out of its owners' garage. As the U.S. government geared up to fight World War II, the demand for electronic equipment to support the war effort expanded what had been a very small market into a larger and larger part of the national economy. Hewlett-Packard, operating in Palo Alto, grew its business as a War Department contractor.

Hewlett-Packard's first product: an audio oscillator

In the 1950s, Hewlett-Packard expanded into the post-war economy through the introduction of non-defense products. In 1958, Hewlett-Packard opened its first global office in Geneva, Switzerland and a plant in Germany. This was followed in 1963 by a joint venture in Japan and further expansion in the U.S.

Dave Packard and Bill Hewlett in 1981

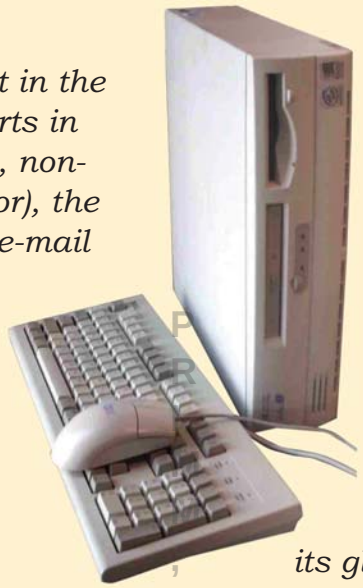
, with manufacturing plants in Colorado and Pennsylvania.

Hewlett-Packard continued to grow as a global organization during the 1970s. As one of the first firms to explore a joint venture in China, Hewlett-Packard's vision was rewarded in 1985 with the establishment of China Hewlett-Packard, a pioneering effort in China's gradual opening to external firms and economic reform. Hewlett-Packard's leadership in

Introduced in 1968, the world's first Desktop scientific calculator

Profiles of Great Organizers of Productivity

Hewlett Packard (continued)



research and development in the U.S. was matched by efforts in Germany (a breakthrough, non-invasive fetal heart monitor), the United Kingdom (the first e-mail system) and Japan (the first Japanese character calculator). Hewlett-Packard became a $1 billion company in 1977.

As the personal computer market exploded in the 1980s, Hewlett-Packard kept pace. By the end of the decade, Hewlett-Packard stock traded not only in the U.S., but on the Tokyo stock exchange as well. Sales topped $11 billion and Hewlett-Packard's labor force globally reached toward 100,000 employees.

By the end of the next decade, Hewlett-Packard spun off Agilent Technologies, keeping the computing and computing related business units. Agilent Technologies, a multi-billion dollar company, continued the Hewlett-Packard tradition by establishing two Chinese ventures within the first five years of its existence.

Hewlett itself continued to expand its global presence by opening a high-technology center in Moscow, establishing and maintaining a contract with the Bank of India, and operations in over 170 countries.

Profiles of Great Organizers of Productivity

*Nothing but blue skies...**jetBlue**, that is*

JetBlue Airways initiated its service with an inaugural flight between JFK International Airport and Fort Lauderdale, Florida on February 11, 2000. The airline now serves 30 cities in the U.S. and the Caribbean with a fleet of 68 new Airbus A320 planes. It is the only airline with all-leather seats and each seat is equipped with 24 channels of free, live satellite television.

JetBlue's true origin dates back to 1993, when CEO David Neeleman sold his first airline, Salt Lake City Air, to Southwest Airlines. Later, as founder and president of Morris Air, another airline originating in Salt Lake City, Neeleman proved that high quality service and low fares attract a loyal market.

After selling Morris Air to Southwest in 1993 for $130 million, Neeleman launched a successful Canadian carrier, WestJet, and developed an e-ticketing system into Open Skies, the simplest airline reservation system. Neeleman sold Open Skies to Hewlett Packard in 1999. In July, Neeleman formed a management team and with $130 million in capital funding from investors such as Chase Capital, he announced his next venture, an airline that would bring "humanity back to our travel."

