

SEMESTER - 4 Course: 401: Information System

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UNIT - 1 - INTRODUCTION

1.1. Data & Information

Data consists of raw or basic facts such as an employee's name and number of hours worked in a week, inventory part numbers, and sales orders.

Data consists of raw facts which have value beyond their existence. Data are facts, events, and transactions that have been recorded. They are the input raw materials from which information is produced.

Data are facts obtained by reading, observation, counting, measuring, weighting, etc. which are then recorded. Several types of data can be used to represent these facts.

Data can be of the following types:

Data	Represented by
Alphanumeric data	Numbers, letters, and other characters
Image data	Graphic images, and pictures
Audio data	Sound, noise, or tones
Video data	Moving images or pictures

When these facts are organized or arranged meaningfully, they become information. Information is a collection of facts organized in such a way that they have additional values beyond the value of the facts themselves. Information is data that have been processed in such a way as to be helpful to the recipient.

Example:

The principal of the school is interested in the total number of students who passed particular standards rather than the marks obtained by each student.

The terms data and information are frequently used interchangeably. However, data usually refers to unorganized facts, while information is the knowledge derived from the manipulation of data. Data represent real-world things. It has little value beyond its existence.

Rules and relationships can be set up to organize data into useful, valuable information. So the type of information created depends on the relationships defined among existing data.

Process of converting data into information

The process is a set of logically related tasks performed to achieve a defined outcome. There are some logically related steps that turn data into information, this is called process. The process of defining relationships among data to create information requires knowledge.

Knowledge is an awareness and understanding of a set of information and ways that information can be made useful to support a specific task or reach a decision.

Example:

knowledge required for building railroad layout

-how large an area is available for the layout?

-how many trains will run on the track?

If we want to generate the merit list, then we must have knowledge about

-what are the percentage ranges for different classes.

In some cases, data is organized or processed manually. In other cases, a computer is used. The following figure shows the process of transforming data into information.



1.2. Information need and benefits

- Information need is an individual or group's desire to locate and obtain information to satisfy a conscious or unconscious need.
- Information needs are related to, but distinct from information requirements. An example is that a need is hunger, and the requirement is Food.
- Information needs are related to problems and an important issue is how problems are understood, delimited, and formulated.
- When we go to real-life problems, there are usually different opinions about how they should be understood and how they should be addressed, including different opinions about what information is relevant to solve the problem. Collecting only the information that can be used effectively for management decisions is important.
- People within an organization who have timely, reliable information are better able to conduct, manage, and control the organization's operations.
- How important the information is, depends on the information itself.

- Understand that information is a commodity and it can have a monetary value, the level of which depends on its accuracy, its potential use, and its particular intended use.
- We need to ensure that information is up-to-date and of use to an organization/individual.
- Information has become a valuable resource, just as much as capital, infrastructure, and people.
- Information is collected on any amount of different items and used by managers to make strategic decisions concerning the Organization.
- The information that is collected and/or assembled in any business is as valuable a resource as capital or people

Information may cover:

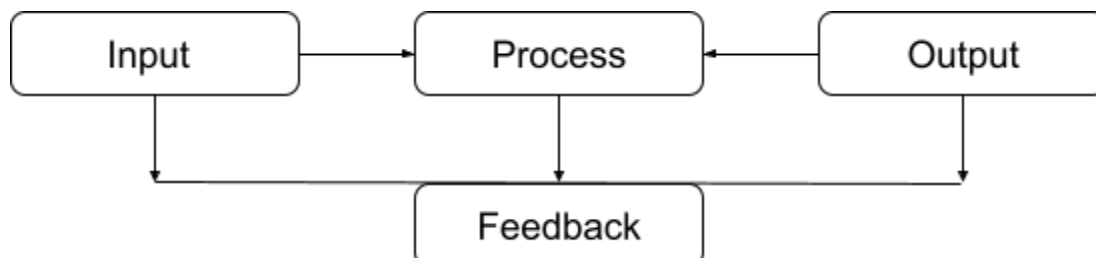
- Market trends
- Buying preferences
- Customer profiles
- It may be processed, summarized, and analyzed by computers before being used. by managers as the basis for decision-making.
- The values of information are directly linked to how it helps decision-makers achieve their organization's goal

1.3. Input, Processing, Output, and feedback

inputs are anything that you put into a system for a computer the input can be from the user via keyboard a keyboard or gaming controller you can also get input from USB sticks or cd's as essentially anything that goes into your computer or system

the process is what the system does with this inputs again with the computer example it takes in what you press on the keyboard or joystick to say control and action in the game

output is anything that kinda like goes out of the system, for example, your computer monitor is an output device and so is stuff like speakers printer or USB stick can also be an output device if you put something on it essentially anything that course out of the system



Input is anything we wish to embed in a system for some type of use. A variety of sources are used to input: keyboard, scanner, microphone, mouse, and even another computer. What we input has a purpose - but until it is processed and generated in some form of output, it doesn't do us much good.

Processing takes place in the internal parts of the computer. It is the act of taking inputted data and converting it into something usable. What we typically see on the screen in today's computer world (known as what you see is what you get or WYSIWYG) is the result of our input being processed by some program so we can have usable output: an English paper, an edited photograph, this video you're watching.

Output, or processing information in a usable format, comes in many different forms: monitor or printer for visual work, a speaker for audio. Sometimes our output is short-term, such as printing a photo, and sometimes what we work on needs to be kept around for a while. That's where storage comes in.

Feedback output that is used to make changes to input or processing activities

Unit - 2 - Concepts of Systems

2.1. Definition of the system in an organization

- A system is an organized collection of parts that are highly integrated in order to accomplish an overall goal
- The system has various inputs which are processed to produce certain outputs together, accomplishing the overall goal decided by the organization.
- There is ongoing fit back among these various parts to ensure they remain aligned to accomplish the overall goal of the organization. There are several classes of systems, ranging from very simple frameworks all the way to social systems which are the most complex. organizations are, of course, social systems.
- system has inputs, processes, outputs, and outcomes
- to explain, input to the system includes resources such as raw materials, money, technology, and people.
- These inputs go through a process where they're aligned, moved along, and carefully coordinated ultimately to achieve the goals set for the system.
- outputs are tangible results produced by processes in the system, such as products or services for customers
- another kind of results outcomes, or benefits for customers, for example, jobs for workers, enhanced quality of life for customers, etc system can be the entire organization or department groups process, etc
- Feedback comes from example employees who carry out processes in the organization, customers/clients using the products and services, etc feedback also comes from the larger environment of the organization example influences from government, society, economics, and Technology

2.2. Types of systems

System is defined as a set of elements arranged in an orderly manner to accomplish the objective or a system is a group of interrelated components working together towards by aspecting input & processing outputs in an organized transformation process

system is arranged with some logic governed by rules, regulations, principle, and policies. such an arrangement is also influenced by the objective of the system's desire to achieve

2.2.1. Deterministic probabilistic systems

A Deterministic system has a single result or set of results given a set of input parameters, while a probabilistic system will have results that vary. The often probabilistic

system is solved with the Monte Carlo method. in this case, a computer program uses a pseudo Random numbers generator to provide values of the attributes in the systems that vary. the program provides an assessment of the uncertainty of results.

typically a large number of runs are made. a summary statistic may include the value that occurs most frequently, the means value, and the low and high range, for instance, the 10% and 90% percentile. the standard deviation and histogram of results may also be part of the summary information there is no single standard please will depend on the application to solve the problem using the mathematics of probability this can be very complicated do in some cases

2.2.2. Open and Close systems

a system is commonly defined as a group of interacting units of elements that have a common purpose. the units of elements of a system can be cogs, wires, people, computers, and so on. systems are generally classified as open systems and closed systems and they can take the form of mechanical, biological, and social systems

open systems are computer systems that provide some combination of interoperability, portability, and open software standards. a system with Input and an entity that changes its behavior in a response to conditions outside its boundaries. a system without outputs is non-knowable by an external observer example black hole in the visible Universe systems without inputs are not controllable

An open system is a system that continuously interacts with its environment; the interaction can take the form of information, energy, or material transfer into or out of the system boundary, depending on the discipline which defines the concept.

