

Unit-2 Concepts of Systems

2.1 Definition of system in organization

2.2 Types of system

2.2.1 Deterministic & Probabilistic systems

2.2.2 Open & Closed Systems

2.3 Introduction to Organization

2.4 Organization Structure

2.1 Introduction to System

- System is a **set of elements or components** that interact to achieve goals.
- The elements themselves and the relationships among them determine how the system works.
- Systems have inputs, processing mechanism, output and feedback.

Systems	Elements			Goal
	Inputs	Processing Mechanism	Output	
Restaurant	Vegetables, Drinks, Wheat, Fruits, Labors, Management	Frying, Boiling, Heating, Drink dispensing, Cooking	Spicy Dishes, Soups, Juices, Cold Drinks	Customer Satisfaction with tasty and healthy food
College	Students, Lecturers, Administrators, Books, Equipments	Teaching, Research, service, seminars, Projects	Educated Students, Useful research, service to community, state, nation	Acquisition of Knowledge
Automatic Car Wash System	Dirty Car, Water, Ingredients to wash the car, time, energy, skills	Cleaning type, car wash operator	Clean Car	Assessment from the customer regarding car cleanness

Performance measurement criteria

Performance of any system measured in different ways

- **Efficiency**
- **Effectiveness**
- **Standards**

Efficiency

- Efficiency is measured by **what is produced divided by what is consumed**. It can range from 0 to 100 percent.
- I.e. efficiency of motor is the energy produced (in terms of work done) divided by the energy consumed. (in terms of electricity or fuel used)
- It can also use comparatively. i.e. **performance of Diesel Car Vs Petrol Car Vs CNG car**

Effectiveness

- Effectiveness is measure of the extent to **which a system achieves its goals**. It can be computed by dividing the goals achieved by the total of the stated goals.
- I.e. a company manufacturing machine spare parts is developing 100 damaged parts. For reducing this damage control system developed. After installation of it the total damage part is 15. So the **effectiveness of the system is measured as 85%**
- Similar to the efficiency; **effectiveness can use to compare system**.
- Efficiency and effectiveness are performance objectives for an overall system. Meeting these objectives may involve trade-offs in terms of cost, control and complexity.

Standards

- It is a **specific objective of the system**.
- I.e. a system performance standard for a particular marketing campaign might be to have each sales representative sell 100 products a week. The performance of the sales may be calculated on the basis of this objective.
- Once the standards are defined the system performance is measured and compared with the standards.
- **Variances from the standards are determinants of the system performance**

System Variable and System Parameter

- **System variable** are **quality of item** that **can be control** by the decision maker. For example: Price for any product is a system variable because

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it can be control

- **System Parameter** is **values of quality** that **cannot be control** For Example: cost of raw material. Rate of chemical to produce certain types of plastic which is control by low of chemistry not the decision maker.

System Modeling

System Models are used to test different relationships and their effects since they are simplified then the real system.

Model

- It is an **abstraction or an approximation** that is used to represent the reality.
- It enables us to **explore and gain an improved understanding** the real world situations.
- I.e. recorded history has been used by people as models (like a battle, physical mock-up of ancient building, symbols which represents the money, numbers and mathematical relationships).
- Managers and decision makers used such models to make better decisions which may help them to understand what happening in their organization.
- There are various types of models. Among them mostly used models are: **narrative, physical, schematic and mathematical model.**

Narrative Model

- As the name implies the model is based on the words.
- It is **logical** and not a physical model.
- Both **verbal and written descriptions** of reality are considered narrative models.
- In any organization; **reports, documents, and conversations** concerning to the system are important narratives.

Physical Model

- It is a **tangible representation** of reality.
- Basically these models are **computer designed or constructed.**
- E.g. **Building Raw Models**
- A Civil Engineer may develop a scale model of a new complex or shopping centre to give potential investor information about overall appearance and approach of the development.

Schematic Model

- It is a **graphical representation** of reality.

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- Graphs, Charts, figures, diagrams, illustrations and pictures are such type of models.
- They are used extensively in developing computer programs and systems.
- e.g.
- A plan for new building, a graph which shows company's financial projection, electric diagrams, scheduling charts for projects.