*JetBlue not only values its passengers, it rewards its crews as well. At Morris Air, Neeleman created "**homesourcing.**" In the homesourcing model, 400 of JetBlue's ticketing reservation agents work 25 hours per work from their homes. The vast majority of JetBlue's reservation agents are stay-at-home mothers and Mormons (as is Neeleman). As a personal value, Neeleman believes that society will be better off if more mothers are able to stay at home with their young children but still have a chance to be wage earners. At Morris Air, employees took 30% more bookings.*

All employees of JetBlue participate in the Paid Time Off (PTO) plan that combines vacation, sick leave, and holidays in a single bank of time. Medical, life, and disability insurance benefits, a 401(k) plan and a profit sharing plan round out the employee benefit package. JetBlue received the award for Best Domestic Airline and Best Value for Cost for each of the four years of its operation. The keys to JetBlue's success: start with the best capital in order to be able to invest in the best product, fly new planes that are reliable and fuel-efficient, screen to hire only the best people, train them well with the best tools, and focus on service thus offering customers the best possible experience.

Decisions for Discussion

Alexander the Great and Darius: the Battle of Gaugamela

An Efficient Use of Resources to Accomplish Organizational Objectives

The Alexander Mosaic

In October of 331 B.C.E., Darius of Persia appeared to have all the advantages in his coming battle with Alexander of Macedon: superior information about his opponent, choice of the field of battle, even the opportunity to prepare the field of battle in such a way as to maximize the capabilities of his war machines, not to mention at least a 4-to-1 advantage in the number of troops. Yet, at the end of the day, Darius had abandoned his army and fled the field of battle. Within two weeks, he was dead, assassinated by his own cousin. How did Alexander use the available resources to achieve this surprising outcome?

First, Alexander previously developed an excellent communication network with his commanders. Second, Alexander used the smaller size of his army as an asset, leveraging the communications advantage of a smaller, more closely associated group. Beyond the senior commanders, Alexander's army, although smaller than Darius' (estimates place Alexander's forces at approximately 40,000 and Darius' at 200,000 to 250,000), was organized into highly trained and well-disciplined units. The phalanxes, or rows of troops armed with 18-foot spears, prevented opposing troops from attacking with their much shorter swords. The phalanxes were the core of Alexander's battle line and because of them, a direct assault on the center of Alexander's army presented an extremely difficult challenge. Darius' infantry was organized along conventional lines and therefore, spread out and did not have successive rows of troops to move forward while engaged.

Alexander

Alexander lined his troops up on Darius' left flank, and as the battle began, Darius was forced to move his forces further to the left, thus diluting the advance of his superior numbers. Alexander arranged his troops so that the full capability of his phalanx units was screened by his infantry. After a brief initial engagement, Alexander's troops broke off the attack deliberately and fell back. When Darius' forces pursued, they faced the strongest units of Alexander's army. Alexander's other infantry units still waited, not engaged in the battle, as Darius committed more of his forces against the enemy immediately in front. As Alexander committed more of his cavalry on Darius' left, Darius was forced to continue to move to the left in order to avoid being flanked.

Darius

After Darius fully committed his forces, Alexander still retained a significant proportion of his best men. As Darius' army stretched further to the left, Alexander formed his available, and still fresh troops into a wedge and drove toward the weakest section of Darius' line: the center. As Darius' army began to withdraw in disorder, Alexander's forces pressed forward. Darius fled the battle and left his troops in disarray, open to the advances of Alexander's army.

At the conclusion of the battle, Darius' army suffered losses of at least 40,000 dead and many more wounded. Alexander's losses were placed at approximately 500 dead. Alexander's ability to deploy the available resources in an effective manner against a significantly stronger (at least in numerical terms) opponent provides a demonstration of the principle of equifinality. Many means exist to achieve the same the end; the manager who is able to use the minimum amount of resources to achieve the organizational objective produces the most value to the organization.

Discussion Questions:

1. Would you say that Alexander was effective, efficient, or both? Why?
2. How did Alexander's strategy prevent Darius from using his resources in a more efficient manner?
3. Put yourself in Darius' position. Based on the description above, how could you make your army more efficient?

