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UNIT - 4

TRANSACTION PROCESSING SYSTEM

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4.1 Overview of Transaction Processing System

DEFINITION:

"A transaction processing system (TPS) is an information system that captures and processes data generated during an organization's day-to-day transactions. A transaction is a business activity such as a deposit, payment, order or reservation."

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OR

"A transaction is any event that generates or modifies data that is eventually stored in an information system. Transaction processing systems collect, store, modify and retrieve the transactions."

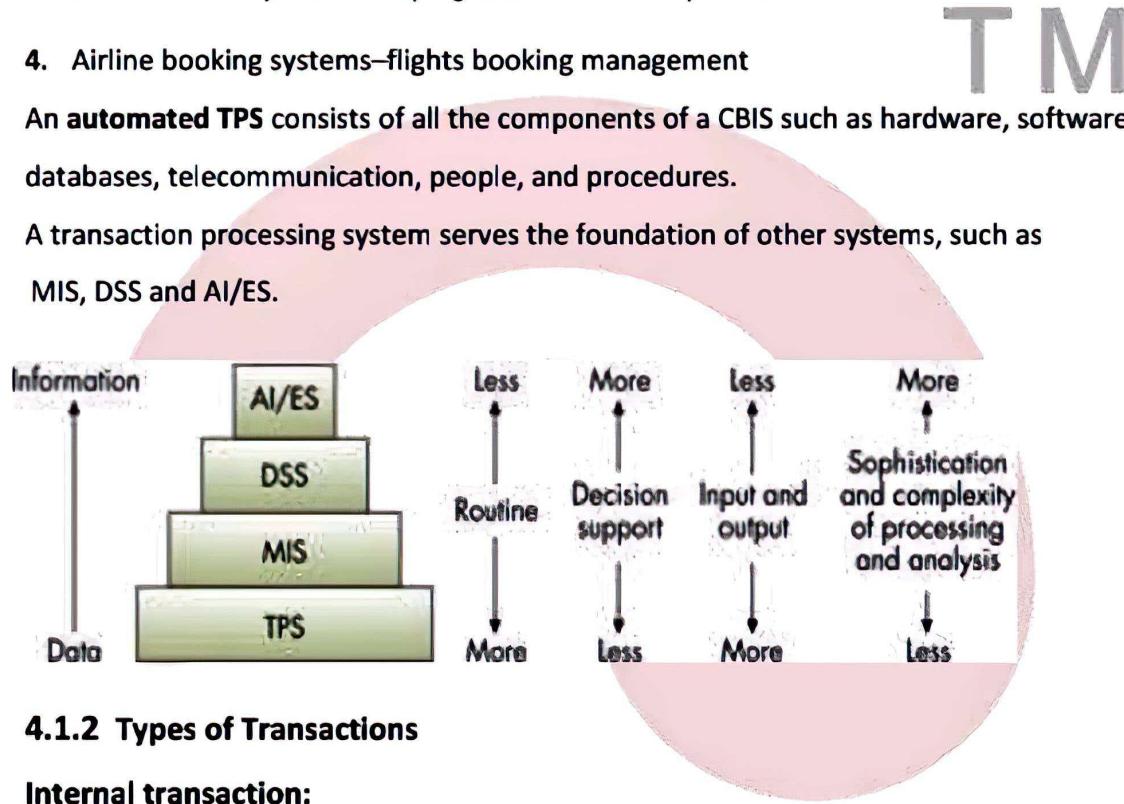
OR

"A transaction is any business related exchange such as payments to employees, sales to customers and payments to suppliers. Thus, processing business transaction was the first application of computer for most organization."

4.1.1 TRANSACTION PROCESSING SYSTEMS:

- Transaction processing systems are used to record day to day business transactions of the organization.
- They are used by users at the operational management level. The main objective of a transaction processing system is to answer routine questions such as;
 - 1) How printers were sold today?
 - 2) How much inventory do we have at hand?
 - 3) What is the outstanding due for John Doe?
- By recording the day to day business transactions, TPS system provides answers to the above questions in a timely manner.
- TPS is the backbone of an organization's information systems. It monitors, collects, stores, processes & disseminate (distribute) information for all routine core business transactions.
- The information produced from the transaction processing system is very detailed.

- Examples of transaction processing systems include;
 1. Point of Sale Systems—records daily sales
 2. Payroll systems—processing employee's salary, loans management, etc.
 3. Stock Control systems—keeping track of inventory levels
 4. Airline booking systems—flights booking management
- An automated TPS consists of all the components of a CBIS such as hardware, software, databases, telecommunication, people, and procedures.
- A transaction processing system serves the foundation of other systems, such as MIS, DSS and AI/ES.



4.1.2 Types of Transactions

Internal transaction:

- An internal transaction is a business transaction which does not involve any outside organisation or third party. An internal transaction does not involve two parties.
- These transactions are generally triggered by and are concerned with internal functions of a business. For example, conversion of raw material of one department to work in progress of another department is internal consumption of stock and is an example of an internal transaction.
- Some internal transactions are also triggered by passage of time such charge of depreciation in the books, amortization of prepaid expenses etc.

External transaction:

- An external transaction is a business transaction which takes place between the business and an outside third party. An external transaction therefore involves two or more parties.
- External transactions involve exchange of resources between the business and outside third parties. For example, purchase or sale of goods from a third party in exchange of cash/credit, payment for supply of utilities to a third party.
- An event involving 2 parties must have a monetary impact on the company's accounts to qualify as an external transaction. For example, a settlement reached with a trade union although involves 2 parties does not qualify as an external transaction as it does not have impact on the accounts. On the other hand a payment of compensation to employees under this settlement would qualify as an external transaction as it affects the accounts of the business.

INTERNAL TRANSACTION	VS	EXTERNAL TRANSACTION
Meaning		
Business transaction which occurs without involving an external third party		Business transaction that occurs with the involvement of one or more external third parties
Exchange of resources		
None or within the organization		Between the organization and external third party/parties
Impact on cash flow		
Generally no impact		In most cases, there is an impact on the cash flow
Number of parties		
Single – only the organization		Multiple – the organization and one or more external parties
Trigger		
Internal functions or passage of time		Business dealings involving external exchange of resources
Examples		
Internal inventory transfer, depreciation, amortization, recording losses, charging of prepaid expenses		Purchase and sale of goods with outside third parties

4.1.3 Characteristics of TPS

Rapid response

Fast performance with a rapid response time is critical. Businesses cannot afford to have customers waiting for a TPS to respond. The turnaround time from the input of the transaction to the production of the output must be a few seconds or less.



Reliability

Many organisations rely heavily on their TPS. A breakdown will disrupt operations or even stop the business. For a TPS to be effective, its failure rate must be very low. If a TPS does fail, then quick and accurate recovery must be possible. This makes well designed backup and recovery procedures essential.

Inflexibility

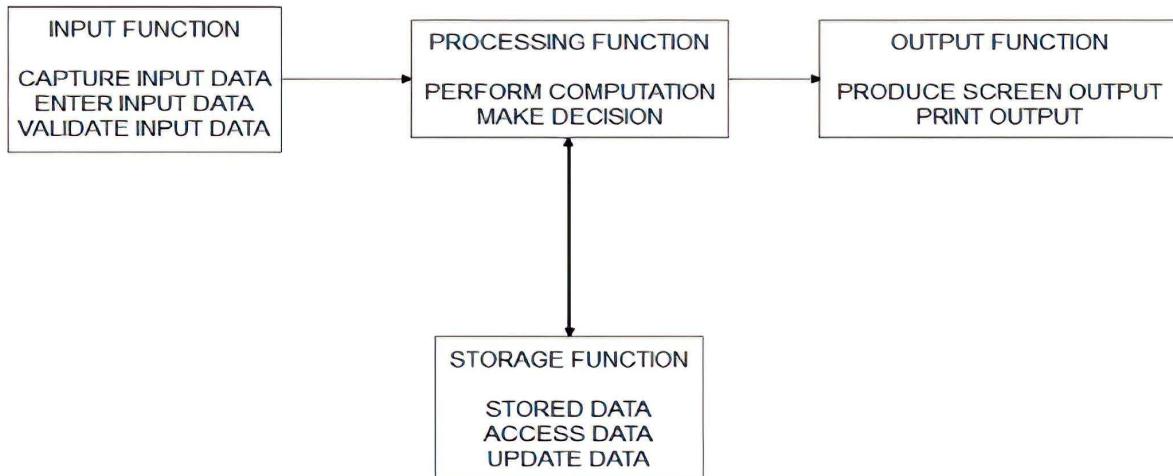
A TPS wants every transaction to be processed in the same way regardless of the user, the customer or the time of day. If a TPS were flexible, there would be too many opportunities for non-standard operations. For example, a commercial airline needs to consistently accept airline reservations from a range of travel agents. Accepting different transaction data from different travel agents would be a problem.

Controlled processing

The processing in a TPS must support an organisation's operations. For example, if an organisation allocates roles and responsibilities to particular employees, then the TPS should enforce and maintain this requirement. A TPS minimises the organisation's costs by reducing the number of times that data must be handled and by providing timely updates to the database. There are two types of transaction processing: batch transaction processing and real-time transaction processing

4.1.4 TRANSACTION PROCESSING SYSTEM FUNCTION:

- Transaction processing systems perform input, output, storage, and processing functions.



- Input functions include capturing data on a **source document**, entering the input data into the system, and checking input data for errors, a process called **data validation**.
- Output functions include producing screen or paper **reports**, such as **detail reports**, **Summary reports**, and **exception reports**.
- Storage functions include storing data in files and databases, accessing stored data, sorting stored data, and updating stored data.
- Processing functions involve the manipulation of data, including computation and decision making.

4.2 Transaction Processing methods & objectives

4.2.1 TRANSACTIONS PROCESSING METHODS

Transactions are commonly performed in batch or on-line. Transaction processing methods are:

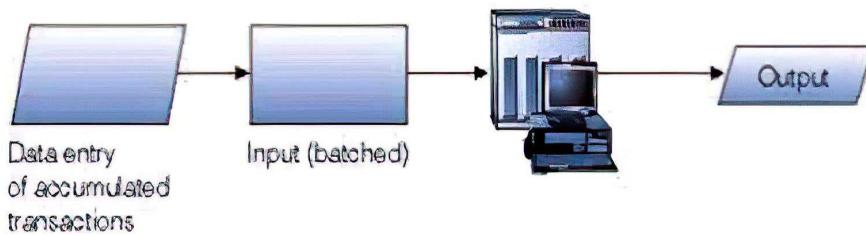
1. Batch Processing
2. On-Line/Real-Time Processing
3. On-Line Entry with Delayed Processing

BATCH PROCESSING

- With batch processing, business transactions are accumulated over a period of time and prepared for processing as a single unit or batch.
- There is some delay between the occurrence of an event and the processing of the event.
- All transactions for a period of time would be collected in a group (called a batch), input & processed as a unit.
- The transactions are collected and stored offline on a magnetic tape or on paper. The time delay before processing or completing a batch run could be several minutes, hours or even days.
- This was normally done at regular intervals, such as every hour, day, or week. The biggest problem with batch processing is that the master file is never current.
- It is good for some applications, such as processing end of semester grades or payroll; it is unacceptable for others, such as financial transactions. Example: Problems that would arise if your bank only processed deposits and withdrawals once a day!
- Batch programs are often run at night when there is less demand for the information system.
- Batch processing is fast and cost effective for many applications. A batch approach is used for generating pay cheques and other forms of paper output.
- It involves a large batch of an identical data type, such as payroll or stock information.
- **For example:**
 - 1) A payroll application collects data for each employee, such as the hours worked and overtime earned. This data is processed in batches by updating a payroll master file. After the master file is updated, the payslips are created for all employees in the organization.
 - 2) Accounts Payable and Accounts Receivable.

DISADVANTAGES IN BATCH PROCESSING:

1. All processing must wait until a settime. The processing schedule is predetermined.
2. Errors cannot be corrected during processing.
3. Sorting the transaction data is expensive and time consuming.



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ON-LINE/REAL-TIME PROCESSING (OLTP)

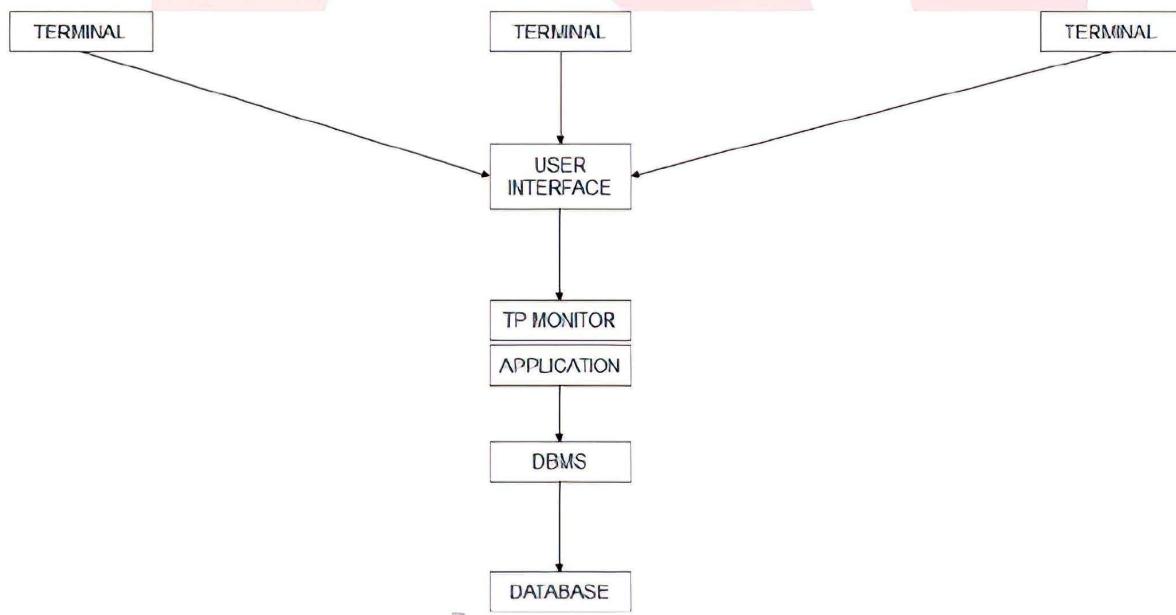
- With this form of data processing, each transaction is processed immediately, without the delay of accumulating transactions into a batch.
- As soon as the input data is available, a program performs the necessary processing and updates there cord affected by the transaction.
- Data in an OLTP always reflect the current status. The drawback to OLTP is the high costs associated with the necessary security & fault tolerance features.
- Online transaction processing is interactive & each transaction is processed as it occurs. Files are always current when online processing is used.
- A person enters the data for a transaction into a system, where it is processed and the output is received before the next input is entered.
- Real-time processing involves using a terminal or workstation to enter data and display the results of the TPS.
- It uses a computer network to link the terminals to the mainframe computer and to access the online database.
- Real-time processing involves a large number of users who are simultaneously performing

transactions to change data. Even though each individual user is processing a relatively small number of records, their requests are being made at the same time.