Mathematical Model

- It is an arithmetic representation of reality.
- A mathematical model is a description of a system using mathematical concepts and language.
- E.g. Mathematical models are used in the natural sciences (such as physics, biology, earth science, chemistry) and engineering disciplines (such as computer science, electrical engineering)
- Retail chains have developed mathematical models to identify all the activities, efforts and time associated with planning, building and opening a new store so that they can decide how long it take to complete the store.

Accuracy is critical in development of any model. An inaccurate model will usually lead to an inaccurate solution to a problem. Assumption should be always as realistic as possible.

2.2 System types (classification of system):

System can be classified as follow:

1) Simple and Complex

- Simple system have few component and the Relationship or interaction between elements is An uncomplicated and strait forward
- Complex system has many components that are highly related and inter connected.

2) Open and Closed System (V. IMP)

- The systems that have interfaces with the environment are considered as open systems. These systems are either open to inputs from the environment or are open to provide output to the environment.
- It is very easy to find examples of open systems. Information systems in general are open systems. They receive input from the environment and they generate outputs that are given to entities outside the scope of the system that is to the

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environment in which they operate

- Almost all the **business and social systems** in real world are open systems. They have **multiple interfaces** with the environment in which they operate.
- Open systems have **to be flexible** enough to adapt to the changing environment in order to remain in existence. **Management information systems** are open systems.
- The systems that do not have **any interaction with the outside world** are called as closed systems. Closed systems have **no interaction** with the environment in which they operate.
- It is, however, difficult to find examples of closed systems. Some **scientific research systems** are known to operate without any interaction with the environment in which they operate.
- The environment is not static. The environment keeps on undergoing changes from time to time.

3) Deterministic and Probabilistic System (V. IMP)

- There are systems whose results can be predicted and there are systems whose results cannot be predicted. **Systems can also be classified into deterministic and probabilistic systems based on the predictability of the results.**
- The systems **whose results can be predicted** are called as **deterministic system**. The systems **whose results cannot be predicted** are called as **probabilistic systems**.
- **The solar system is a simple example of deterministic system.** The movement of planets can be predicted to high degree of precision as the planets movement is taking place as per specific predetermined rules. The solar system is based on specific rules and therefore the outcome can be predicted.
- Similarly, computer systems contain programs. Programs contain certain set of instructions that are followed during its execution. Programs are performing specific operations in accordance with predetermined set of rules and conditions embedded in the program. Thus computer systems become **deterministic systems**.
- On the other hand, there are systems whose results cannot be predicted with precision. The results of these systems can be predicted with certain degree of probability. These systems are **probabilistic systems**.
- **Sales forecasting system** is an example of probabilistic system. One cannot say with high degree of confidence that the result of the system would match exactly with real world situation. One can only predict with certain degree of probability. Sales Forecasting,

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Budgetary Planning, Revenue projections etc. are some of the examples of probabilistic systems.

4) Stable and Dynamic

- Stable system undergoes **very little change over Time**. A stable system is one in which relationship are define and it is disturb by environmental facts. It is capable of returning to its desire state. Stability is measure in term of certain elements. For example: **stock control system**.
- Dynamic systems repeatedly go over-time. For Example: **computer parts manufacturing company**.

5) Permanent and Temporary

- Permanent system exists for a relative **long period of Time**. people made system are generally permanent. System operates for long time span. Operation performed by human may be said to by permanent.
- Temporary systems are design to **last specified period of time**. These systems are important for the **accomplishment of specific task** in business and for research on science.

6) Adaptive and Non-adaptive

- A system that reacts to its environment to such Way to **improve with functioning achievement or productivity** of survival it's called an adaptive System.
- It is able to change in response to changes in the environment and their interaction with the environment to continue their existence.
- **For example** : A company which changes according to demand & adjust its price of product to look for new market it is consider as adaptive system.
- Those systems that **do not react or adapt changes from the Environment** are called **non-adaptive system**.

7) Stationary and non-stationary

- A stationary system is one whose properties and Operations either do not vary in **repetitive Cycles**. For example: the automatic factory, super market store operation, high school.
- Anadvertising**organization,aresearch and Developmentslaboratory**are non- stationary system.