The open system refers to systems that interact with other systems or the outside environment, whereas closed systems refers to systems having relatively little interaction with other systems or the outside environment. For example living organisms are considered open systems because they take in substances from their environment such as food and air and return other substances to their environment. Humans for example inhale oxygen out of the environment and exhale carbon dioxide into the environment similarly, some organizations consume raw materials in the production of products and emit finished goods and pollution as a result.

close system in that it is a relatively self-contained, self-maintaining unit that has little interaction or exchange with its environments it is a system marked by clear boundaries which admit of no movement of energy across them the entropy of any closed system never decreases. a closed system is something we cannot externally add anything new to.

all systems have boundaries, a fact that is immediately apparent in a mechanical system such as the watch, but much less apparent in a social system such as an organization the boundaries of open systems, because they interact with other systems or environments, are more flexible than those of closed system, which are rigid and largely impenetrable. A

closed system perspective views the organization as relatively independent of environmental influences. closed system approach conceives of the organization as a system of Management, Technology, personnel, equipment, and materials but tends to exclude competitors, suppliers, distributors, and governmental regulators. this approach allows managers and organizational theorists to analyze problems by examining the internal structure of a business with little consideration of the external environment, the closed system perspective basically views an organization much as a thermostat limited environmental input outside of changes in temperature is required for the effective operation

Unit - 3 - Introduction to various Information Systems

3.1. Business Information Systems

Following are the various type of information systems used in business organizations

- ERP(Enterprise resource planning)
- TPS(Transaction processing system)
- MIS(Management information system)
- DSS(Decision support system)
- GDSS(Group D Season support system)
- ESS(Executive support system)
- E-Commerce(Electronic Commerce)
- Work Flow system
- Special Purpose system

Artificial intelligence

- Robotics
- Vision system
- Natural Language Processing
- Learning system
- Neural networks
- Expert system

Virtual reality

E-Commerce

E-Commerce involves conducting business activities using electronic data transmission involving computers, telecommunication networks and work process business and individual use E-Commerce to reduced cost, speed up the flow of goods and information improve the level of customer service and enable coordination of action among manufacturers suppliers and customers

Work flow system

it is rule based management software that directs co-ordinates and monitor execution of inter-related set of task organized to form a business process the primary purpose of work flow system is the provide employee be to tracking and routing of documents to improve business processes it can handle multiple user and distribution business processes

Special Purpose System

a) Artificial intelligence

AI is field in which the computer system takes on the characteristic of human intelligence

1) Robotics:- A mechanical all-computer device that performs Complex routine or tedious task such as welding or assembly computer system

2) Vision System:- It includes the hardware and software that permits computers to capture, store and manipulate visual images and pictures it is also used to perform figure print analysis and it is also effective for identifying people based on their facial feature

3) Natural Language Processing:- it allows computers to understand and act on variable commands in natural languages. with some natural language processor, you can speak a word the computer matches it, and type it into the computer it can also be used to retrieve information without typing a command

4) Learning system:- A combination of hardware and software that allows the computer to change how it functions or react to a situation based on feedback it receives it gives the computer an ability to learn from a past mistake and experience such as games.

5) Neural Network:- A computer system that can similar to the functioning of the human brain it allows computers to recognize and act on patterns or trends for example Diseases Diagnostic system

6) Expert system:- it gives the computer the ability to make a suggestion and act like an expert in the particular field. the collection of data, rules, procedures, and relationships that must be followed to achieve value or the proper outcome is Stored in the knowledge base of the expert system it can be applied to almost any field or discipline.

b) Virtual Reality:-

With this system user becomes fully immersed in an artificial, three-dimensional world completely generated by the computer it enables the user to move and react in a computer Simulated environment its simulation requires a special interface device that transmits the view, sounds, and sensation of the simulated word to the user

this device can also record and send the speech and Movements of a participant to the simulation program so users can sense and manipulate virtual objects as they are real objects.

3.1.1. Principal Function System in Business

- With most product-oriented enterprises principal functional systems are 9 in number: purchasing, receiving, inventory, Sales, distribution, billing, collection, paying, and production

- Some of the authors account for the same 7 major organizational functions they are order processing, purchasing, payroll, Personal Administration, logistics, production, and accounting
- Many of the other systems come under the above as substance, for example, inventory control, material requirement planning, general ledger, financial planning, financial control

Purchasing:- procuring from the vendor the goods and materials required for the business

Receiving:- inspecting and accepting delivered goods and materials

Inventory:- storing the received good and plans

production:- Production of goods as per the plans

Sales:- marketings the goods produced

Distribution:- supplying the customer with the goods sold from a produced goods inventory

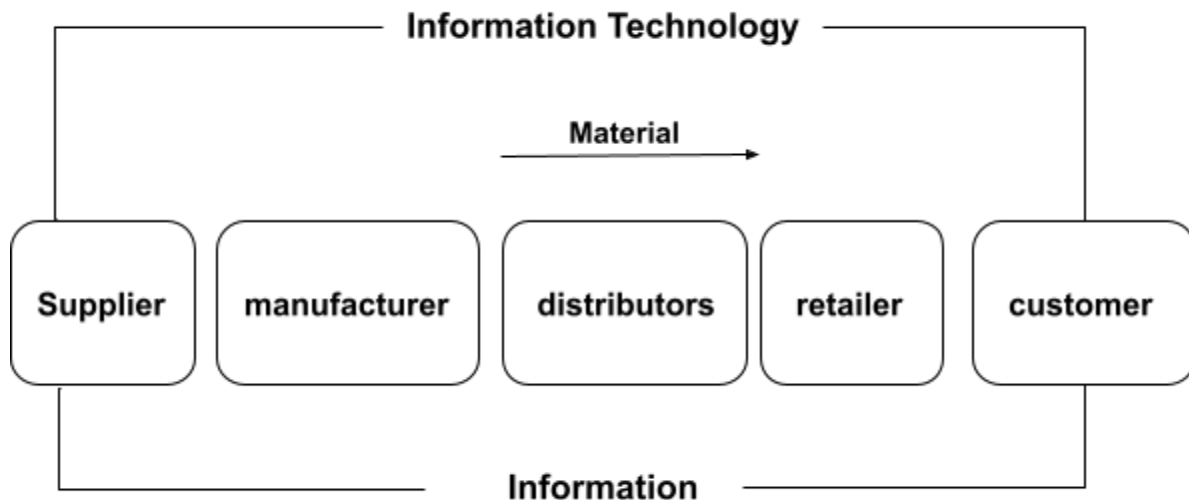
Billing:- sending statements of the account owed to customers

Collection:- receiving payment from customers.

Paying:- making payments home to those for whom the business owed money such as vendors and employees

- Each of the above functional systems produces one or more outputs in the form of products or documents.
- These outputs are an indication of the relationship of each system to other systems and to the business as a whole.
- Since systems are assigned their own necessary resources, they are to a degree relatively independent elements of a business
- A system is a combination of resources(Men, materials, facilities, and equipment) working together to convert the input to output
- A system produced outputs
- A business integrates the outputs of its components systems to accomplish objectives and to achieve goals.
- A system is through in terms of its mechanics viz. methods techniques and procedures by which it achieves its purpose.
- this definition of a system by interface includes such mechanics example a distribution system is defined to include not only its functions but the Associate's Written methods and procedures for processing shipping orders more systems may be considered to be composed of subsystems

3.1.2. Product flow and Information Flow



Material(Product) Flow:

This is the flow of the physical product from the supplier all the way down to the customer. this flow is usually uni-directional, that is it only flows one direction from the supplier to the customer however, in certain instances when the customer returns the products the flow Occasionally goes in the other direction.