- Examples: Airline Reservation Systems and Banking Transaction Systems. Two main concerns with real-time processing are:
 - **Concurrency:** ensures that two users cannot change the same data at the same time. That is, one user cannot change a piece of data before another user has finished with it.
 - **Atomicity:** ensures that all of the steps involved in a transaction are completed successfully as a group. If any step fails, no other step should be completed.

The main disadvantage associated with real-time processing is the tremendous expense. Both the hardware and software costs of this type of processing exceed those of batch processing.

TRANSACTION PROCESSING MONITOR:



A Transaction Processing Monitor (TP monitor) is software that allows the transaction processing application programs to run efficiently. It manages the sequence of events that are part of a transaction.

ON-LINE ENTRY WITH DELAYED PROCESSING

- On-line entry with delayed processing is a compromise between batch and on-line processing.
- With this type of system, orders or transactions are entered into the computer 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 typically entered into the computer when you make the call. However, the order may not process until that even in after business hours.

DIFFERENCE BETWEEN REAL-TIME AND BATCH PROCESSING:

The differences between real-time and batch processing is given below:

S.NO:	<u>Real-Time</u>	<u>Batch Processing</u>
1.	With this form of data processing, each transaction is processed immediately, without the delay of accumulating transactions into a batch.	With batch processing, business transactions are accumulated over a period of time and prepared for processing as a single unit or batch.
2.	Each transaction in real-time processing is unique. It is not part of a group of transactions.	All transactions for a period of time would be collected in a group (called a batch), input & processed as a unit.
3.	Real-time processing requires the master file to be available more often for updating and reference	Batch processing requires the master file to be available less often for updating and reference.
4.	The database is accessible all of the time for processing.	The database is not accessible all of the time for batch processing.
5.	Real-time processing has fewer errors than batch processing as transaction data is validated and entered immediately.	With batch processing, the data is organized and stored before the master file is updated. Errors can occur during these steps.
6.	More computer operators are required in real-time processing, as the operations are not centralized.	Comparatively less computer operators are required in batch processing.
7.	It is more difficult to maintain a real-time processing system than a batch processing system.	It is comparatively easy.

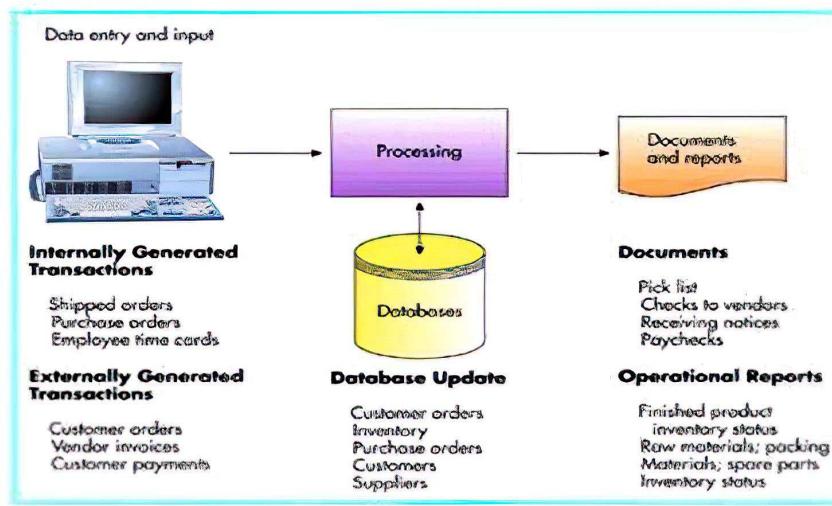
8.	The main disadvantage associated with real-time processing is the tremendous expense, because of the hardware and software costs.	It is comparatively less expensive.
9.	Here is no delay between the occurrence of an event and the processing of the event.	Here is some delay between the occurrence of an event and the processing of the event.
10.	Examples: Airline Reservation Systems And Banking Transaction System	Examples: Payroll Processing, Billing, Accounts Payable, And Accounts Receivable.

4.3 Transaction Processing Activities

All transactions processing system performs a common set of basic data processing activities. TPS capture and process data that describe fundamental business transactions. This data is used to update databases and to produce a variety of reports.

TRANSACTION PROCESSING ACTIVITIES

All transaction processing systems performs a common set of basic data processing activities. TPSs capture and process data that describe fundamental business transactions. This data is used to update databases and to produce a variety of reports.



4.3.1 Transaction Processing Methods:

- **Batch Processing:** With Batch processing, business transactions are accumulated over a period of time & prepared for processing as a single unit or batch.
- There is some delay between the occurrence of an event & the processing of the event.
- **Example:** Payroll processing, Billing, Account payable & account receivable.

✓ **On-Line / Real Time Processing(OLTP):**

- With this form of data processing, each transaction is processed immediately, without the delay of accumulating transactions into a batch.
- As soon as the input data is available, a program performs the necessary processing and updates the records affected by the transaction.
- Data in an OLTP always reflect the current status.

4.3.2 Transaction Processing Cycle:

The business data goes through a transaction processing cycle that includes:

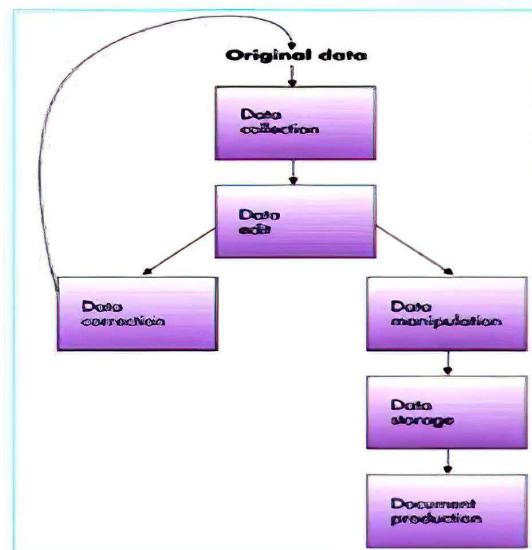
- a. Data Collection: Capturing data necessary for the transaction
- b. Data Editing: Check validity and completeness of data
- c. Data Correction: Correct the wrong data
- d. Data Manipulation: Calculate, Summarize, Process data
- e. Data Storage: Update Transaction(on databases)
- f. Document Production and Reports: Create end result reports

TRANSACTION PROCESSING CYCLE

The business data goes through a transaction processing cycle that includes:

- Data Collection
- Data Editing
- Data Correction
- Data Manipulation
- Data Storage
- Document Production

These are briefly described in the following.



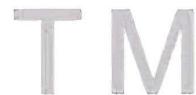
Data Collection:

- The process of capturing and gathering all data necessary to complete transactions is called Data Collection.
- It can be manual such as completing a purchase order by hand. It can also be automated via special input device such as scanners and terminals.
- Data collection begins with a transaction (such as customer order) and results in the origination of data that is input to the transaction processing system.
- Data should be captured as its source and it should be recorded accurately in a timely fashion, with minimal manual effort, and in a manner that can be directly entered to the computer rather than entering using keys.

- Automatic data collection termed as **source data automation**. An Example is the use of scanning device at the grocery store to read UPC code and hence the price of an item. Another example is an employee badge used as a time card when going in and out of an office building.

Data Editing:

- An important step in processing data is to check for validity and completeness of data. Controls must be placed in the data-entry form.
- For example, quantity and cost must be numeric and names must be alphabetic.

**Data Correction:**

- A data that is not entered properly needs to be entered correctly.
- Data Correction involves re-entering incorrect data in the data entry point.
- For example, a UPC code not found in the retail store checkout, is given a special code to complete the transaction for an item.

Data Manipulation:

- The process of performing calculation and other data transformations is termed as data manipulation.
- Examples are, sorting data, summarizing data, finding price of the fire item, calculating employee weekly pay and so on.

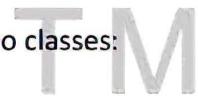
Data Storage:

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- Involves updating one or more database, tables or files with new transactions.
 - For example, inserting new customer information, updating customer demographics, updating inventory transactions, creating new student registration and so on.

Document Production and Reports:

- TPSs produce important business documents such as sales receipts, order entry list, customer list, invoices, purchase orders, inventory on-hand report, paychecks and so on.
- Document can be hard copy report or displayed on computer screen.

These transaction documents produced by TPS may be divided into two classes:



- Action documents
- Information documents.

1. Action documents direct that an action take place. Turnaround documents initiate action and are returned after its completion to the requesting agency. They therefore also serve as input documents for another transaction.
2. Information documents confirm that a transaction has taken place or inform about one or several transactions. Transaction documents require manual handling and, in some cases, distribution of multiple copies. The process is costly and may lead to inconsistencies if one of the copies fails to reach its destination.

4.4 TRADITIONAL TRANSACTION PROCESSING APPLICATIONS:

Traditional transaction processing systems include:

1. Order Processing
2. Purchasing
3. Accounting

4.4.1 ORDER PROCESSING SYSTEM

Order processing system includes following functions:

- 1) Order entry
- 2) Sales Configuration
- 3) Shipment planning
- 4) Shipment Execution

- 5) Inventory Control (Finished Product)
- 6) Invoicing
- 7) Customer interaction
- 8) Routing
- 9) Scheduling

- Running these systems efficiently and reliably is so important that the order processing systems are sometimes referred to as the “lifeblood of the organization.”
- The activities of order processing system are described below:

1) ORDER ENTRY:

- ✓ The order entry system captures the basic data needed to process a customer order. Orders may come through the mail or telephone; it can be gathered by a staff of sales representatives or by EDI or directly by the customer using a data entry form on the firm's website through internet.
- ✓ The inventory status of each inventory item on the order is checked to determine whether sufficient finished product is available. If an order item cannot be filled, a substitute item may be suggested.
- ✓ Once an order is entered and accepted, it becomes an open order daily sales journal (which includes customer information, products ordered, quantity, discount and price) is generated.
- ✓ With Electronic data interchange (EDI), a customer can place order directly from its purchasing TPS into the order processing TPS of another organization, or both the TPS of customer and supplier can be linked indirectly through a third party.
- ✓ With EDI orders can be placed at any time, and immediate notification of order receipt and processing can be made. Today mostly companies are using EDI.

2) SALES CONFIGURATION:

- ✓ Another important aspect of order processing is sales configuration. It ensures that the product and services ordered are sufficient to accomplish the customer's objective and work well together.
- ✓ For example, using a sale configuration program, a sales representative knows that a computer printer needs a certain cable and a LAN card so that it can be connected to the LAN. Without sales configuration program, a sales representative might sell a customer the wrong item.
- ✓ Sales configuration program also suggest optional equipment. For example, if a customer orders a palmtop computer, the sales configuration program will suggest an AC adapter, backup software and cables and a modem to allow the palmtop computer the ability to connect to the internet.
- ✓ Sales configuration software can also solve customer problems and answer customer questions. For example: determination of whether factory robot by one manufacturer can be controlled by another manufacturer.

3) SHIPMENT PLANNING

- ✓ A system that determines which open orders will be filled and from which location they will be shipped.
- ✓ The output of this system is a plan that shows where each order is to be filled and a precise schedule for shipping with a specific carrier on specific date and time.
- ✓ The system also prepares a pick list that is used by warehouse personnel to select the ordered goods from the warehouse. (Containing item and quantity).
- ✓ Picking list instruct the warehouse workers where to locate the items. Once items are picks from inventory this data is entered into the data transaction processing system, and a packing slip and shipping notice are generated.

- ✓ These outputs may be in paper form or they may be computer records that are transmitted electronically.

4) SHIPMENT EXECUTION

- ✓ This system coordinates the outflow of all products and goods from the organization, with the objective of delivering quality products on time to customers.
- ✓ Warehouse operators pack items in the box and item number and quantity for each item is entered in the system.
- ✓ It also creates a packing document for each order, which is enclosed with the shipping materials.
- ✓ The system passes shipped information (item number and quantity) to the inventory control system to update the inventory.
- ✓ The shipped information is also passed on to the Invoicing system to create an invoice.

5) 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, inventory records are updated the inventory records to reflect the exact quantity on hand of each stock keeping unit.
- ✓ Once products have been picked out of inventory, other documents and reports are initiated by the inventory control application. For example, the inventory status report summarizes all inventory items shipped over a specified time period. It can include stock numbers, descriptions, number of units on hand, number of units ordered, avg. cost etc.
- ✓ When a shipment is made, the quantity of the item is deducted from the current stock.
- ✓ It creates inventory status report to reflect current stock and the need for ordering.

6) INVOICING

- ✓ Generates customer invoices based on records received from the shipment execution

system.

- ✓ The knowledge of order number, which contains customer and item information, helps creating the invoice.