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8) Sub-system and super-system

- Each system is nested in a large system. The System in the **hierarchy** that was most interested in state as controlling is usually called the sub System.
- For example: In organization any small part or single module can consider as sub system
- Super system is a term that has at least two uses
 - as a opposed to subsystem
 - To denote any extremely large and complex system.
- **For example:** when number of sub systems grouped together it became one super system

9) Conceptual and Empirical

- **Conceptual system** are concern with **theoretical structured**, which may or may not have counterpart in the world. Conceptual system for organization is composed of ideas. These systems are also appear in the **form of plans, structures and procedures**
- **Empirical system** is made up of **people, materials, machines, energy and physical things**

10) Natural and Manufactured

- Natural system is **planting in nature**. For Example: solar system and water system
- Manufactured system is **form after people Gathering groups** to live and hunt together. For Example: Transportation system, Natural Defense.

11) Social, People-machine and Machine

- Systems made up of **people are purely social System**. For example: political parties' most **empirical system call** into the category of People-machine system. Pure machine system would have to obtain their Own inputs and maintain themselves.

For Example: **Electric power generations system**.

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Difference between Open and Close System (V IMP)

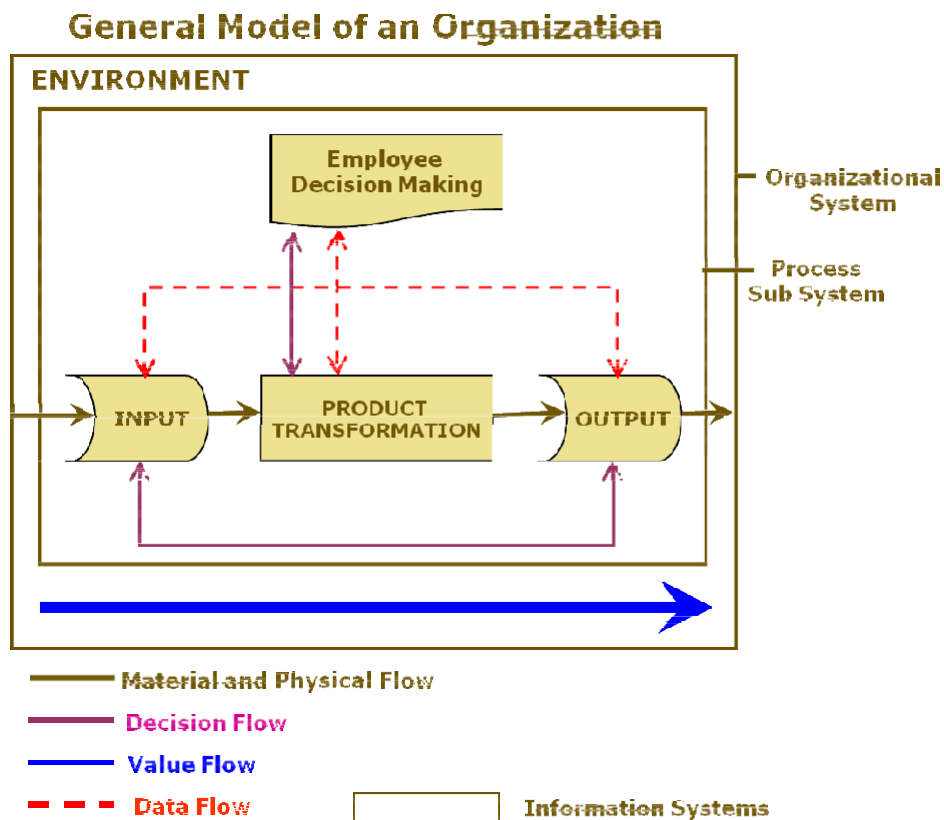
Sr. No.	OPEN SYSTEM	CLOSED SYSTEM
1	An open system is one that interacts with its environment.	A closed system is one that does not interact with its environment.
2	Open system is affected with the change in living organisms and its environment.	Closed system are not affected with the living organisms and its environment because barrier exists between the environment and the system from being affected.
3	The company in turn is a system within the larger industry system. The company interacts with its environment, a larger system, makes that individual company an open system.	In research for instance, we attempt to develop models that are essentially closed models.
4	In reality, an open system must exist .	In reality, closed system rarely exists .
5	The demand forecasting is a Example of open system	All kind of accounting system, case, stock, Attendance of employee is close system.
6	EX:- All Industry is a part of national economic system and are an open system.	EX:- The scientists who device a laboratory system to measure the elastically of a metal is assuming a closed system.
7	Every social organization is an open system.	Simple operational lower level functional management is closed system.