A Typical flow of materials usually begins with the raw materials suppliers to manufacturers to warehouse and distribution to the final customer the product flow is a representation of the order by which a sequence of products is created according to product-based planning principles.

the product flow diagram is typically created iteratively with product description and the product breakdown structure because as project manager works through the logic and they will identify missing products and additional information about products

Information Flow:

Information flow is the flow of information from supplier to customer and from customer back to supplier this flow is bi-directional that is it goes both directions in the supply chain the type of information that flows between customers and suppliers includes quotation purchase order delivery status invoice and customer component complaints and so on.

For supply chain to be successful there has to be constant interaction between supplier and customer. in many cases, other partners like distributors, dealers, retailers, logistics service providers are involved in the Information Network An information flow indicates how Information is communicated from a source to a receiver or target through some medium.

An if can be used to model the information flow throughout an organization An if shows the relationship between Internal information flows within an organization and external information flows between organizations it also shows the relationship between the internal department and subsystem

3.1.3. Principal Document Associated with Information Flow

1. **Purchase order:-** prepared by purchasing original sent to the vendor, retains a copy, second copy to receiving
2. **Receiving report:-** when materials ordered arrive, receiving verifies the order against the purchase order copy, inspects material, informs purchase department of its arrival, and accounts through a receiving report.
3. **Inventory transfer:-** prepared by receiving Department transfers the inventory accompanied by an inventory transfer.
4. **Purchase requisition:-** prepared by inventory departments request purchasing to order those materials not on hand and of insufficient quantity.
5. **Production documents:-** designs and develops the product. the components that are in house baits are combined with the components of sub assemblies that are procured from outside sources.
6. **Material requisition:-** prepared by Production department. material requisition is to request needed materials from inventory. Inventory notifies the availability of the requisitioned materials by retaining a copy of the requisitioned material requirement.
7. **Sales Order:-** sales contact the customers, sells the product, prepare the sales order. A copy of sales order is sent to billing and to production. An additional copy is sent to distribution.
8. **Warehouse transfer notice:-** prepared by distribution. it receives the finished goods from the production accompanied by warehouse transfer notice.
9. **Shipping notice:-** distribution ships the product to the customer and informs sales by means of a shipping notice.
10. **Customer invoice:-** billing prepares and mails customers invoice.
11. **Collection:-** receives customer payments from the customer.
12. **Customer payment notice:-** collection sends updated information to billing, by means of customer payment notice.
13. **Vendor Cheque:-** paying makes payment to vendors through this. cheque is prepared after the vendor submits vendor's invoice, after invoice verification and forwarded by purchasing.
14. **Pay cheque:-** paying department distributes pay cheques to employees.
15. **Time tickets:-** the amount of pay cheques are based upon time tickets submitted by employees.

3.2. ERP

Enterprise system: a system central to the organization that ensures information can be shared across all business functions and all levels of management to support the running and managing of a business. Enterprise systems employ a database of key operational and planning data that can be shared

Examples of enterprise systems

- Transaction processing system (TPS)
- Enterprise resource planning system (ERP)

Enterprise resource planning (ERP):

ERP is an integrated Computer Based system used to manage internal or external resources including tangible assets financial resources materials and human resources its purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connection to outside stakeholders. build on a centralized database and normally utilizing a common computing platform ERP system consolidates all business operations into a uniform and Enterprise-wide system environment

ERP system can either reside on a centralized server or be distributed across modular hardware and software units that provide service and communicate on a local area network the distributed design allows a business to assemble modules from different vendors without the need for the placement of multiple copies of complex and expensive computer system in areas which will not use their full capacity.

A collection of software packages, which ties all of an enterprise's various functions into a cohesive database. These packages affect everything from order capture to accounting and procurement (verification) to warehousing. Employees enter information only once and that information is then available to all systems company-wide

Commercial applications:

- **Manufacturing:-** Engineering, bills of material, work orders, scheduling, capacity, workflow management, quality controls, Cost Management, manufacturing process, manufacturing projects, manufacturing flow,
- **Supply chain management:-** Order to cash, inventory, order entry, purchasing, product configuration, supply chain planning, suppliers scheduling, and inspection of goods, claim processing, and commission calculation.
- **Financial:-** general ledger, cash management, accounts payable, accounts receivable, fixed assets.
- **Project management:-** costing, billing, time and expense, performance units, and activity management.
- **Human resources:-** human resources, payroll, training, time and attendance, rostering, benefits.
- **Customer relationship management:-** Sales and marketing, Commission, service, customer contact, Call Centre support.
- **Data service:-** Various self-service interfaces for customers, suppliers, and employees.
- **Access control:-** Management of user privileges for various processes.

Advantages of ERP

- Improved access to data for operational decision-making
- Enhanced tracking and forecasting
- Improved efficiency performance and productivity levels
- Reduce the risk of loss of sensitive data by consolidating multiple permissions and security models into a single structure
- Shorten production Lead time and delivery time
- Facilitating Business learning, empowering, and building common visions
- Elimination of costly, inflexible legacy systems
- Improvement of work processes based on best practices
- Upgrade of technology infrastructure

Disadvantages of ERP

- Expense and time in implementation
- The scope of customization is limited in several circumstances
- ERP systems can be extremely expensive to implement
- There could be lack of continuous technical support
- Customisation of the ERP software is limited
- The blurring of company boundaries can cause problems in accountability, lines of responsibility, and employee morale.
- Difficulty implementing change
- Difficulty integrating with other systems
- Risks in using one vendor
- Risk of implementation failure

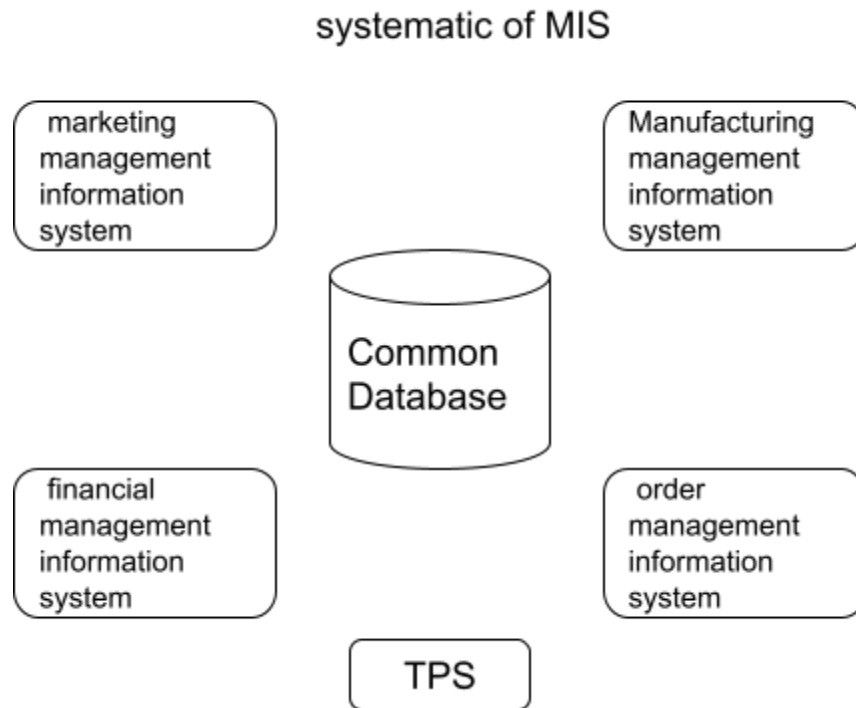
Tips for avoiding failed ERP implementations

- Assign a full-time project manager
- Appoint an experienced, independent resource to oversee a project and validate system performance
- Allow sufficient time for transition
- Spend substantial time and money for training
- Define metrics to assess progress and identify risks
- Keep project scope well defined
- Be cautious of modifying ERP software to conform to firm's business practices

3.3. Management Information Systems

MIS is an organized collection of people, procedure, software, databases and device used to provide routine information to the manager and decision maker MIS can often give a competitive advantage to companies by providing the right information to right people in the right format at the right time.