7) CUSTOMER INTERACTION:

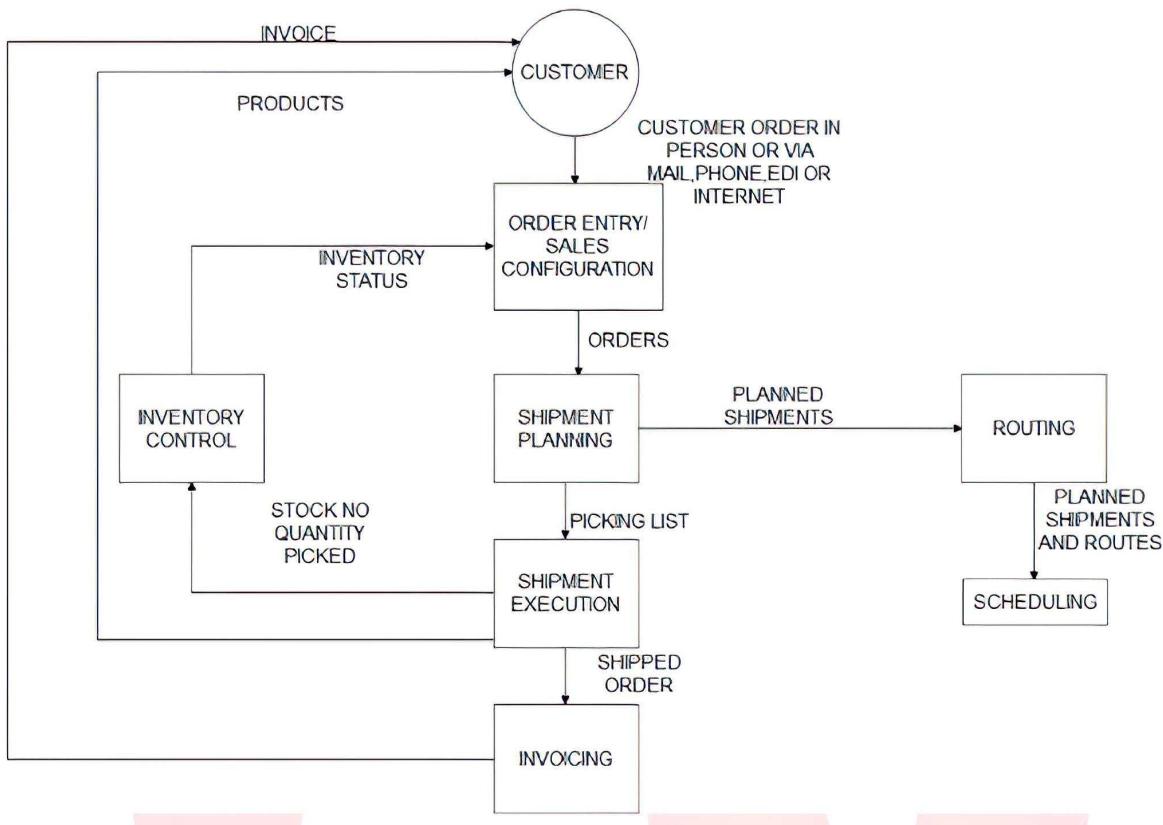
- ✓ Customer interaction system is system which monitors and tracks each customer interaction with company. Winning new customer and keeping exiting ones happy is a key to success. To keep customers happy, companies use a Customer interaction system.
- ✓ Customer's request, sale ,problem idea, request for information and customer related contacts acts as an input to Customer interaction system and results in success in market research, sales, marketing, quality control and product development.

8) ROUTING:

- ✓ This system determines the best way to get goods and products from one location to another.
- ✓ UPS and FedEx use vans, trucks, and airplanes to physically deliver their packages around the world. They also use information systems to keep track of delivery status of each package using a tracking number for each package.

9) SCHEDULING

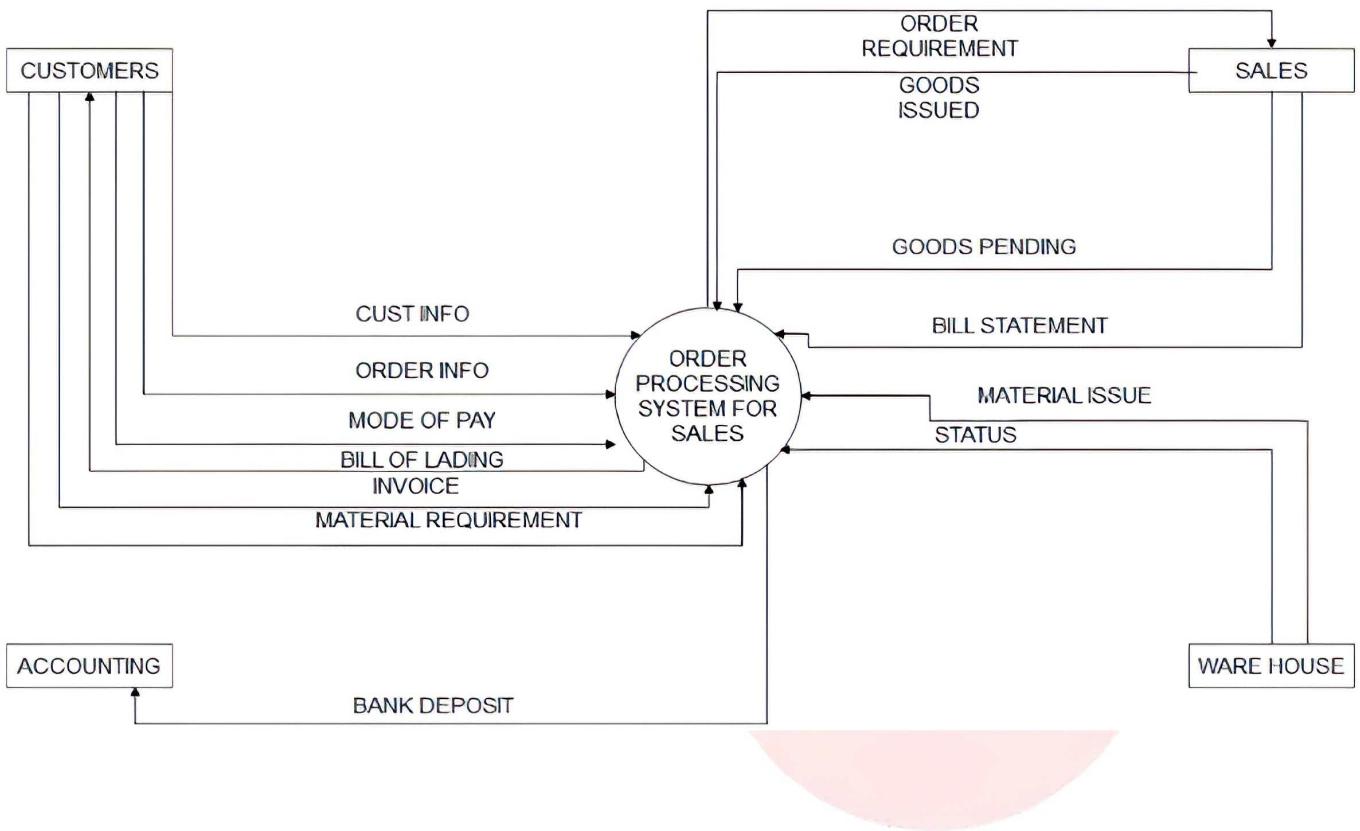
- ✓ This system determines the best time to deliver goods and services. For example, trucks are scheduled when oil and gas price are low.



- The processing flow begins with the receipt of a customer order. The finished product inventory is checked to see if sufficient inventory is on hand to fill the order.
- If sufficient inventory is available, the customer shipment is planned to meet the customer's desired receipt date. A product pick list is printed at the warehouse from which the order is to be filled on the day the order is planned to be shipped.
- At the warehouse, workers gather the items needed to fill the order, and enter the item identifier and quantity for each item to update the finished product inventory.
- When the order is complete and sent on its way, a customer invoice is created with a copy included in the customer shipment.

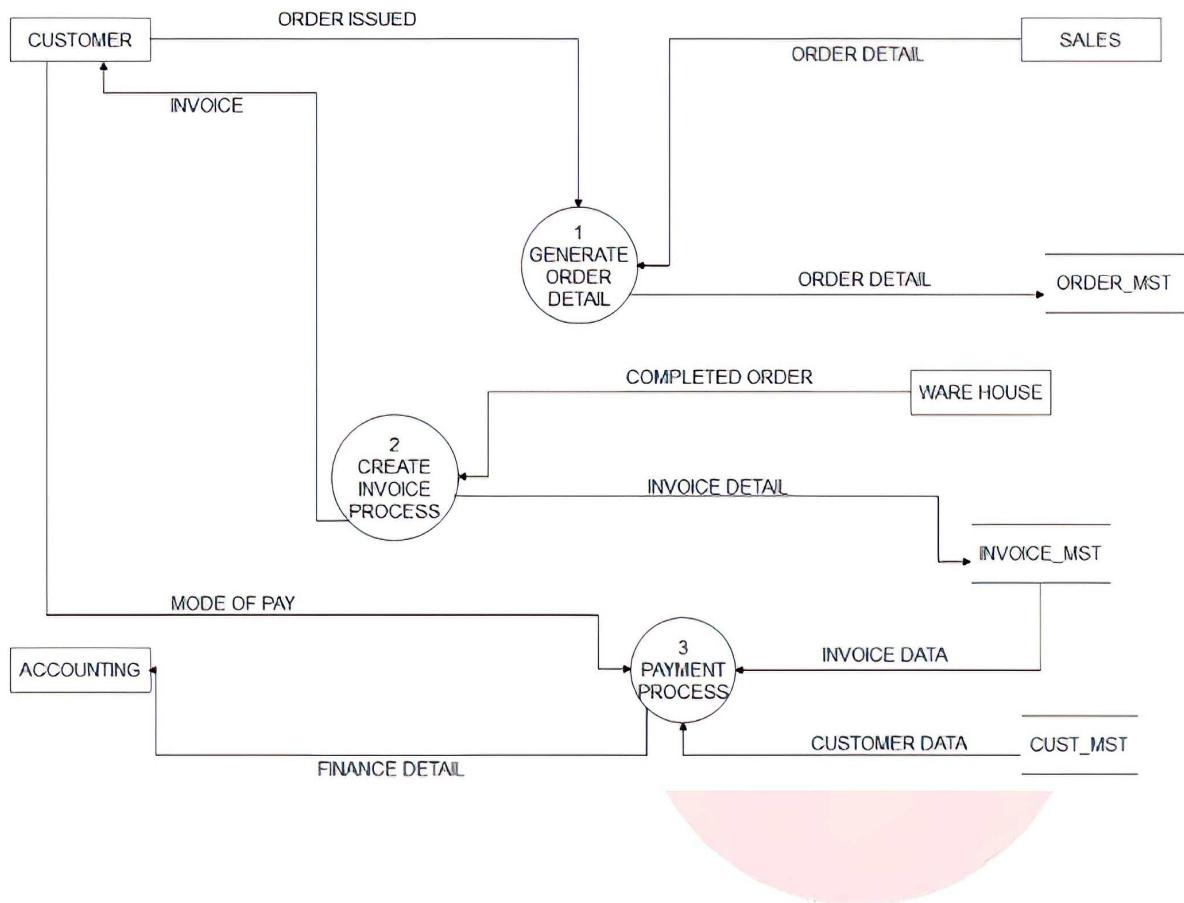
➤ DFD of SALES ORDER Processing

Context Diagram (Sales Order Processing System)

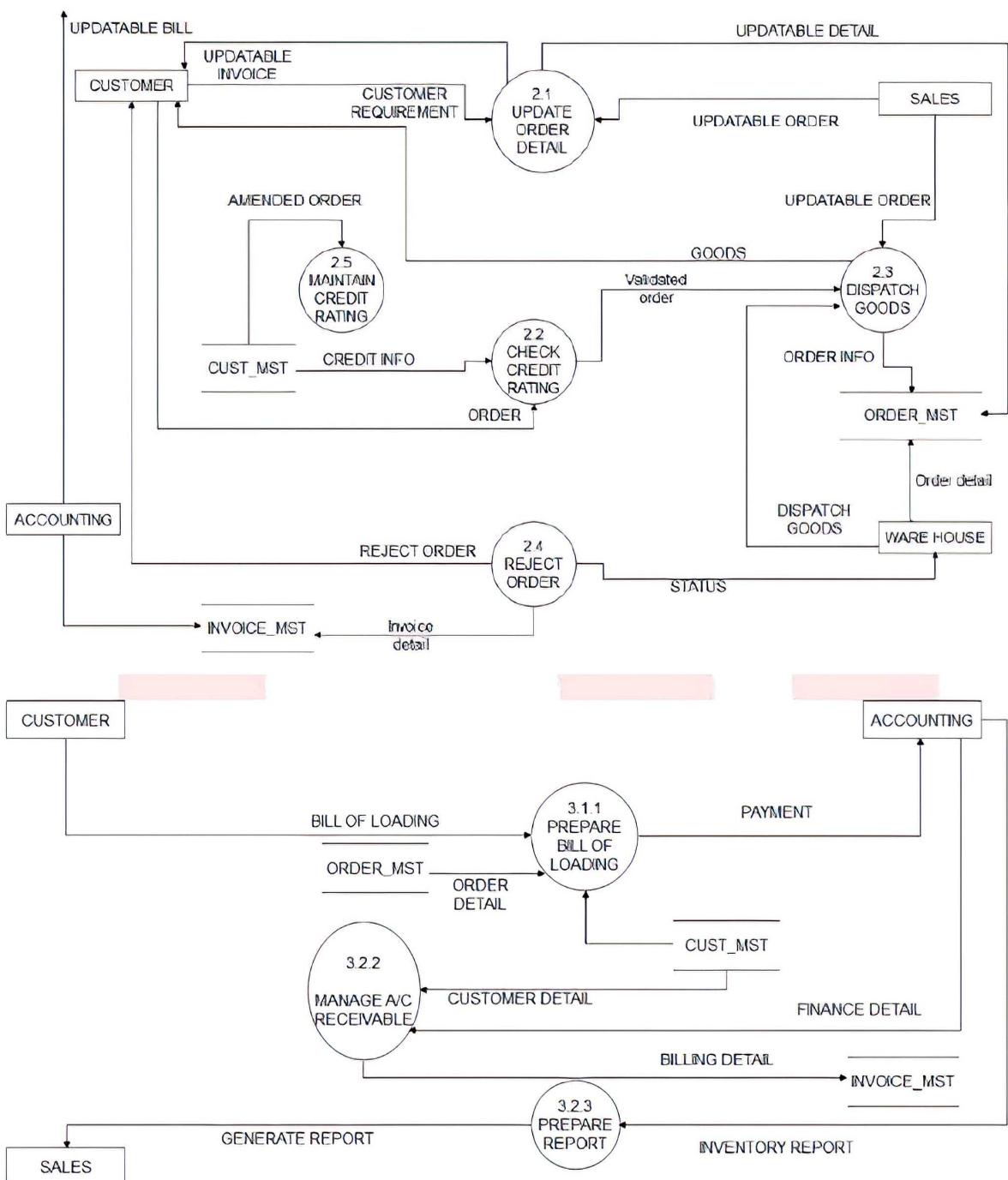


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Level 1 Dataflow Diagram (sales order Processing System)