Difference between Deterministic and Probabilistic System (V IMP)

Sr.No	Deterministic	Probabilistic
1	The systems whose results <i>can be predicted</i> are called as Deterministic System .	The systems whose results <i>cannot be predicted</i> are called as Probabilistic System .
2	Deterministic system provides guarantee of output	Probabilistic system does not provides guarantee of output
3	In deterministic system, same process is followed to get the output	In Probabilistic system, different process is followed to get the output
4	Example: computer systems become deterministic systems.	Example: Sales forecasting system is an example of probabilistic system.

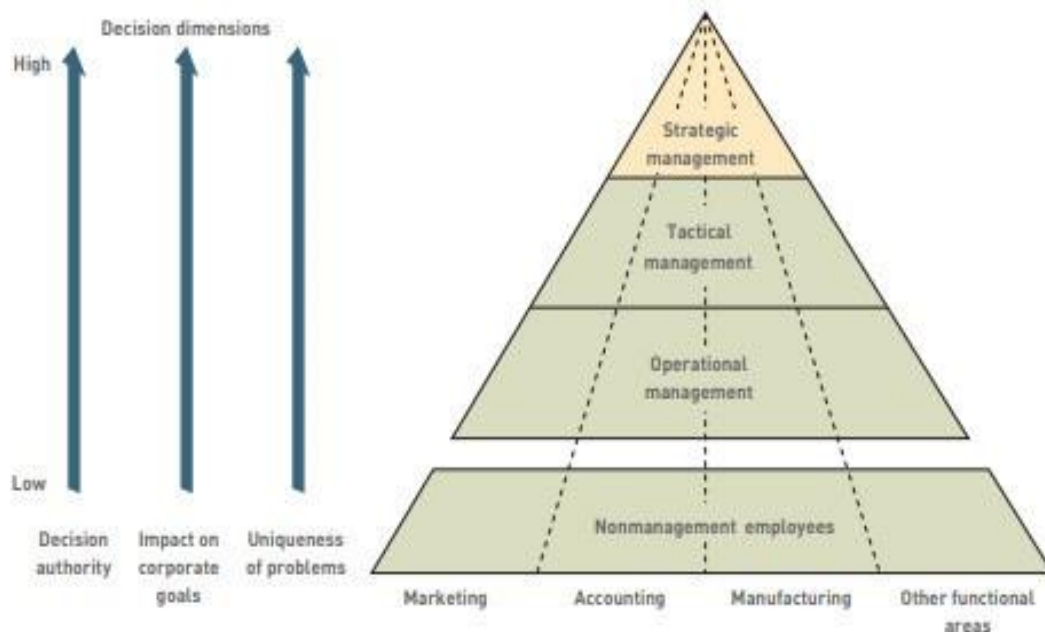
2.3 Introduction to Organization

- Organization is **formal collection of people and other resources** established to accomplish a set of goals.
- The **primary goal** of a for-**profit organization** is to maximize shareholder value, often measured by the price of the company stock.
- i.e. Diamond Company, Marketing agency, Self Finance Institutes etc.
- **Non-Profit organizations** include social groups, religious groups, universities and other organizations that do not have profit as the primary goal.
- i.e. Charitable Trusts, Government Schools etc.
- An Organization is a system, which means that it has **inputs, processing mechanisms, outputs and feedback.**
- An Organization constantly uses Money, people, materials, machines, equipment, data, information and decisions.



2.4 Organizational Structure

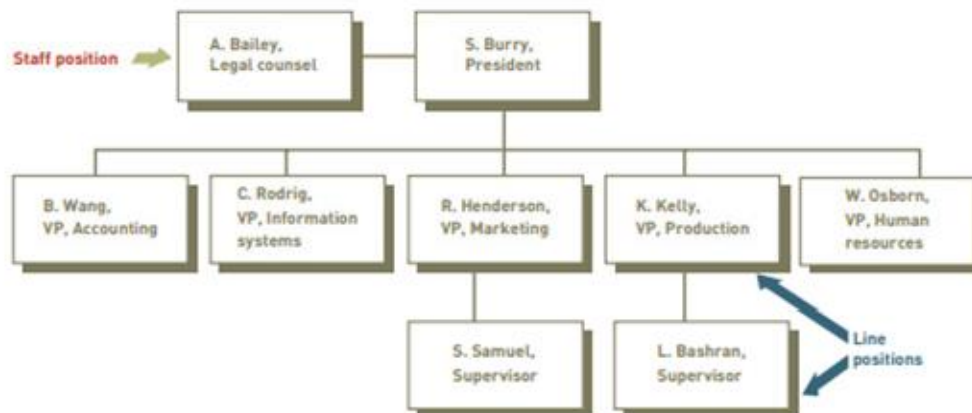
- An organization is a **formal collection of people and other resources** established to **accomplish a set of goals**.
- It refers to organizational subunits and the way they relate to overall organization. Depending on the goals of the organization and its approach to management, a number of structures can be used.
- An organization structure can **affect** how information systems are **viewed** and what kind are **used**. Although there are many possibilities organizational structure typically falls into one of the following categories.