Summary

- There are alternate routes to reaching any desired outcome.
- Managers should explore such routes and adopt the most efficient alternative to accomplish the desired outcome.
- Equifinality is the foundational concept for
  - Process of continuous improvement (Kaizen)
  - Practice of benchmarking
- Long term survival of any organization depends on its continuous improvement efforts.

This is a copy of the online form you will fill out in the COMPLETE section of this unit's coursework.

THE MISSION IS DIVIDED INTO MAJOR GOALS

MAJOR GOALS ARE DIVIDED INTO OBJECTIVES

OBJECTIVES ARE ACCOMPLISHED BY PROCESSES

PROCESSES ARE SEQUENTIAL STEPS OF WORK ACTIVITIES, DESIGNED TO ACCOMPLISH OBJECTIVES

Identify a process that you perform regularly to fulfill the objectives of your position. Trace and list the specific steps that make up the process below:

Name of Process: _____

_____

Now List the Steps:

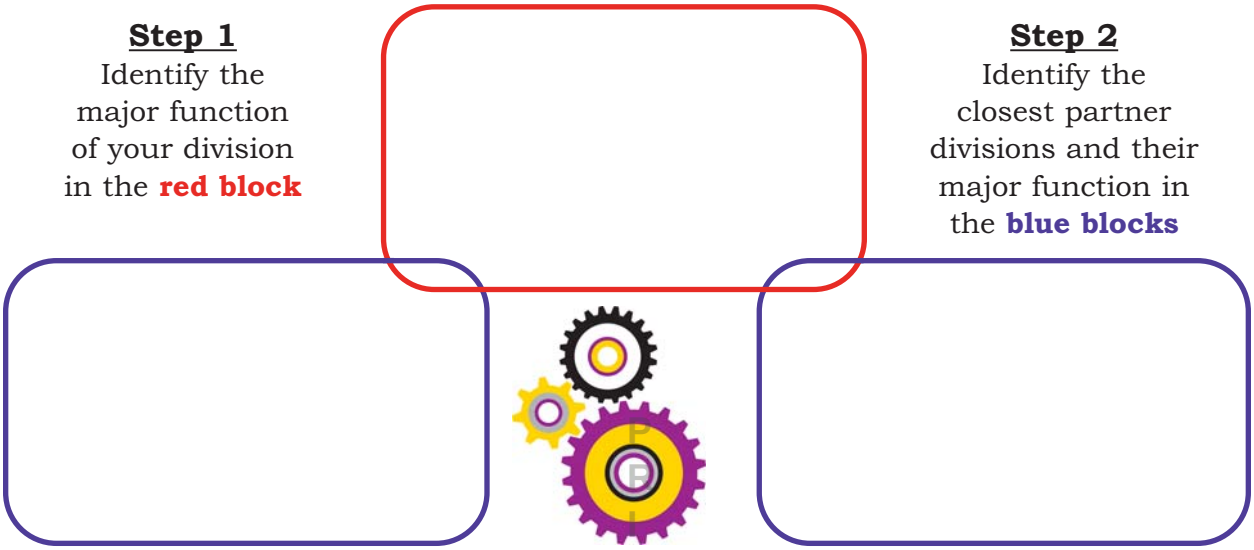
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

This is a copy of the online form you will fill out in the COMPLETE section of this unit's coursework.

Work Process Analysis

Step 1
Identify the major function of your division in the **red block**

Step 2
Identify the closest partner divisions and their major function in the **blue blocks**



Step 3: Review the steps you listed on the **Process Sequence** form and evaluate each step for any of the following actions.

ELIMINATE: Here, identify and list all steps that can be eliminated without reducing the overall effectiveness of the process.	
COMBINE: In this space, identify and list any step(s) that can be combined to improve efficiency.	
MODIFY: In this box, identify and list any step(s) the modification of which can improve overall efficiency.	
ADD: Finally, list and briefly describe any step the addition of which can add value to the process (i.e. enhance product quality, reduce reworks, etc.).	