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Database tables:- Probable tables which can be involved in the sales order processing can be

(1) Master tables: - Customer Master, Product Master, Distributor Master, Warehouse Master

(2) Transaction tables: - Sales order, Product price, sales dispatch, pending order, Invoice/bill, Reject order, cancellation order, goods return, excise /tax table

Modules: - In sales order probable Modules are

1. Order generation
2. Invoice process
3. Dispatch process
4. Payment Process
5. Cancellation/ Reject Order Process
6. Goods Return process
7. Credit Note/ Debit Note generation Process
8. Discount Process

Input Document Involved in sales order are

1. Customer order
2. Order acceptance
3. Delivery Note

Output document involved in sales order are

1. Sales Order
2. Bill of Loading/ Shipment detail
3. Invoice
4. Dispatch Challan
5. Discount Receipt
6. Excise /Tax challan

Types of Reports:

(a) **Schedule Report can be:-**

- 1) Product sale
- 2) Product family
- 3) Sales value
- 4) Sales tax report
- 5) Dealer wise sales
- 6) Distributor wise sales
- 7) Customer sales
- 8) Excise duty
- 9) Zone wise sales

- 10) Area wise sales**
- 11) Inventory detail**
- 12) Receivables**
- 13) Market segment**
- 14) Experts market**
- 15) Goods Returns**
- 16) Bill payment /Pending report**
- 17) Product wise discount report**

(b) Statutory Report :- This are the report which generated in order make to fulfill the compliance of government which are mainly related to tax and duties and that has to submitted to appropriate government authorities which are

- (1) Excise tax register like RG22,**
- (2) Excise tax return.**

(c) MIS Reports can be:-

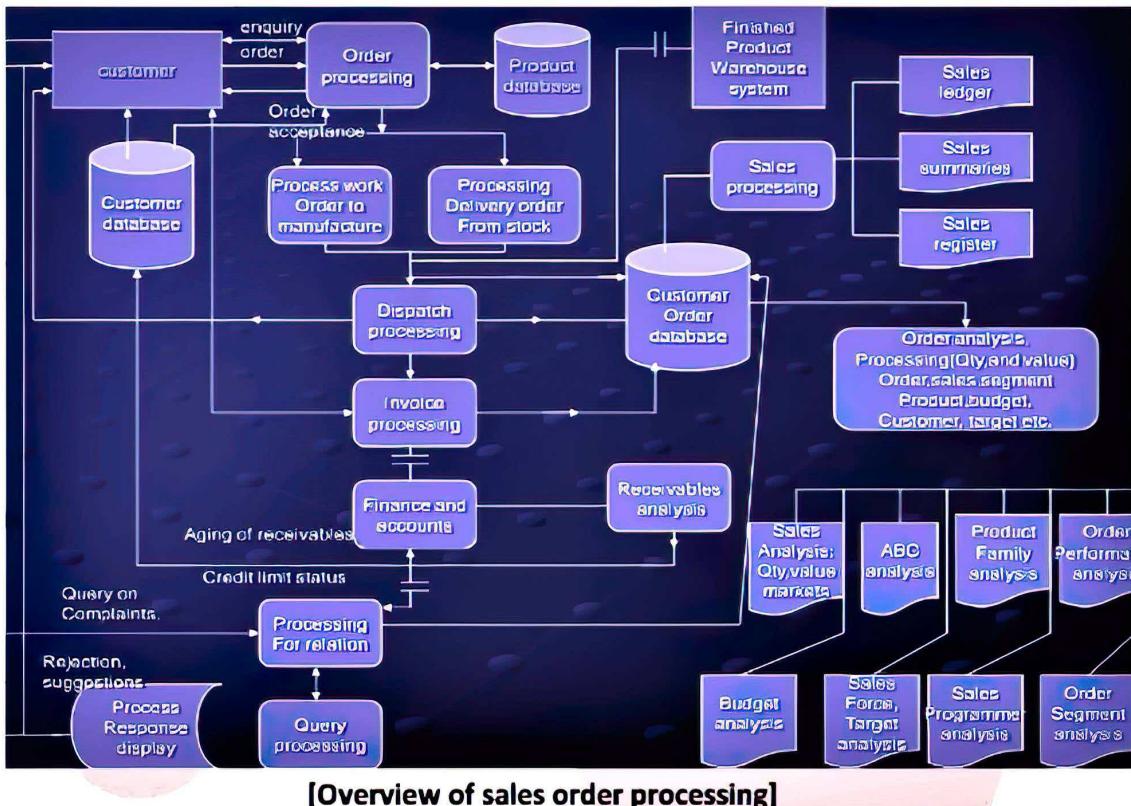
- 1. Product wise, Group Wise Comparison**
- 2. Area wise/Zone wise comparison**
- 3. Budget vs sales performance**
- 4. There some MIS type reports through this system which can be used for knowledge update such as**
 - a. Product sales ledger**
 - b. Sales summaries**
 - c. Accounts receivables**
 - d. Orders received and accepted**
 - e. Sales analysis**
 - f. Aging of receivables**
 - g. Contribution analysis**
 - h. Market analysis**
 - i. Competition analysis**

(d) Some of MIS type of reports through this system can used to take decision analysis can be

- 1. Sales versus Budget,**
- 2. Marketing cost versus Budgeted cost,**
- 3. Product sale versus Target fixed for market segments which can be -**

distributor, dealer, branch and marketing persons,

4. planned sales programmed versus actual sales versus competitor's sales



4.4.2 PURCHASE SYSTEM

- The purchasing transaction processing system is used when an item (such as a chair or software) is ordered to a supplier from a company.
- The activities for purchasing system are:

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- 1) Inventory Control
 - 2) Purchase Order Processing
 - 3) Receiving
 - 4) Accounts Payable

1) Inventory Control:

- ✓ It helps inventory to maintain and keep track of raw materials, packing materials, spare parts, supplies etc.

- ✓ Through this inventory ensures that sufficient raw material, packaging material, maintenance part are available or not. As the items are used, the system updates the item quantity, and produces reports.

2) Purchase Order Processing System:

- ✓ This system helps purchasing departments in completing their transactions quickly and efficiently.
- ✓ The purchasing department can facilitates the buying process by keeping data of supplier's goods and services.
- ✓ Telecommunication, internet, public networks allows purchasing manager to compare price, products and do this purchase order processing efficiently.
- ✓ Once supplier is selected, the supplier's computer gets directly connected to buyer's system, orders can be sent by an EDI which reduces purchasing cost, time, and efforts.
- ✓ Before issuing a purchase order, company policies such as charged account number, required signatures, order limit etc are checked.
- ✓ Purchase order can be delivered electronically to the supplier.
- ✓ A copy of the purchase order is forwarded to the receiving system to compare with the invoice when items will be received.

3) Receiving System:

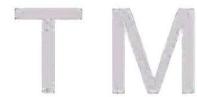
- ✓ Receiving department is responsible for taking control of all incoming items, inspecting them, routing them to the people or department that ordered them.
- ✓ This department notifies the purchasing department when items have been received.
- ✓ Notification can be done by receiving report or electronically by business transaction created by entering data in to the receiving TPS.
- ✓ Receiving departments do quality control by inspection, whose procedure and practices are set.
- ✓ Suppliers sent customers advance shipment notice. In addition items have bar codes for item checking and reading, to improve accuracy and fewer efforts.

- ✓ This system creates record of expected and actual received items.
- ✓ A receiving system typically updates the inventory to keep the inventory status current.
- ✓ Received items are checked and a receiving transaction is forwarded to the accounts payable system.

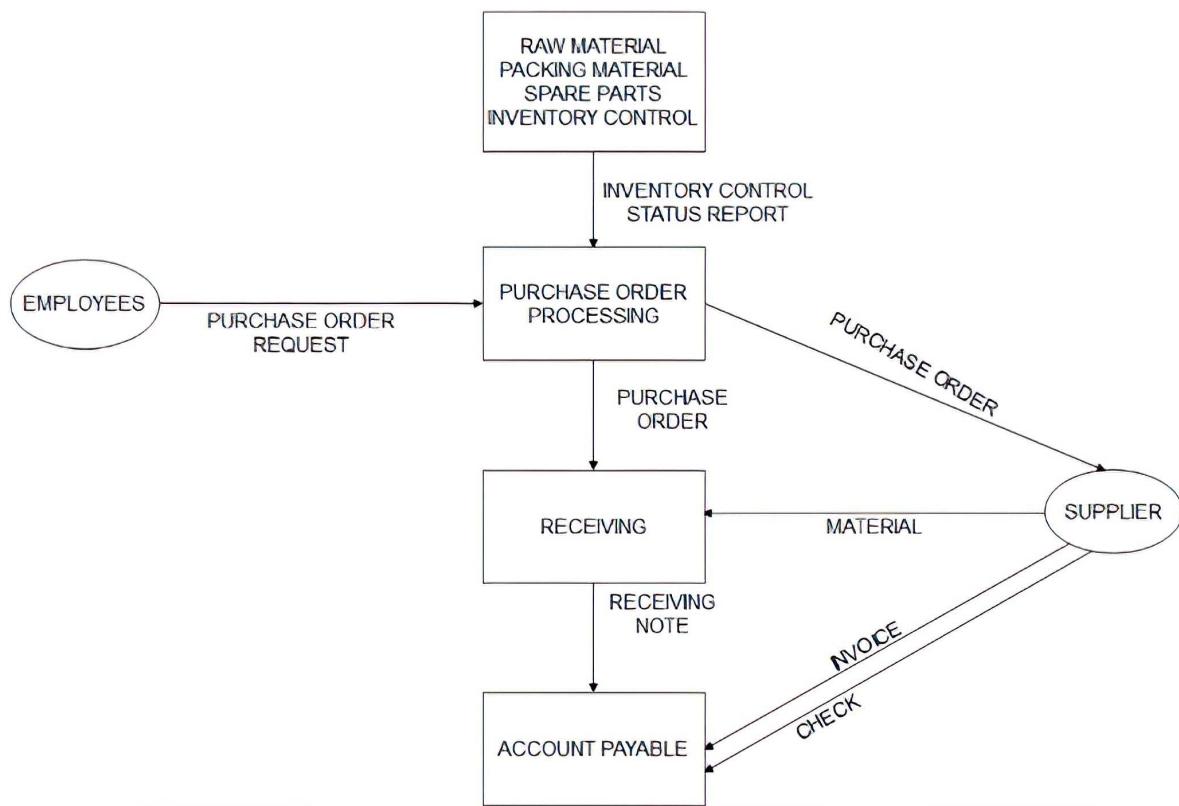
4) Accounts payable system:

- ✓ This system that increases an organization's control over purchasing, improves cash flow, increases profitability, and provides more effective management of current liabilities.
- ✓ Once the accounts payable department receives a bill from supplier, the bill is verified and checked for accuracy.
- ✓ After satisfaction data is entered into the accounts payable application.
- ✓ In addition to check, payments can be made also with EDI, internet or other electronic payment system.
- ✓ A bill from a supplier initiates the verification of received items and in turn the system creates a check for the supplier.

The system also prints purchase journal which itemizes all purchases for a period. This journal is generated by accounts payable application, this report summarizes an organization's bill paying activities for a particular period.