MIS is used to transform data into Useful information as needed to support managerial decision-making with a structured decision is that based on predictable patterns of activities.



typical MIS is based on four major components:

- **Data Gathering:-** Data relevant to the operations of the organization are gathered from external and internal sources.
- **Data Entry:-** The data gathered is inputted and stored in the database so that it can be processed.
- **Data Transformation:-** Data is transform into Useful information through the application of computer software programs and by technical support of staff and other system users.
- **Information utilization:-** The Useful information is retrieve as needed by the management and applied to wide variety of decision related to the organizational operation.

The primary purpose of MIS is to help an organization to achieve its goals by providing manager with various types of information on the regular operation of an organization. so that, they can control, organize and plan more effective decision making and provides feedback on daily operation.

For Example, A manufacturing MIS is a set of integrated system that can help managers to monitor a manufacturing process, the value of raw materials as they are assembled into a finish product. the monitoring is accomplished through various types of reports produced by MIS These reports can be obtained by filtering and analyzing

the detail data contain in transaction processing databases and presenting the result to manager in a meaningful way.

GIS(Geographic information system)

A geographic information system is a computer system capable of assembling, storing, manipulating & displaying geographically referenced information that is data identified according to their location. A GIS enables to user to pair predawn maps or map outlines with tabular data to describe aspects of a particular Geographic region. For example. The sales manager may want to plot total sales for each country in the states they serve. using GIS they can specify that each country is drawn with a degree of shading that indicates the relative amount of sales.

3.3.1. Characteristics of MIS

- 1. Provide reports with fixed & standard formats:-** For example, scheduled reports for inventory control may contain the same types of information placed in the same location on the reports. different managers may use the same reports for different purposes.
- 2. Produce hard - copy & soft - copy reports:-** Some management information system reports are printed on paper and considered hard copy reports. most output soft - copy using Visual display on computer screen. soft copy output is typically formatted in a report like fashion
- 3. Use internal data stored in the computer system:-** Management information system reports use Primarily internal sources of data that are contained in computerized. some management information system use external sources of data about competitors, the market place & so on. the internet is frequently you source for external data.
- 4. Allow end users to develop their own custom reports:-** Although analysts & programmers may be involved in developing & implementing Complex management information system reports that require data from many sources & users are increasingly developing their own simple program to Query dbase & produce basic reports.
- 5. Require user requests for reports developed by system personal:-** when information system personnel develop and implements management information system reports,a formal request to the information system department may be required. if a manager for example wants a production

reports to be used by in his or her department a format request for the reports is often require.

3.3.2. The development process of MIS

The proces of establishing an MIS involves 4 stages:

- 1. Planning for The MIS**
- 2. Designing The MIS**
- 3. Implementing the MIS**
- 4. Improving the MIS**

1. Planning for The MIS

The MIS should be developed considering some factors to be affected:

- long periods of time needed to acquire MIS related data processing qwuipment
- To integrate it ithin the operation of the organization
- The difficulty of hiring component Operators of the equipment.
- The major amount of financial and managerial resources needed to operate an MIS.

Specific plans should be contain information like...

- Hardware projection
- Human resource projection
- Financial project by time period

2. Designing The MIS

Designing MIS involves strategic decision making. the design of MIS should not begin with the comparative analysis of the types of such equipment available. The MIS should begin with and analysis of the types of decisions the manager actually make in a particular organization.

The design of MIS should consist of four step:

- Defining various decisions that must be made to run an Organization.
- Determining the types of Management policies that may influence the ways in which these decisions should be made.
- Pinpointing the types of data to make these decisions.
- Establishing a mechanism for gathering and appropriately processing the data to obtain needed information.

Design of MIS is an important factor which makes demarcation between a success or a failure. if there is a design defect in the MIS, there is a possibility that the defect will surface only after a couple of years.

The designer famous ladies inputs like.....

- Result of
- Long term information system master plan
- Status reports on existing modules and systems
- Corporate goals as reflected through MIS Goals and objectives.
- Corporate policy guidelines for implementation of MIS
- Review of existing resources and their utilization

3. Implementing the MIS

The third stage in the process of establishing an MIS within the organization is implementation. it is the act of putting the planned and designed MIS into operation or action. In this stage, the equipment is acquired and integrated into organization.

Designed data are gathered, analyzed as planned, and distributed to managers within the organization.

4. Improving the MIS

Once MIS is operating, MIS manager should continuously attempt to maximize it's value. managers must evaluate the symptoms of an adequate MIS to determine MIS Weakness

Typical improvements to MIS are:

- Build cooperation
- Stress still decision making
- Use cost benefit-analysis
- Consider people

Benifits of MIS

3.4. Decision support systems

A decision support system (DSS) is a computer program application used to improve a company's decision-making capabilities. It analyzes large amounts of data and presents an organization with the best possible options available. Decision support systems bring together data and knowledge from different areas and sources to provide

users with information beyond the usual reports and summaries. This is intended to help people make informed decisions.

Typical information a decision support application might gather and present include the following:

- comparative sales figures between one week and the next;
- projected revenue figures based on new product sales assumptions;
- the consequences of different decisions.

A decision support system is an informational application as opposed to an operational application. Informational applications provide users with relevant information based on a variety of data sources to support better-informed decision-making. Operational applications, by contrast, record the details of business transactions, including the data required for the decision-support needs of a business.

Components of DSS

Knowledge base:- A knowledge base is an integral part of a decision support system database, containing information from both internal and external sources. It is a library of information related to particular subjects and is the part of a DSS that stores information used by the system's reasoning engine to determine a course of action.

Software system:- The software system is composed of model management systems. A model is a simulation of a real-world system with the goal of understanding how the system works and how it can be improved. Organizations use models to predict how outcomes will change with different adjustments to the system. For example, models can be helpful for understanding systems that are too complicated, too expensive or too dangerous to fully explore in real life. That's the idea behind computer simulations used for scientific research, engineering tests, weather forecasting and many other applications.

Models can also be used to represent and explore systems that don't yet exist, like a proposed new technology, a planned factory or a business's supply chain. Businesses also use models to predict the outcomes of different changes to a system -- such as policies, risks and regulations -- to help make business decisions.

User interface:- The user interface enables easy system navigation. The primary goal of the decision support system's user interface is to make it easy for the user to manipulate the data that is stored on it. Businesses can use the interface to evaluate the effectiveness of DSS transactions for the end users. DSS interfaces include simple windows, complex menu-driven interfaces and command-line interfaces.

Types of DSS

Decision support systems can be broken down into categories, each based on their primary sources of information.

Data-driven DSS

A data-driven DSS is a computer program that makes decisions based on data from internal databases or external databases. Typically, a data-driven DSS uses data mining techniques to discern trends and patterns, enabling it to predict future events. Businesses often use data-driven DSSes to help make decisions about inventory, sales and other business processes. Some are used to help make decisions in the public sector, such as predicting the likelihood of future criminal behavior.