1. Traditional Organizational Structure:

- A traditional organizational structure, also called a **hierarchical structure**, is like a managerial pyramid where the hierarchy of decision making and authority flows from the strategic management at the **top down** to operational management and nonmanagement employees.

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- Compared to lower levels, the strategic level, including the president of the company and vice presidents, has a higher degree of decision authority, more impact on corporate goals, and more unique problems to solve
- In most cases, major department heads report to a president or top-level manager. The major departments are usually divided according to function and can include marketing, production, information systems, finance and accounting, research and development, and so on
- The positions or departments that are directly associated with making, packing, or shipping goods are called line positions. A production supervisor who reports to a vice president of production is an example of a line position.
- Other positions might not be directly involved with the formal chain of command but instead assist a department or area. These are staff positions, such as a legal counsel reporting to the president.
- Today, the trend is to reduce the number of management levels, or layers, in the traditional organizational structure. This type of structure, often called a flat organizational structure, empowers employees at lower levels to make decisions and solve problems without needing permission from midlevel managers.
- Empowerment gives employees and their managers more responsibility and authority to make decisions, take action, and have more control over their jobs.

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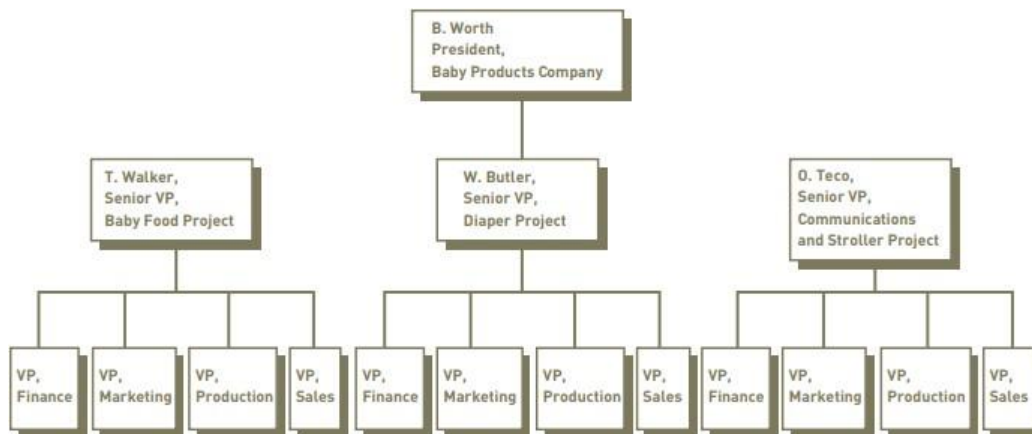
- For example, an **empowered sales clerk** could respond to certain customer requests or problems without needing permission from a supervisor.

2. Project and team Organizational Structure:

A project organizational structure is **centered on major products or services**. E.g. in a manufacturing firm that produced baby products, each type is produced by a **separate unit**.

Traditional functions like marketing, finance & production are positioned within these major units.

Many project teams are temporary when the project is complete; the members go on to new teams formed for another project.



3. The Team Organizational Structure:

The team organizational structure is centered on **work teams or groups**. In some cases, these teams are small; in other they are very large.

Typically **each team has a team leader** who reports to an upper level manager in the organization. Depending on the task being performed, the team can be either **temporary or permanent**.

For example a healthcare company can form small teams to organize its administrators, physicians, and other to work with individual patients.

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4. Multidimensional Organizational Structure:

A multidimensional organizational structure, also called **matrix organizational** structure, incorporate several structure at the same time. E.g. an organization might have both traditional functional area & major project units.

One advantage of the multidimensional organizational structure is the ability to communicate with **different groups and able to discuss and solve problems.**