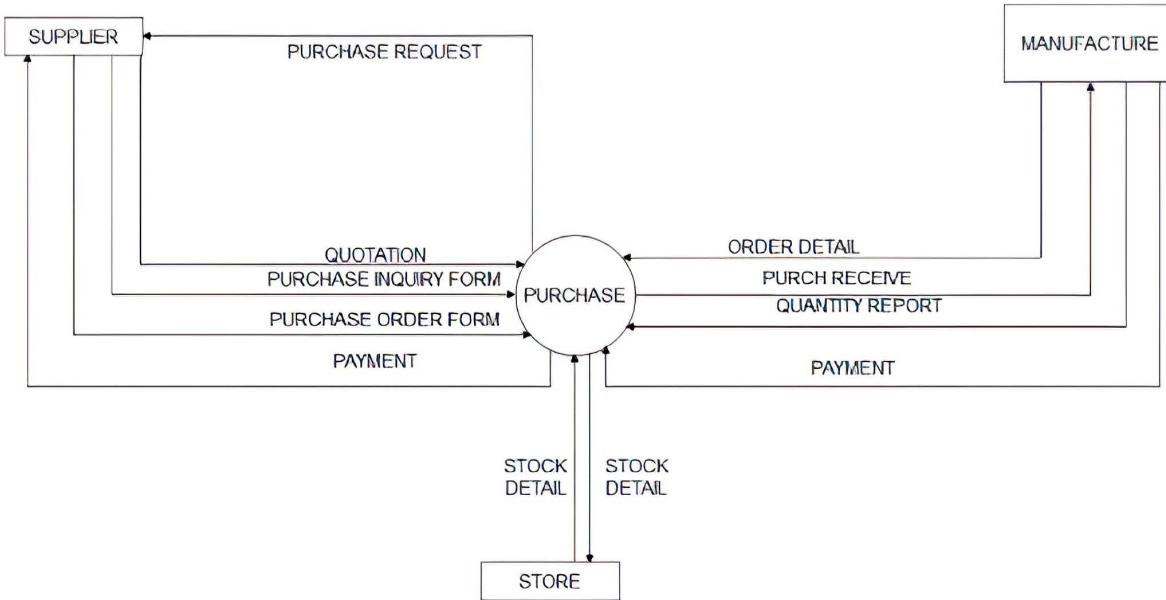


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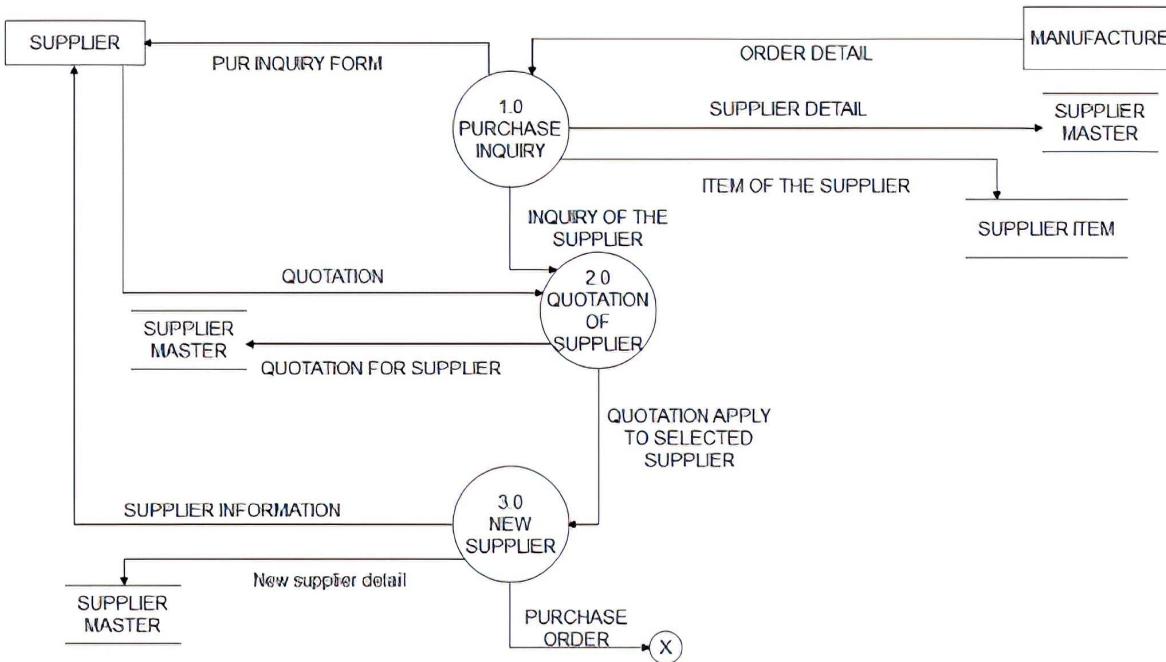
- Employees place purchase order requests in response to shortages identified in inventory control reports. Purchase order information flows to the receiving system and accounts payable systems.
- A record of receipt is created upon receipt of the items ordered. When the invoice arrives from the supplier, it is matched to the original order and the receiving report, and a check is generated if all data is complete and consistent.

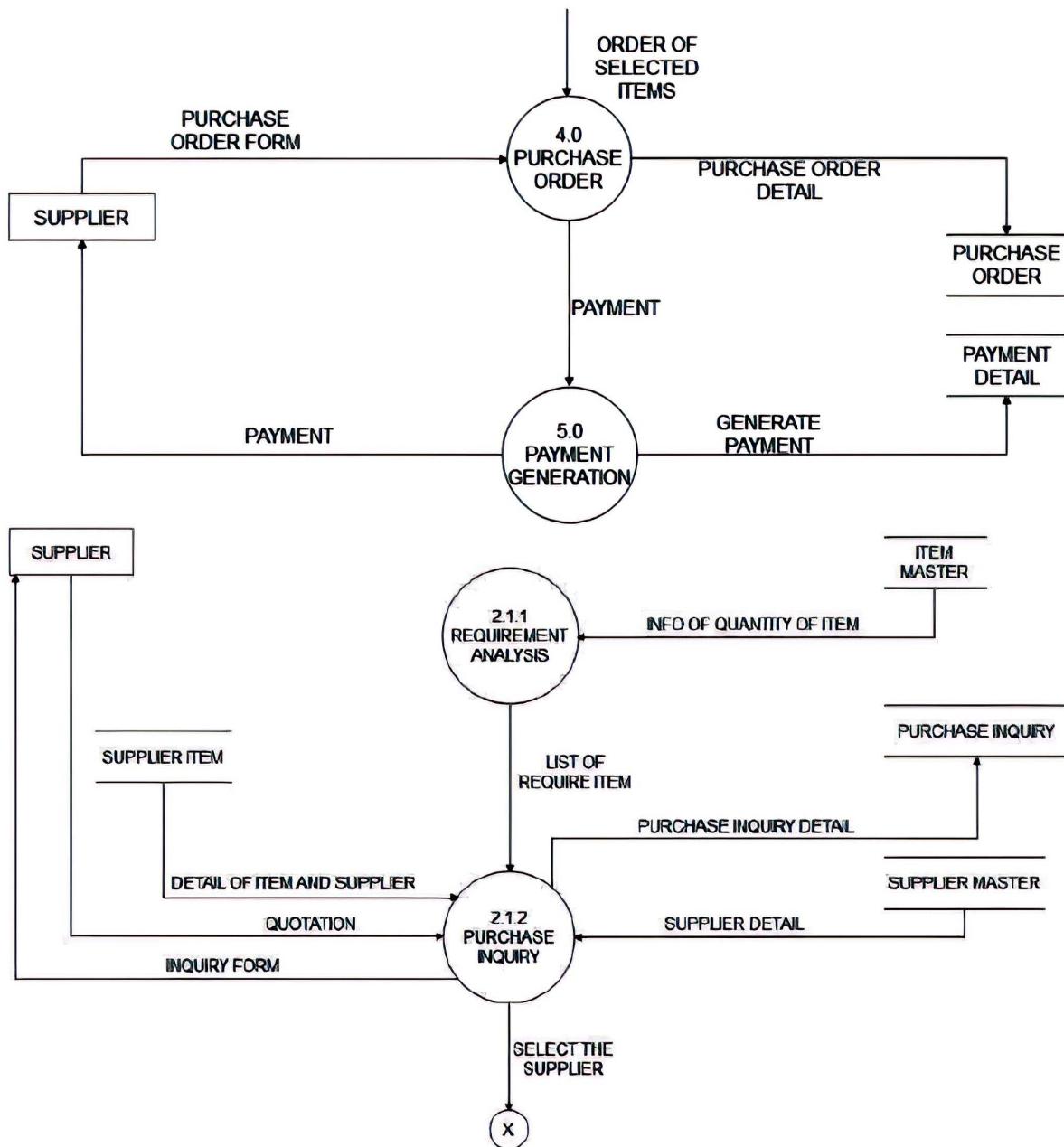
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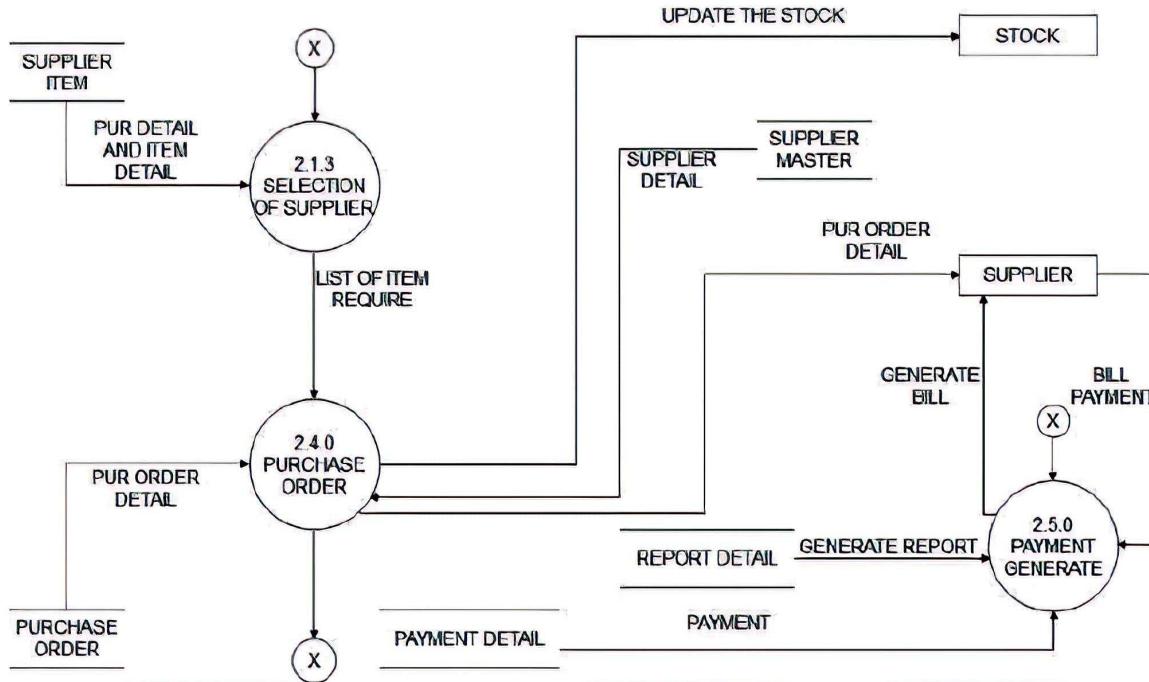


Context Level Diagram (0 Level)

Level 1 DFD (Purchase Order System)







Purchase System is effectively inter depended on inventory management system, Account payment system and also Manufacturing system. Some of the modules of these systems may overlap on each other.

Database: - Probable database tables involved in purchase system can be:-

- a) Supplier master table
- b) Item master table
- c) Material issue table
- d) Purchase order table
- e) Payment detail
- f) Quotation (Statement of price) detail
- g) Requirement table
- h) Goods return table
- i) Rejection table
- j) Supplier Contract table

Module: - Modules involved can be

1. Inventory
2. Requirement

- 3. Quotation
- 4. Purchase order
- 5. Goods receipt
- 6. Goods Inspection
- 7. Goods Returns and Rejection Module
- 8. Account Payable (Bill Passing)

Through above sub module different functional needs of accounting, decision making and control can be fulfilled in purchase system.



Input Documents Involves in purchase system may be

- 1. Purchase requisition
- 2. Quotation
- 3. Receipt challan of goods received
- 4. Returns of goods to supplier
- 5. Inspection Reports
- 6. Bill of purchase order received from supplier

Output Documents Involves in this system can be

- 1. Purchase order
- 2. Payment detail
- 3. Goods return receipt
- 4. Goods inspection receipt.

Types of Reports:

(a) Schedule Report can be daily/monthly/six monthly/yearly :-

- 1. Item wise purchase report
- 2. item wise requirement
- 3. item wise quotation report
- 4. Purchase detail
- 5. supplier wise purchase detail
- 6. Goods received register
- 7. Goods reject report
- 8. Goods inspection report
- 9. Goods return report
- 10. Short supply stock
- 11. Report on purchase requisition received but not converted to purchase order

- 12.** Statement of payment due to supplier
- 13.** Statement of item due but not received

(b) Statutory Report :- This are the report which generated in order make to fulfill the compliance of government which are mainly related to tax and duties and that has to submitted to appropriate government authorities which are

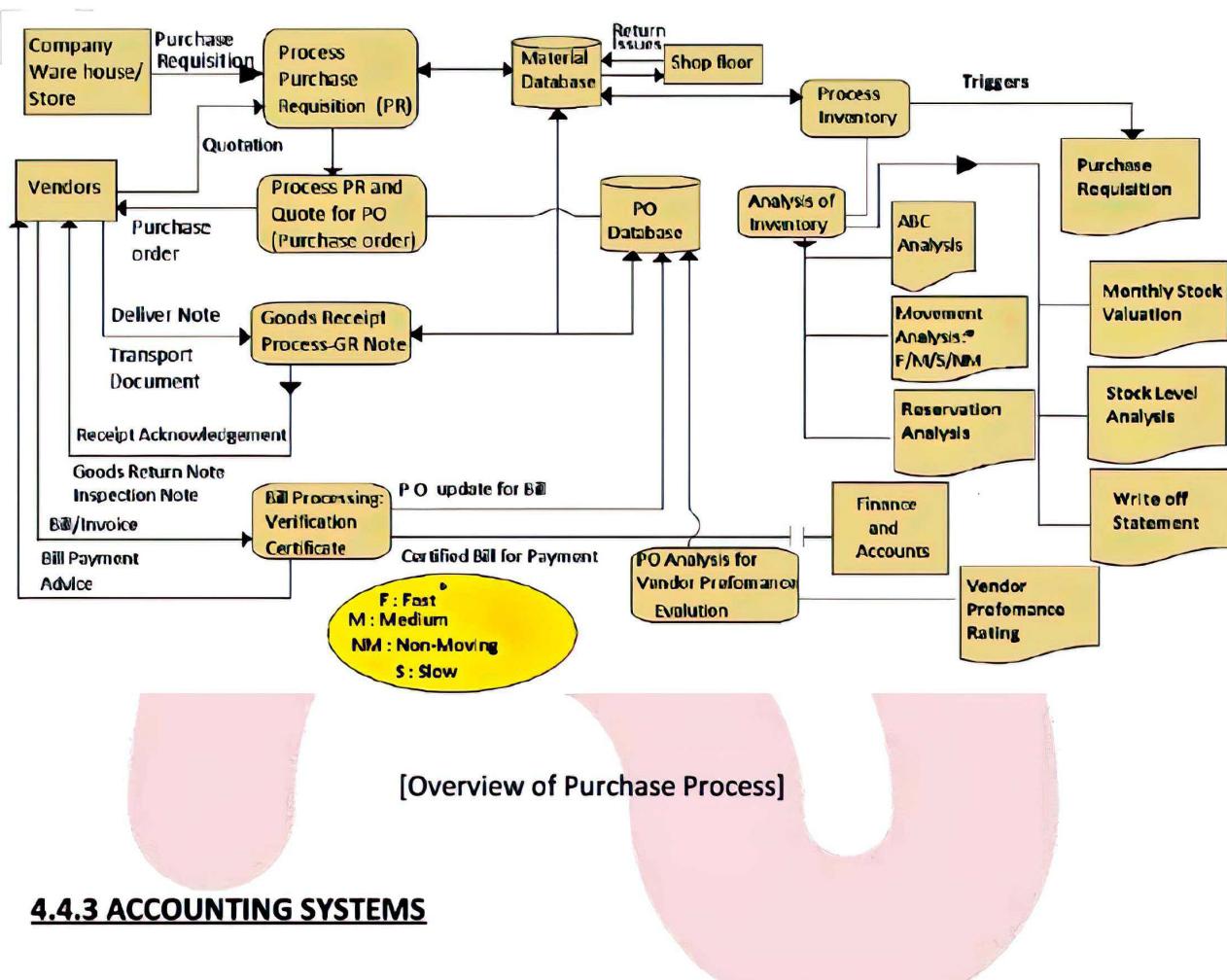
- 1.** Stock value statement
- 2.** Excise duty return statement
- 3.** Custom bond register
- 4.** Return on tax deduced at source