Model-driven DSS

Built on an underlying decision model, model-driven decision support systems are customized according to a predefined set of user requirements to help analyze different scenarios that meet these requirements. For example, a model-driven DSS may assist with scheduling or developing financial statements.

Communication-driven and group DSS

A communication-driven and group decision support system uses a variety of communication tools -- such as email, instant messaging or voice chat -- to allow more than one person to work on the same task. The goal behind this type of DSS is to increase collaboration between the users and the system and to improve the overall efficiency and effectiveness of the system.

Knowledge-driven DSS

In this type of decision support system, the data that drives the system resides in a knowledge base that is continuously updated and maintained by a knowledge management system. A knowledge-driven DSS provides information to users that is consistent with a company's business processes and knowledge.

Document-driven DSS

A document-driven DSS is a type of information management system that uses documents to retrieve data. Document-driven DSSes enable users to search webpages or databases, or find specific search terms. Examples of documents accessed by a document-driven DSS include policies and procedures, meeting minutes and corporate records.

Unit - 4 - Transaction Processing Systems

4.1. Overview of Transaction Processing System

Transaction processing was one of the first business processes to be computerized & without an information system. recording and processing business transactions would consume a huge amount of an organization's resources the transaction processing system also provides employees involved in other business processes the management information system and special purpose information system to achieve their goals

A transaction processing system serves as the foundation for the other system. transaction processing system performs routine operations such as sales ordering and billing often performing the same operations daily or weekly. These systems require a large amount of input data & produced an amount of output without requiring sophisticated complex processing

every organization has a manual and automated transaction processing system, which processes the detailed data necessary to update records about the fundamental business operations of the organization

This system includes:-

- Order entry
- Inventory control
- Payroll
- Account payable
- Account receivable
- General ledger

Impact of these systems:-

- Customer order
- Purchase order
- Receipts
- Carrels
- Invoice
- Payroll checks

The result of processing business transaction is:-

- Database
- Telecommunication people
- Procedure
- Software
- Hardware device used to process transactions

The processing activities include:-

- Data Collection
- Data Collection
- Data manipulation
- Data storage
- Document production

4.2. Transaction Processing methods & objectives

Methods/Types of TPS

when the computerized transaction processing system first evolved, all transactions were collected in groups, called batches & processed together

1) Batch processing system

Batch processing system is the method of computerized processing in which business transaction are accumulated over a period of time & for processing as a single unit or batch.

For example, it may be important to process an invoice and customer payment for the account receivable system daily, on the other hand, the payroll system may receive time cards & process them weekly to create checks, update employee earning records & to distribute labor cost

the essential characteristics of the Batch processing system is that there is some delay between the occurrence of the event and the final processing of the related transaction to update the organization's records.

For many applications batch processing system is a more appropriate and cost-effective payroll transaction and billing are typically done via batch processing system

2) Online Real-time OR Online Transaction Processing System

with this form of data processing is transaction is processed immediately without delay of accumulating transaction into a batch as soon as the input is available a computer program performs the necessary processing and update record effected by that single transaction at any time the data in the on the online system always the current status

for example when you make an airline reservation the transaction is processed and all database are updated immediately this type of processing is essential for a business that requires data quickly and updates it frequently such as airline ticket Agencies

OLTP is faster and provide more efficient service internet is required to perform OLTP functions

3) online entry with delayed processing

It is the combination of batch and online processing with this system transactions are entered into the system when they occur, but they are not processed immediately for example when you call a toll free number and order a product, your order is entered into the system when you called, but not be processed until the business hours are completed

even though Technology exists to run TPS applications using online processing it is not done for all applications for many application batch processing is more appropriate and cost-effective example payroll and billing, according to goal of an organization the best-suited method is selected.

Objectives of TPS

- **Process data generated by and about transactions:** The primary objective of TPS is to capture, gather, process, and store transactions and to produce useful documents related to routine business activities for managers.
- **Maintain a high degree of accuracy:** One of the objectives of TPS is error-free data input and processing. In manual TPS, the resulting transactions were often inaccurate because humans are fallible, resulting in wasted time, and effort and required resources to correct them. In contrast, with computerized TPS, transaction processing appeared to be accurate or errors were minimized because accuracy checks were done by both humans and computer systems.
- **Ensure data and information integrity:** TPS ensures that all the data and information stored in databases are always accurate, current, appropriate, and up to date.
- **Produce timely documents and reports:** Manual TPS take longer time than computerized TPS to produce routine documents. Computerized TPS and the improvements in information technology (IT) allow transactions to be processed in a very short period of time.
- **Increase labor efficiency:** Manual TPS was labor intensive in which the process of a business transaction is done by hand. With computerized TPS, firms can reduce the need for many laborers as computers can replace human laborers, thus saving costs.
- **Help provide increased and enhanced services:** TPS assist organization in providing superior customer service. For example, computerized TPS enables customers to place orders for raw materials electronically and helps firms to track customer orders through all stages from order to delivery to receipt of payment. Thus, this allows firms to be more responsive to customer needs and queries.

Characteristics of Transaction Process System

There are 4 characteristics in every single transaction processing system.

1. **Rapid response:** In order to shorten the waiting time of the users, TPSs are modified to process transactions instantly to ensure the data will be available in the shortest waiting time.
2. **Reliability:** Due to the involvement of cash, the reliability of TPS has to be in place. TPSs have to be designed in a way to avoid the transactions slip past the net at the same time remain themselves operating permanently. Also, the failure rate has to remain within tolerance levels. With that comprehensive safeguards and disaster recovery systems have to be incorporated by the designed TPSs.
3. **Inflexibility:** Mistakes or errors can occur once the steps alter. To maximize the efficiency of the TPS, transactions have to be processed in the same order. With that, TPS interfaces have to be designed so that identical data for each transaction can be acquired.
4. **Controlled Processing:** A transaction processing monitor is found at every end of the computer to ensure that the transactions are correctly inputted. Still, it requires human control on it. TPSs can be used even to modify data and fraudulent transactions. With that, the user of the system has to be restricted only to people who have authority.

4.3. Transaction Processing Activities

Processing business transactions was the first application of computers of most firms. TPS, a cross-functional information system was among the earliest computerized systems developed to record, process, validate, and store business for future use or retrieval. Transactions are economic events or exchanges between two or more business entities. Basically, TPS is an organized collection of people, procedures, databases, and devices used to record completed business transactions and store data about these transaction

4.3.1. Data Collection

The process of capturing and gathering the needed data to complete transactions. Data collection can be a manual process or an automated process. The usage of automated data collection devices has made data collection faster, more efficient, and reliable and allows firms to use the collected data in much more flexible ways. For example, retail stores use scanners to read the bar code from product packages and automatically enter the price item to TPS. Once the price data is entered, the computer will determine the customer's bill.

data should be captured at its source, and it should be recorded accurately with minimal effect and in a form that can be directly entered into computer rather than keying the data from some type of document this approach is called source data automation.

An example of source data automation is the use of devices at a retail store checkout to read universal product codes automatically. The universal product code reading is more accurate and faster than having a cash register clerk enter code manually. another example of automation is industrial Data Collection device. these devices allow employees to scan their magnetized ID cards to enter data and payroll transaction system when they start the job.

4.3.2. Data Editing

It is process of checking data for validity & competence to detect any problems with the data. example quantity and cost data must be numeric and names must be alphabetic otherwise the data is not valid. often the codes associated with an individual transaction are edited against database containing a valid codes. if any code entered is not present in the database, the transaction is rejected

4.3.3. Data correction

It is not valid to reject invalid data. The system should provide error message that alert those responsible for the data edit function. This error message not specifies what problem is occurring so that a correction can be made.