(c) MIS Reports can be:-

- 1.** Price fluctuation and trend
- 2.** New suppliers and sources of supplier
- 3.** Performance of suppliers
- 4.** Value of non moving item
- 5.** Price trends of high value and high purchase rate item
- 6.** Excessive delay in purchase of item
- 7.** Excessive delay in inspection of item
- 8.** Reliability of supplier
- 9.** Vendor performance
- 10.** Fast, medium, slow moving item

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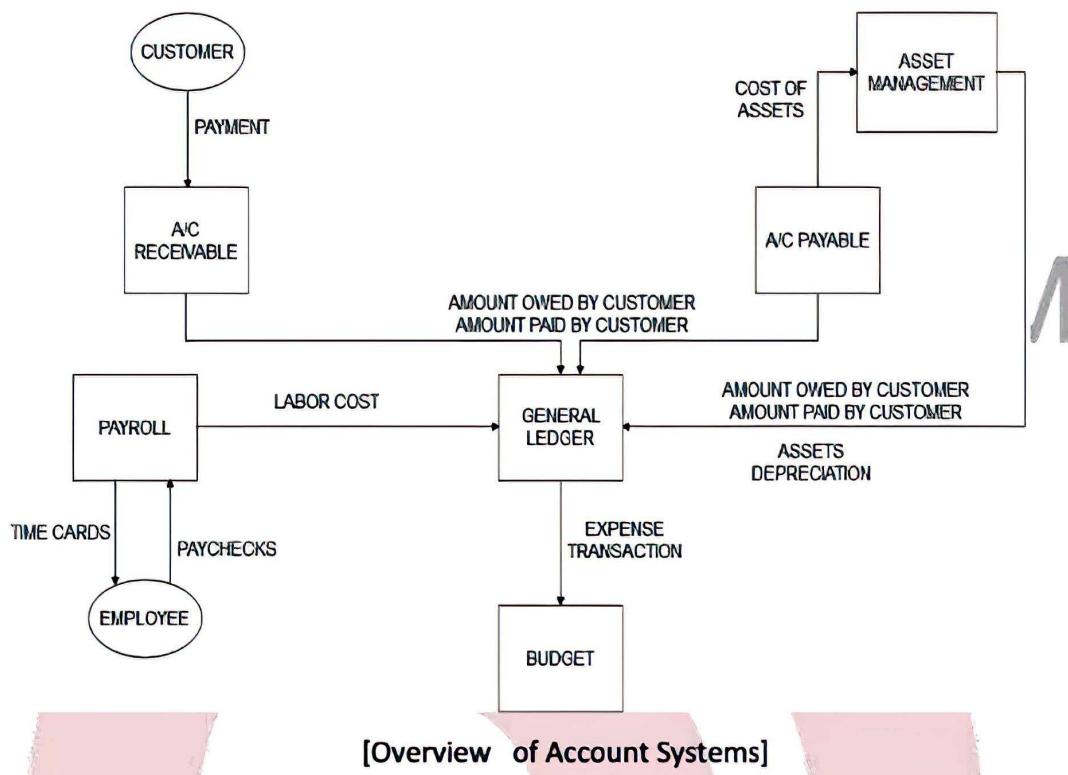
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4.4.3 ACCOUNTING SYSTEMS

The accounting systems must track the flow of data related to all the cash flows that affect the organization. The activities for accounting system are:

- 1) Budget
- 2) Accounts Receivable
- 3) Payroll
- 4) Asset Management.
- 5) Account Payable
- 6) General Ledger



1) Budget transaction processing system:

- ✓ A budget is a financial plan that identifies items amount that the organization estimates it will spend.
- ✓ Budgeting can be an expensive and time consuming process.
- ✓ Automating the budget saves time, ensures consistent budget and monitors well.

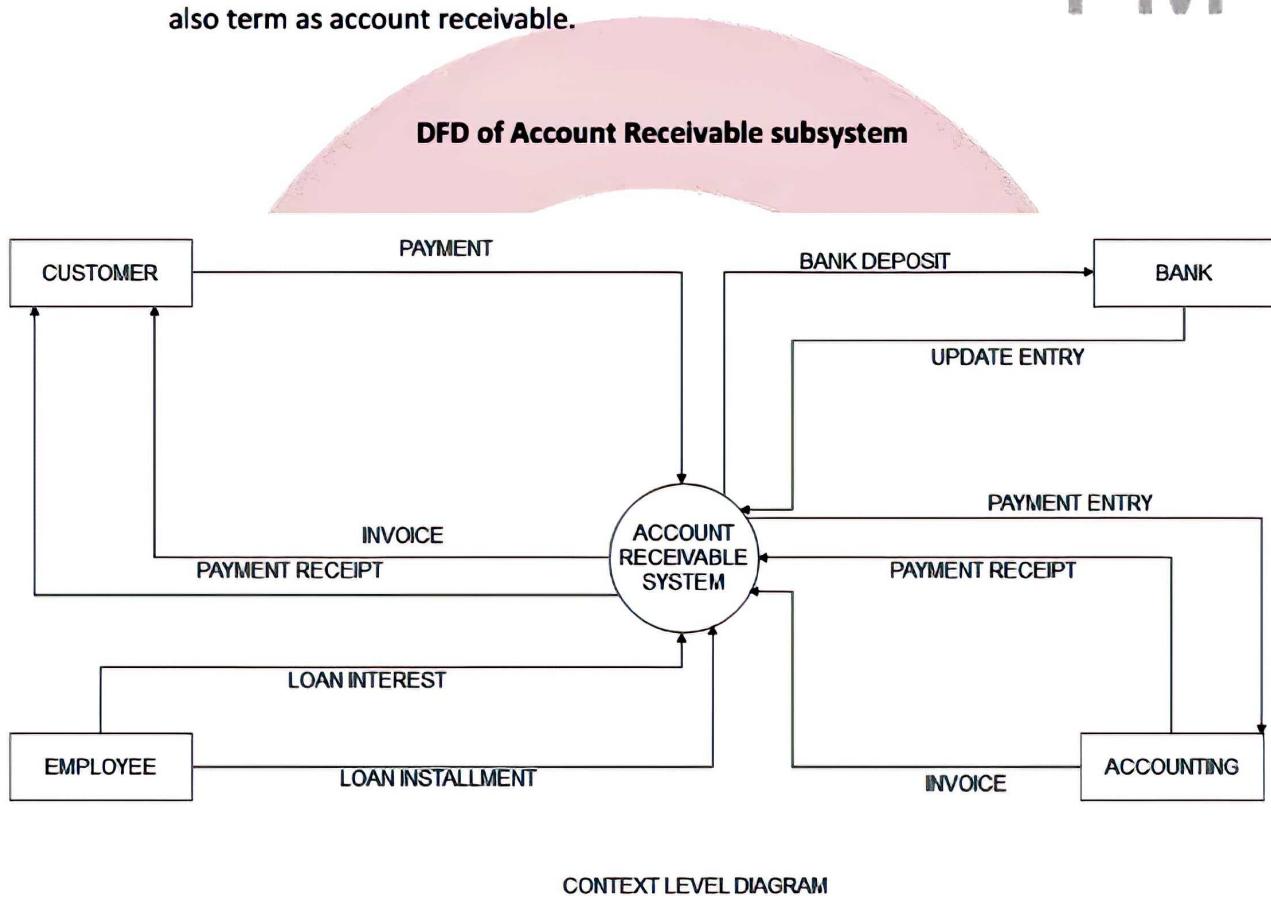
2) Accounts receivable system:

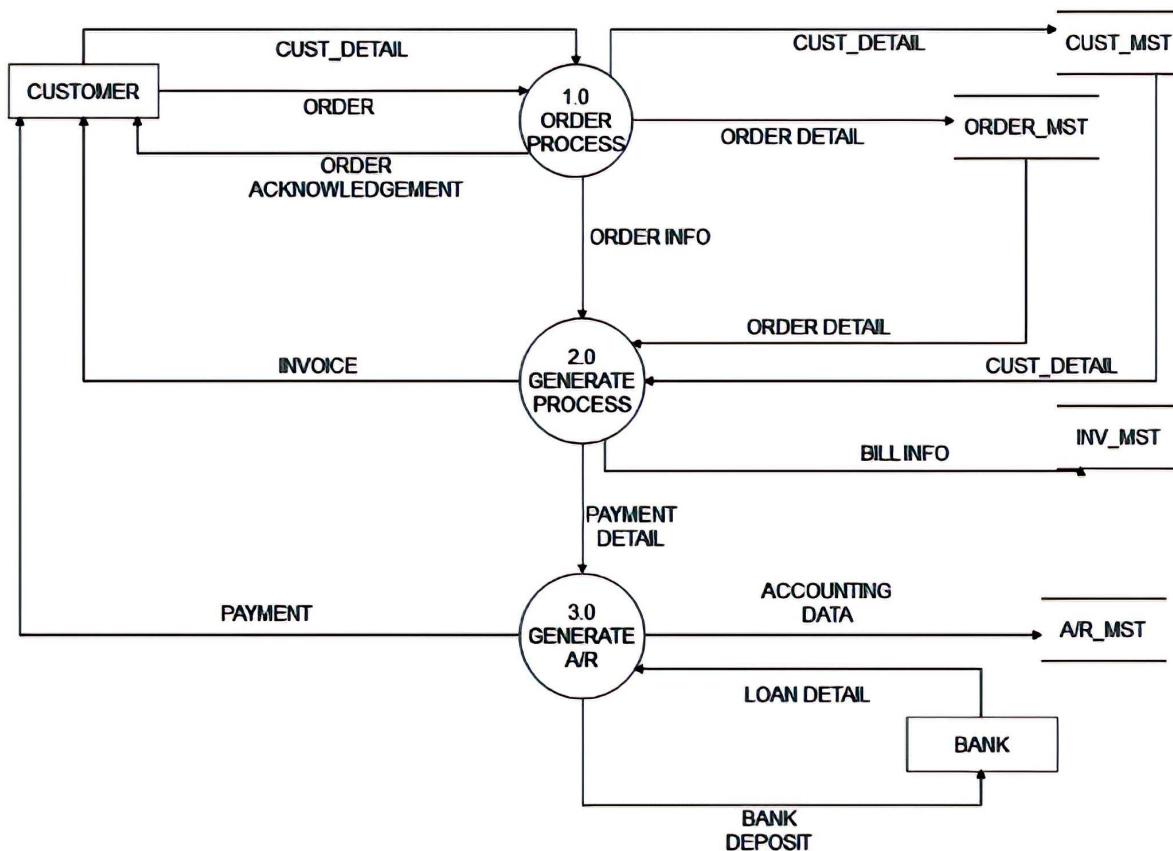
- ✓ A system that manages the cash flow of the company by keeping track of the money paid by the customers and other companies for goods and services sold to them.
- ✓ The major output of the accounts receivable system is monthly bills or statement sent to the customers.
- ✓ Transactions created by accounts receivable system updates general ledger accounts.
- ✓ It is also used to generate reports for “aged” accounts, for which payments are over due by 30, 60, or 90 days. Reminder notices are created for these accounts. Aging report tells managers what bills are overdue, either customer by customer or in a

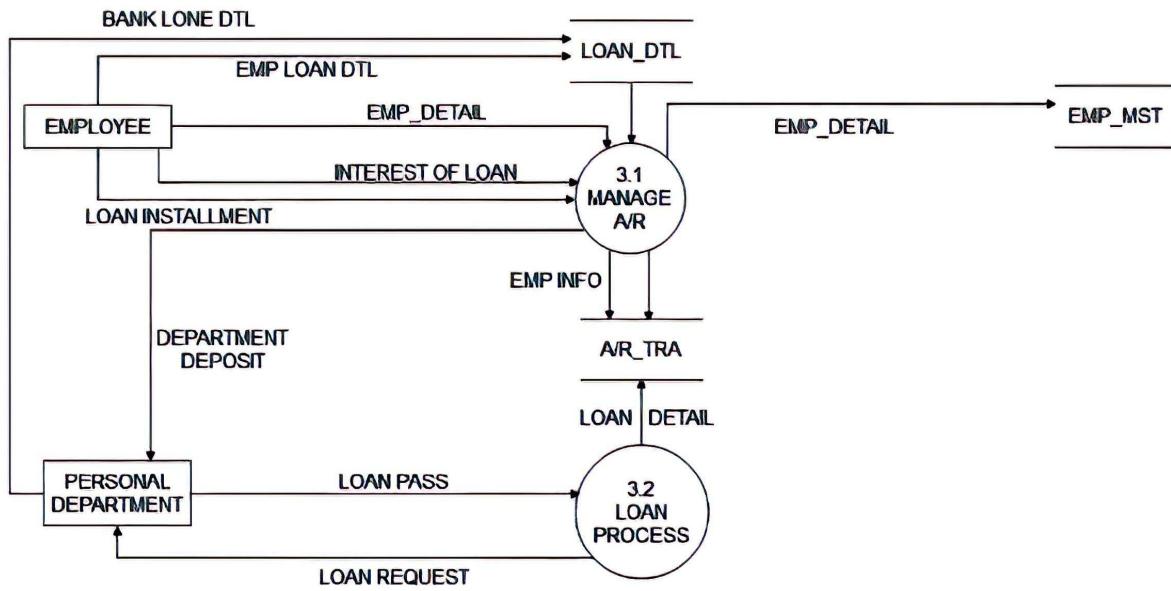
summary format.

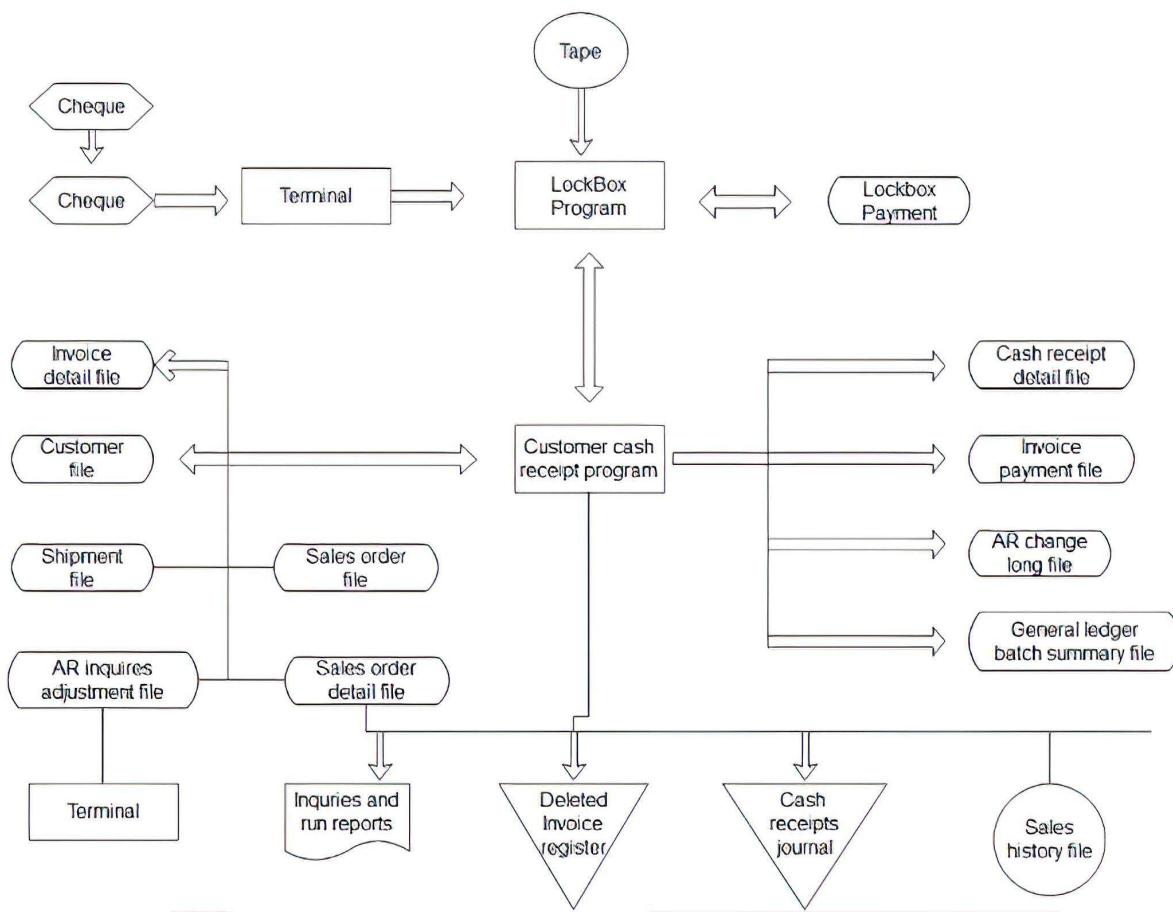
- ✓ Account receivable also maintains Amount received in terms of Loan from Bank, and financial institute. Interest earned by the company from various asset is also maintain in account receivable.
- ✓ Employee Loan repayment or Advance amount received by employee which repaid is also term as account receivable.

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1st LEVEL DATAFLOW DIAGRAM

2nd LEVEL DIAGRAM OF MANAGE A/R



3) Payroll system:

- ✓ Generates payroll checks and payroll register, as well as TDS and form 16 statements at the end of the year for tax purposes as output.
- ✓ In addition, payroll processing produces employee journal containing various earning factors such as leaves taken, all deductions, increment, credits, gross pay etc.
- ✓ A typical pay check register details the employee's hours worked for the period, salary, vacation pay, federal and state taxes withheld, and other deductions.
- ✓ Payroll journal is a report that contains employee's names, the record where employee worked during a week, hours worked, the pay rate, a premium factor for overtime pay, earnings, earning type, various deductions and net pay calculations

done.

- ✓ A payroll journal generated by the payroll application, this report helps managers to monitor total payroll costs for an organization and the impact of those costs on cash flow.

4) Asset management transaction processing system:



- ✓ The asset management transaction processing system controls investments in capital equipment and manages depreciation for maximum tax benefits.
- ✓ This include efficient handling of a wide range of depreciation methods, country specific tax reporting and depreciation structures for various countries where firm does business, and work flow managed processes to easily add, transfer and retire assets.

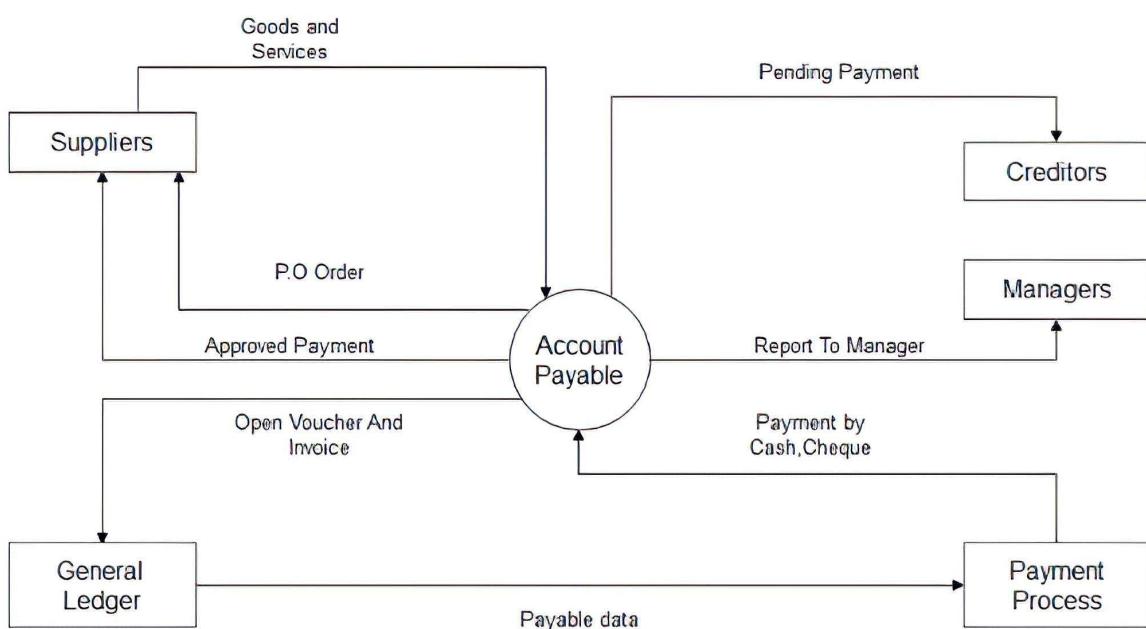
5) Account payable System

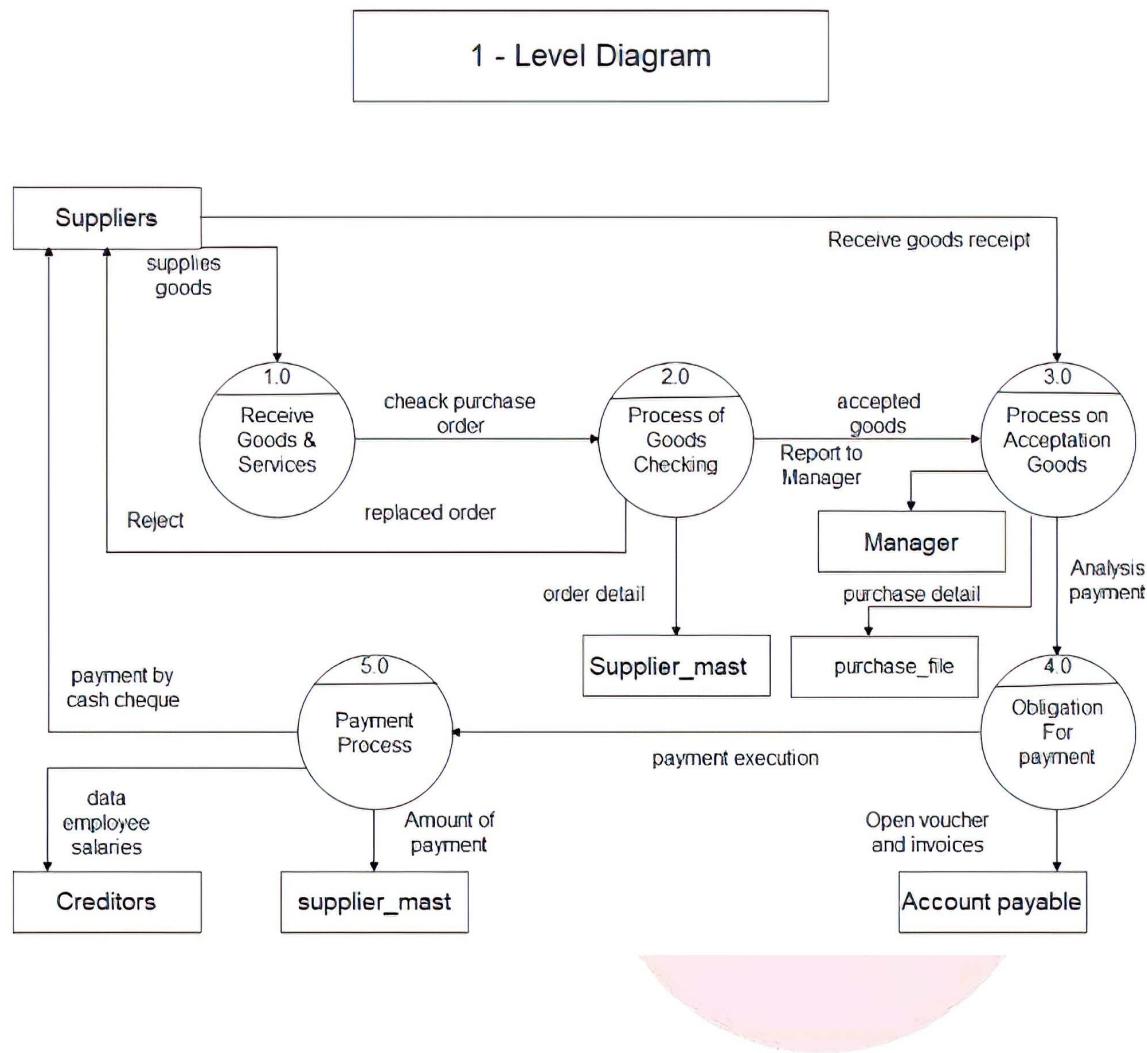
- ✓ In this subsystem Payment to be made by the organization in various capacity such purchase payment, Payment to be made to Employee, contractor, Bank, government, Financial institute
- ✓ Let us discuss about sub system of purchase payment that increases an organization's control over purchasing, improves cash flow, increases profitability, and provides more effective management of current liabilities.
- ✓ Once the accounts payable department receives a bill from supplier, the bill is verified and checked for accuracy.
- ✓ After satisfaction data is entered into the accounts payable application.
- ✓ In addition to check, payments can be made also with EDI, internet or other electronic payment system.
- ✓ A bill from a supplier initiates the verification of received items and in turn the system

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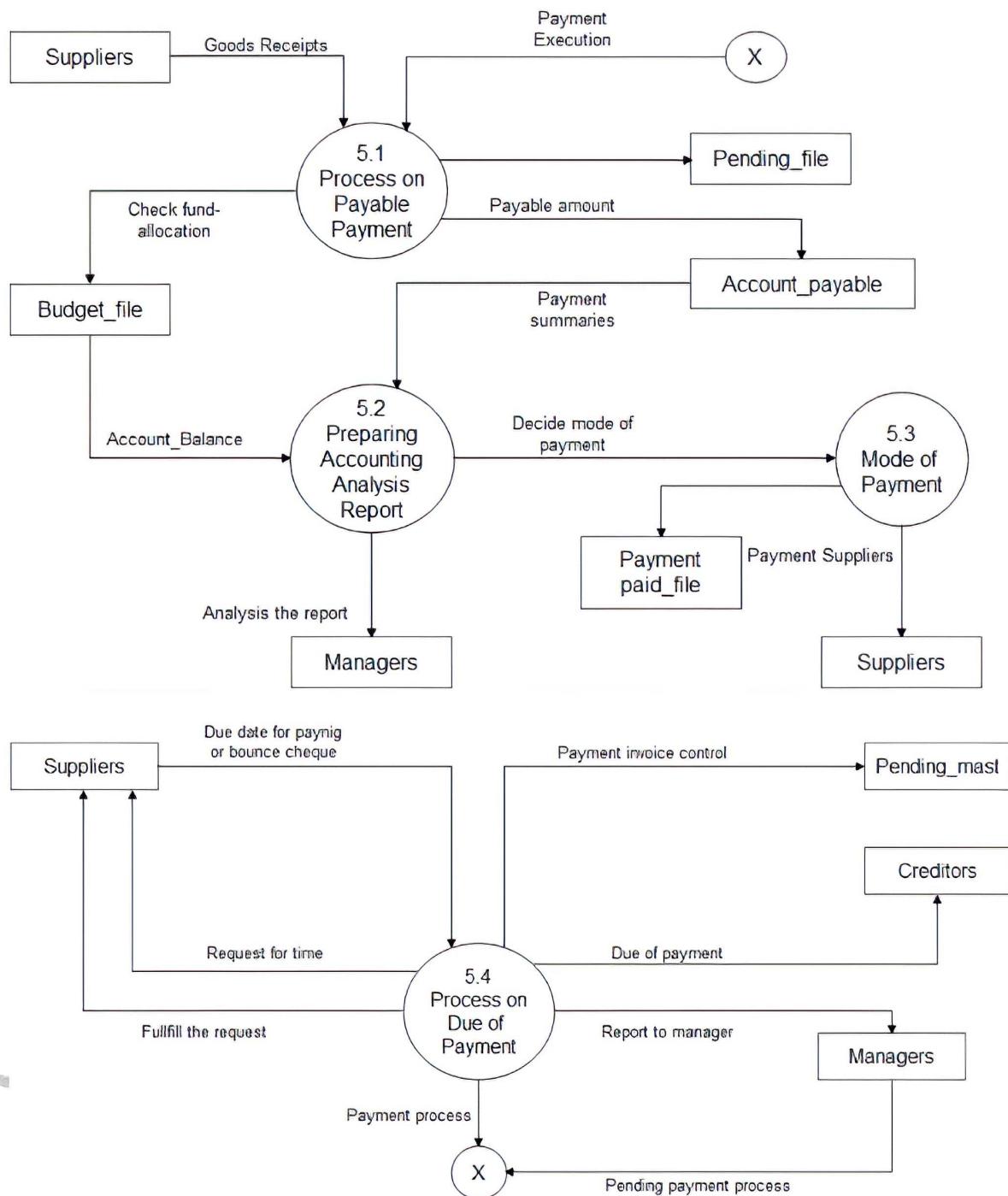
creates a check for the supplier.