Data corrections is the process of reentering miss keyed or miss scanned data that was found during data editing example universal product code must be in a master table of valid universal product codes. it doesn't have it then the appropriate action can be taken.

4.3.4. Data Manipulation

The process of performing calculations and other data transformations related to business transactions and storing data and information in organization's database for further processing. For example, in a payroll TPS, managers multiply employees' hours worked times the hourly pay rate.

data manipulation is the process of performing Calculation and other data transmission related to business transactions

- Classifying data
- Storing data into categories
- Performing calculations
- Summarizing results
- Storing data in the organization databases.

In Payroll transaction processing system data manipulation include:

- Multiplying employee's hours worked by his pay rate.

- Overtime calculation.
- Deductions are also performed

4.3.5. Data Storage

Data storage involves placing transaction data or information in database. The stored data can be further processed and manipulated by other information systems. In other words, the data appears to be the source of data for other information systems

It involves updating one or more databases with new transactions. this data can be further processed and manipulated by other systems so that is available for management decision-making. Thus although transaction databases can be considered by product of transaction processing, they have pronounced effects on other information system & decision-making process in an organization.

4.3.6. Document Production and Reports

The process of outputting records and reports. The documents may be in the form of hard copy paper reports or soft copy where documents are displayed on computer screens.

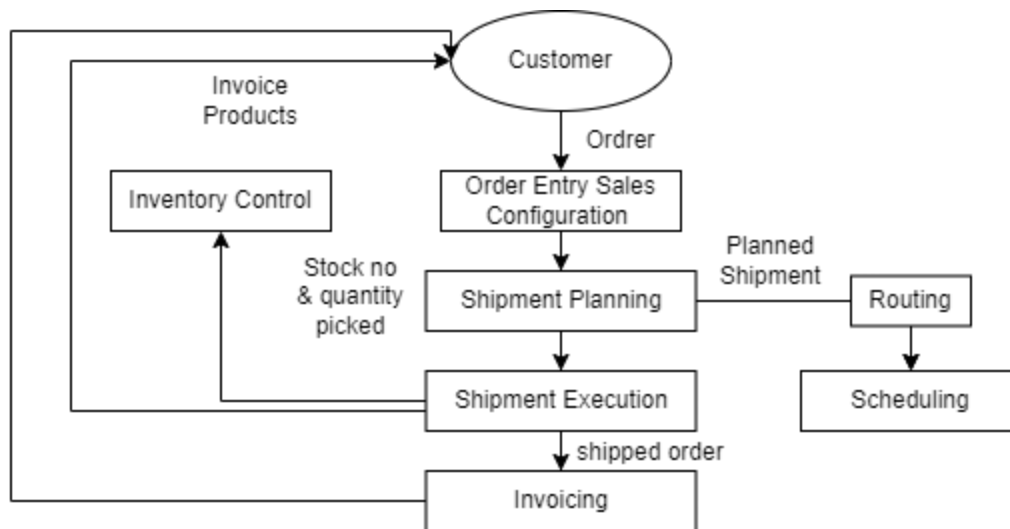
It involves generating output records & reports. These documents may be hard copy paper reports or displayed on computer screens. example paychecks are hard copy documents produced by payroll transaction processing system while an outstanding balance report for invoices might be a soft copy report displayed by an account report for invoices might be a soft copy report displayed by an account receivable transaction processing.

Often results from transaction processing system as input to other systems where the results of updating the inventory database are used to create the stock expansion report of items whose inventory level is less than the reorder point. these reports can be printed or displayed on computer screens.

A transaction processing system can also produce reports required by local & federal agencies such as state tax withholding & quarterly invoice statements.

4.4. Traditional transaction processing Applications

4.4.1. Order Processing Systems



Order entry:- it captures the basic data needed to process a customer order. Orders may come through the mail or via telephone ordering system, be generated by a staff of sales representatives, Arrive via EDI transactions directly from a customer's computer over network, or be entered directly over the internet by the customer using data entry from firm's website.

Order processing systems can also suggest related items for order takers to mention to promote add-on Sales. order takers also review customer payment history data from the accounts receivable system to determine whether credit can be extended. once an order is entered and accepted, it becomes an open order typically, daily Sales journal is generated.

EDI(Electronic data interchange) can be an important part of the order entry TPS. with EDI, a customer or client organization can place orders directly from its purchasing TPS into the order processing TPS of another or supplier's organization. with EDI, orders can be placed any time of the day or night, and immediate notification of order receipt and processing can be made.

Sales configuration:- It ensures that the products and services ordered are sufficient to accomplished the customer's objectives. example using a sales configurations program, a sales representative knows that a computer printer needs a certain cable and a LAN card so that it can be connected to LAN. without it, sales representatives might sell wrong cable and forget the LAN card

Sales configuration programs also suggest optional equipment. For example, if customer order Palmtop computer, the program will suggest an ac adapter, backup software and cables, and a modem to allow the palmtop to connect to the internet.

Sales configuration program can also solve customer problems and answer customer questions. For example, it can determine whether factory robot made by one manufacturer can be controlled by a computer system developed by another manufacturer.

Sales configuration programs can eliminate mistakes, reduce costs and increase revenues

Shipment planning:- New orders received and any other orders not Shipped are passed from order entry system to the shipment planning system. shipment planning system determines which open orders will be filled and from which location they will be shipped. this is a trivial task for a small company with lots of inventory, only one shipping location, and a few customers in small geographic area. but it is an extremely complicated task for a large Global Corporation with Limited Inventory, dozens of shipping locations, and tens of thousands of customers. the trick is to minimize shipping and warehousing costs while still meeting customer delivery dates. the output of the shipment planning system is a plan that shows where each order is to be filled and schedule for shipping with specific carrier on specific date and time.

system also prepares picking list (list of customer names, numbers, order number, and all items ordered and its quantity) that is used by warehouse operators to select the ordered goods it can be on paper or electronically transmitted.

Shipment execution:- It coordinates the outflow of all products and goods from the organization, with the objective of delivering quality products on time to customers. the shipping department is usually given responsibility for physical packaging and delivering all products to customers and suppliers.

this delivery can include mail services, trucking operations, and rail service. the system receives the picking list from the shipment planning system. sometimes orders cannot be filled exactly as specified. one reason is out of stock meaning the warehouse does not have a sufficient quantity of an item to fill a customer's order.

when shipment execution system processing cycle is complete, it passes shipped order translation to invoicing system the shipment execution system also produced packing documents, which are enclosed with the items being shipped, to tell customers what times are in shipment, what is back Ordered, and exact status of the order

Inventory control:- for each item picked during the shipment execution process, a transaction providing the stock number and quantity picked is passed to the inventory control system. in this way, computerized inventory records are updated to reflect the exact quantity on hand of each stock keeping unit

order takers check the inventory level of a product, they receive current information once products have been picked out of inventory, other documents and reports are initiated by the inventory control applications. data from this report is used as input to other information systems to help production and operations managers analyze the production process for almost all companies, inventory must be tightly controlled.

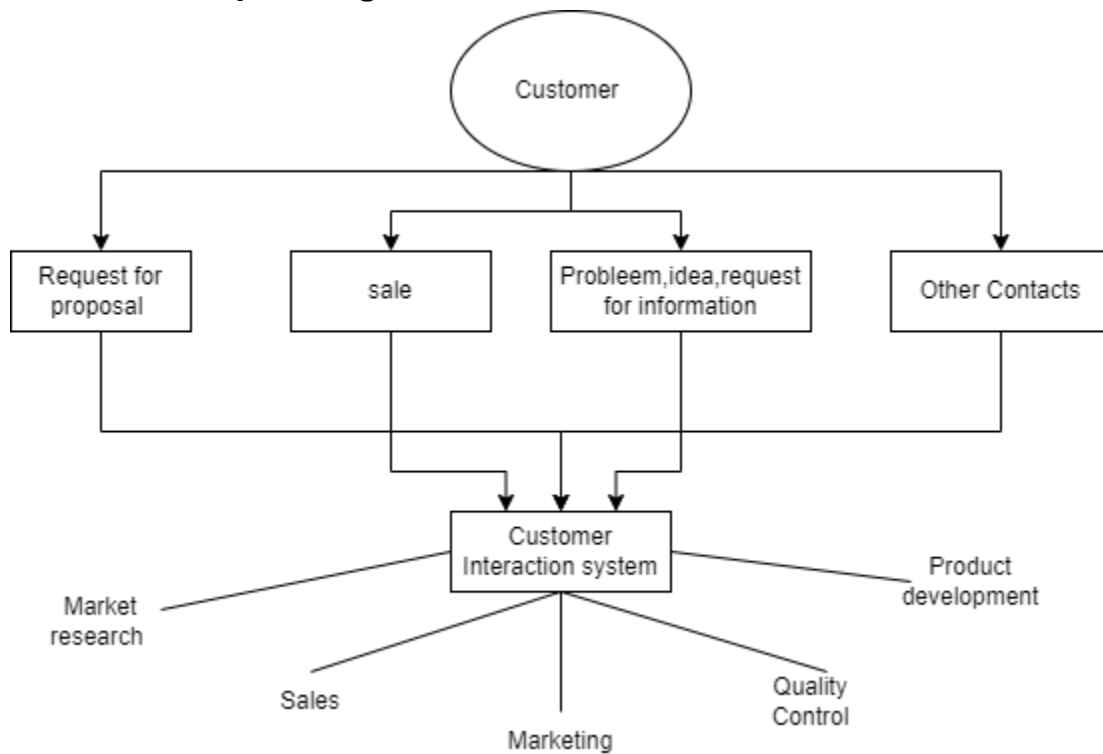
one objective is to minimize the amount of cash tied up in inventory by placing it in just right amount of inventory to gain a competitive advantage, many manufacturing organization is moving to real-time in inventory control system based on the barcoding the finishing product, scanners and radio display terminals mounted on forklifts wireless LAN communication to track the item.

Invoicing customer:- invoices are generated based on records received from the shipment execution TPS this application encourages follow-up on existing sales activities, increases, Profitability, and improves Customer service. most invoicing programs automatically compute discounts, taxes, and other charges.

As most computerized systems have databases on customers and inventory many invoicing applications require only information on the items ordered and the client identification number it looks full name and address of to customer, determines whether the customer has an adequate credit rating and after all calculation prepares invoices.

Invoicing in services organization is even more complicated. As it is difficult to match the service rendered to and ordered by the customer. This is especially difficult if the data needed for billing has not been accurately and completely captured by TPS.

Customer relationship management:-



CRM system is a collection of people, processes, software, and internet capabilities that help an enterprise manage customer relationships effectively and systematically.

The goal of CRM is to understand and anticipate the needs of current and potential customers to increase customer retention and loyalty optimizing the way products and services are sold. It automates and integrates the functions of sales, marketing, and service in an organization.

The objective is to capture data about every contact a company has with a customer through every channel and store it in the CRM system to enable the company to truly understand customer actions.

CRM software helps an organization build a database about its customers that describes relationships in sufficient detail so that management, salespeople, customer service providers, and even customers can access information to match customer needs with product

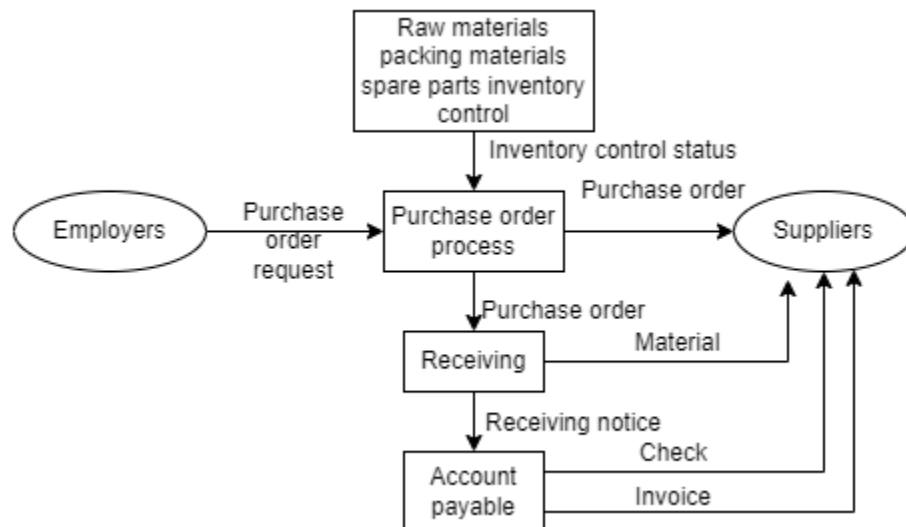
plans and offerings, remind customers of service requirements, know what other products a customer had purchased, etc.

Routing & Scheduling:- Routing system helps determine best way to get products from one location to another scheduling system determines best time to pick up or deliver goods and services

A routing system helps determine the best way to get products from one location to another. Scheduling system determines the best time to pick up or deliver goods and services. Another objective is to carry a profitable load on the return trip and to minimize total distance traveled, which can result in lower fuel, driver, and truck maintenance cost.

4.4.2. Purchase Systems

The purchasing TPS include inventory control, purchase order processing, receiving, and account payable.



Inventory Control:- A manufacturing firm has several kinds of inventory such as raw material, packaging material, finished goods, and maintenance parts. If they buy too much, they will tie up too much cash in idle inventory, but if they don't keep enough items on hand, then they will be unable to meet demand and lose sales revenue. Mistakes in tracking current raw material inventory can block millions of dollars, causing the manufacturer to miss profitability targets.

Ex: Sun Microsystems uses an accurate inventory control system and demand forecast data that factors in market volatility, the price of components, their rate of depreciation and their availability to determine how many of each server components to order.

Purchase Order Processing:- It helps the purchase department to complete their transactions quickly and efficiently. Every organization has its own policies and procedure for

purchasing supplies and equipment. Companies are purchasing needed supplies through the internet. The purchasing department can facilitate the buying process by keeping data on suppliers' goods and services. Technologies like the internet and public network allows purchasing manager to compare products and price list on internet.

Once the supplier is selected, the supplier's computer system might be directly linked to buyer's system. Orders can be sent via EDI (Electronic Document Interchange), reducing purchasing costs and time. Instead of searching for the lowest price from the list of suppliers, many companies form a strategic partnership with one or two major suppliers for parts and materials.

Receiving:-Like centralized purchasing, many organizations have a centralized receiving department responsible for taking possession of all incoming items, inspecting them, and routing them to the people or departments that ordered them. The receiving department also notifies the purchasing department when items have been received.

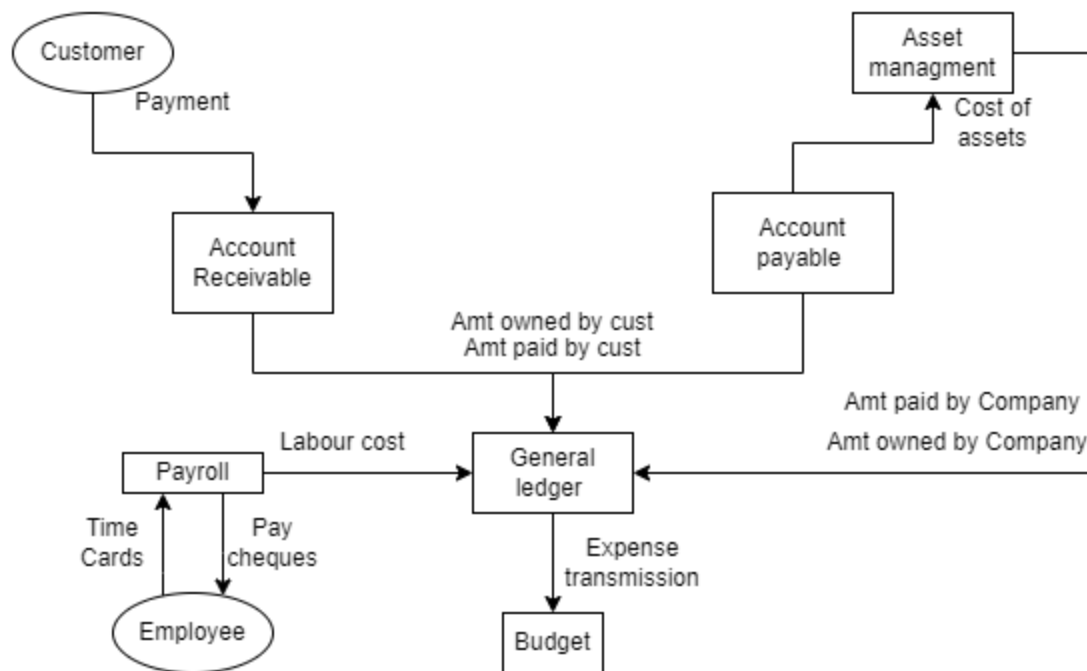
This notification may be done in a paper form called receiving report or electronically through a business transaction created by entering data into the receiving TPS. The function of receiving department is quality control by the inspection of incoming items. Each day manufacturers must determine how much of each item to buy to make and ship the products to the customers. Many suppliers send their customers a shipment notice. This business transaction is inputted into the customer receiving system to create a record of expected receipts. Items are also shipped with barcode identification on the container. The worker scans the barcode and a transaction is sent to the receiving system.

Accounts Payable:-It attempts to increase an organization's control over purchasing, improve cash flow, increase profitability, and provide more effective management of current liabilities. Cheques to suppliers for materials and services are the major outputs. Once the bill is received from the supplier, the bill is verified and checked for accuracy. (Invoice data, number amount of each item, any discounts, and the total amount). This information allows the company to consolidate several invoices and bills into a single statement.

In addition to cheques, companies can also pay their suppliers electronically using EDI, the internet, or other EPS (Electronic Payment System). Account payable application can integrate into other systems including cash flow analysis which helps an organization to ensure that sufficient funds are available and can show the best source of funds for payment.

4.4.3. Accounting Systems

It includes budget, accounts receivable, payroll, asset management, and general ledger.



Budget:- In an organization, a budget can be considered a financial plan that identifies items and amounts that the organization estimates it will spend. In some organizations, budgeting can be an expensive and time-consuming process of manually distributing and consolidating information. The budget TPS automates many of the tasks required to amass budget data, distribute it to users, and consolidate the prepared budgets. Automating the budget process allows financial analysts more time to manage it to meet organizational goals by setting enterprise-wide budgeting targets, ensuring a consistent budget model and assumptions across the organization, and monitoring the status of each department's spending.

Accounts Receivable:- The accounts receivable system manages the cash flow of the company by keeping track of the money owed by the company on charges for goods sold and services performed. When the goods are shipped to a customer, the customer's accounts payable system receives a business transaction from the invoicing system and the customer's account is updated in the accounts receivable system of the supplier. A statement reflecting the balance due is sent to active customers.

Upon receipt of payment, the amount due from the customer is reduced by the amount of payment. The major output of the application is monthly bills or statements sent to customers. The bill includes all details regarding the orders placed by the customers. In addition, bills can include amounts for various periods, totals, and allowances for discounts. The application should monitor sales activity, improve cash flow by reducing the time between a customer's receipt of items ordered and payment of bills for those items and ensure that customers continue to contribute to profitability.

Most systems can handle payment in a variety of ways, including standard bank checks, credit cards, money-wiring services, and electronic funds transfer via EDI. With the help of internet, customers can pay their bills by connecting their devices from anywhere and

at any time. The system is vital to managing the cash flow of the firm. One major way to increase cash flow is by identifying overdue accounts. Reports are generated that "age" accounts to identify customers whose accounts are overdue by more than specified days. Special action may be initiated to collect funds or reduce the customer's credit limit with the firm, depending on the amount owed and degree of lateness. The important function of this application is to identify bad credit risks. Because a sizable amount of an organization's assets can be tied up in accounts receivable, one objective of application is to minimize losses due to bad debts through early identification of potential bad-debts customers.

Thus many companies routinely check a customer's payment history before accepting a new order. With advances in telecommunications, companies can search huge databases for the names of firms and individuals who have been reported as delinquent on payments or as bad credit risks. When using external data in TPS applications, companies must be extremely cautious regarding the accuracy of data. The account receivable aging report is valuable aspect of this application. In most cases, this report sorts all outstanding debts or bills by date. It gives managers an immediate look into large bills that are long overdue so that they can be followed up to prevent more orders from being sent to delinquent customers. For unpaid bills that have remained outstanding for a predetermined amount of time, "reminder notices" can also be automatically generated. This type of report can be produced on a customer-by-customer basis or in a summary format.

Payroll:- The two primary outputs are the payroll check and stubs which are distributed to the employees, and the payroll register, which is a summary report of all payroll transactions. In a manufacturing firm, hours worked and labor costs may be captured by job so that this information can be passed on to the manufacturing costs system. In addition to a paycheck, most payroll programs produce a payroll journal. A payroll journal contains employees' names, the areas where employees worked during the week, hours worked, the pay rate, a premium factor for overtime pay, earnings, earning type, various deductions, and net pay calculations. Financial managers at operational level use the payroll journal to monitor and control pay to individual employees. Payroll TPS also provides input into various weekly, quarterly, and yearly reports. Most of these reports are used by financial managers to help control payroll costs and cash flows.

It also provides audit trails through the use of payroll master files and documents used by internal accountants and external auditors to make sure that application is functioning as intended. Like other TPS, payroll interfaces with other applications. All payroll entries are entered into the general ledger systems. Payroll activities are also directly linked with production / inventory control operations.

Asset management:- Capital assets represent major investments for the organization whose value appears on the balance sheet under fixed assets. These assets have a useful life of several years or more, over which their value is depreciated, resulting in a tax reduction. Asset management TPS controls investments in capital equipment and manages depreciation for maximum tax benefits.

Key features of this application include efficient handling of wide range of depreciation methods, country-specific tax reporting and depreciation structures for the various countries in which the firms do business, and workflow-managed processes to easily add, transfer, and retire assets.

General ledger:- Every monetary transaction (for example Payment of suppliers invoice, receipt of payment from a customer, and payment to an employee) that occurs within an organization must be properly recorded. A computerized general ledger system is designed to allow automated financial reporting and data entry. A general ledger application produces a detailed list of all business transactions and activities. Reports, including profit and loss statements, balance sheets, and general ledger statements, can be generated.

Historical data can be kept and used to generate trend analyses and reports for various accounts and groups of accounts used in general ledger package. Various income and expense accounts can be generated for the current period, year-to-date, and month-to-date as required. The reports generated are used by accounting and financial managers to monitor the profitability of the organization and to control cash flows. Financial reports that summarize sales by customer and inventory items can also be produced. This reports are used by marketing and financial managers to determine which customers are contributing to sales and inventory items that are selling as expected. A key to the proper recording and reporting of financial transactions is the corporation's chart of accounts.