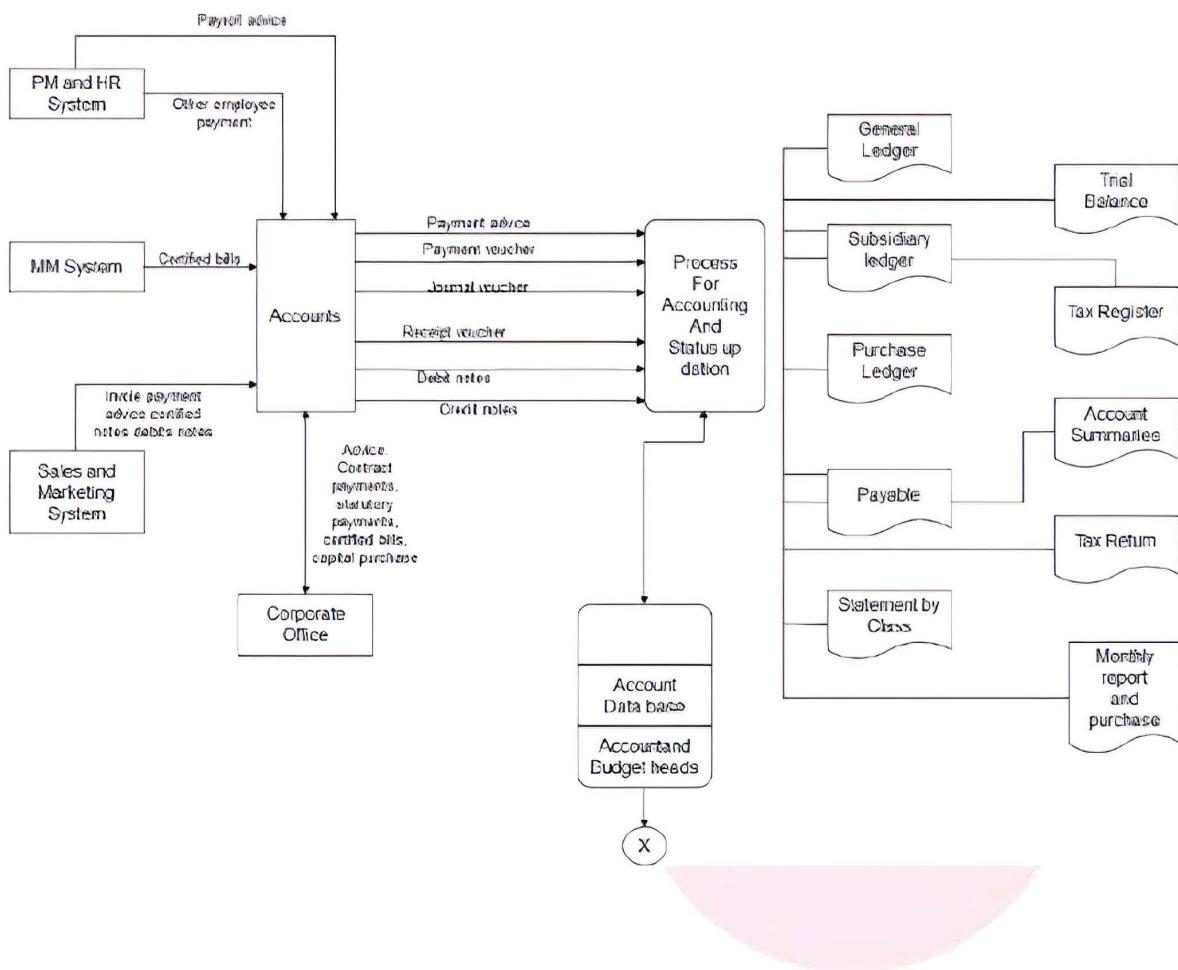
- ✓ The system also prints purchase journal which itemizes all purchases for a period. This journal is generated by accounts payable application, this report summarizes an organization's bill paying activities for a particular period
- ✓ In Payment to be made to employee will be in form of salary, bonus, overtime amount, advance amount which done monthly. Here for every employee account is maintained.
- ✓ While in Payment to make to various Bank includes Loan repayment by the organization, fixed deposit done by the organization.
- ✓ In Payment to be made to government includes Taxes, excise duties to be submitted to government, Tax deductions amount of employee, supplier which is to be deposited to government. Also payment to be done to PF and ESI to PF office and ESI.
- ✓ **DFD of Account Payable sub system**



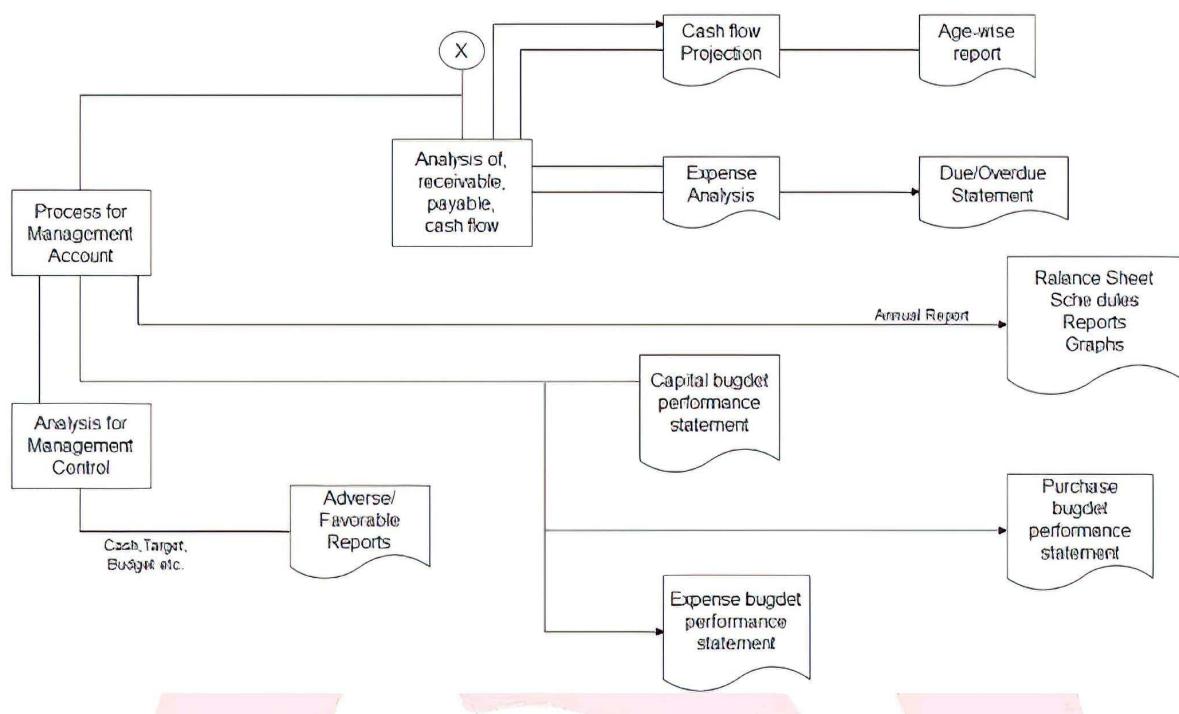


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6) General ledger system:

- ✓ Every monetary transaction that occurs within firm must be properly recorded.
- ✓ Payment of supplier's invoice, receipt of payment from customer and payment to an employee are examples of financial transaction
- ✓ It is a system that produces a detailed list of all business transactions and activities.
- ✓ General ledger system designed to automate financial reporting and data entry.
- ✓ Reports include profit and loss statements, balance sheets, general ledger statements etc. various income and expense accounts can be generated for the current period, year to date and month to date as required.
- ✓ The reports generated by the general ledger application are used by accounting and financial managers to monitor the profitability of the organization and to control cash flow.

- The order processing system generates an invoice for customer orders to include with the shipment. This information is also sent to the accounts receivable system to update the customer's account. When the customer pays the invoice, the payment information is also used to update the customer's account.
- The necessary accounting transactions are sent to the general ledger system to keep track of amounts owed and amounts paid.
- Similarly, as the purchasing systems generate purchase orders and those items are received, information is sent to the accounts payable system to manage the amounts owed by the company.
- Data about amounts owed and paid by customers to the company and from the company to vendors and others are sent to the general ledger system that records and reports all financial transactions for the company.

Input Documents Involves in account can be

- a) sales bill
- b) Employee payment slip
- c) Bank slip
- d) payment slip to supplier, employees, shareholder, financial institute
- e) Receipts from customer, government authorities, financial institutions

Output Documents Involves in this system can be

- a) Bank deposit /payment receipt
- b) Investment detail
- c) Government challan/receipt

Types of Reports:

- (a) Schedule Report can be daily/monthly/six monthly/yearly :-
- a) Salary/wages statement
- b) Capital Purchase statement

- c) Fixed deposit statement
- d) Budgets statement
- e) Fixed Assets
- f) Sales tax/ excise duty /Income tax statement
- g) Trial Balance, Balance Sheet , Profit and Loss statement
- h) Cash Position statement
- i) Stock valuation statement
- j) Creditor/debtor statements
- k) Account Payables and aging
- l) Account Receivable and aging

(b) Statutory Report :- This are the report which generated in order make to fulfill the compliance of government which are mainly related to tax and duties and that has to submitted to appropriate government authorities which are

- a) Tax Returns
- b) Register like Sales tax, Excise , TDS at source
- c) Declaration of financial result to financial institute and government

(c) MIS Reports can be:-

- a) Break even analysis for cost and price decision
- b) Return on investment
- c) Cash flow, source and use of flows
- d) Budget Analysis
- e) Creditor/Debtors analysis and aging
- f) Capital Budgeting and ranking of investment
- g) Current and fixed Assets analysis
- h) Current Liabilities Statement
- i) Overdue Receivable /Payable

RELATIONSHIP BETWEEN TPS & MIS:

Transaction Processing System (TPS) is a type of system which usually helps an organization to handle its daily business operations and transactions in an efficient and effective manner by processing and recording each operation.

A transaction is an occurrence in which goods, services, or money is passed from one person, account, etc., to another. Such operations/transactions may include customer orders, purchase orders as well as handling of invoices.

A TPS is therefore responsible for collecting, storing, modifying and retrieving data pertaining to the transactions that have taken place in an organization and finally generate reports which are used by other levels of management. The characteristics of a TPS include performance, reliability and consistency.

Transaction Processing Systems are usually used at the operational level (by employees who are at the bottom level) of an organization's hierarchy as shown on Figure below.

An example of a TSS is a point of sale in a supermarket such as Big bazaar which is used to record each sale transaction which takes place in the supermarket. At the end of the day, a record of all transactions can be generated from the TPS in order to view which products have been sold.

Management Information System (MIS) is a system which brings together people (the management), information as well as the systems (both hardware and software). This type of system is important in an organization as it provides information that is essential to operations, management and decision making functions.

Some of these functions include planning, controlling, decision making, organizing, and staffing. Management Information Systems are usually used at the tactical level (by employees who are at the middle level) of the organization's management hierarchy

- The TPS is the major source of data for other systems in an organization. Since they record daily routine transactions in an organization, they aid managers in monitoring the status of the operations and thus help in structured decision-making.
- MIS usually receive and utilize the data they get from the TPS. The ESS is the major recipient of data from the lower-level systems which is mainly used in unstructured decision-making.

4.4.4 MIS SYSTEM CASE STUDY

FINANCIAL MIS

- An information system that provides financial information not only for executives but also for a broader set of people who need to make better decisions on a daily basis.
- Most financial MIS performs the following functions:



- ✓ Integrate financial and operational information from multiple sources, including the Internet, into a single system.
- ✓ Provide easy access to data for both financial and nonfinancial users, often through the use of a corporate intranet to access corporate Web pages of financial data and information
- ✓ Make financial data immediately available for analysis of turnaround time.
- ✓ Enable analysis of financial data along multiple dimensions—time, geography, product, plant, and customer
- ✓ Analyze historical and current financial activity.
- ✓ Monitor and control the use of funds overtime.

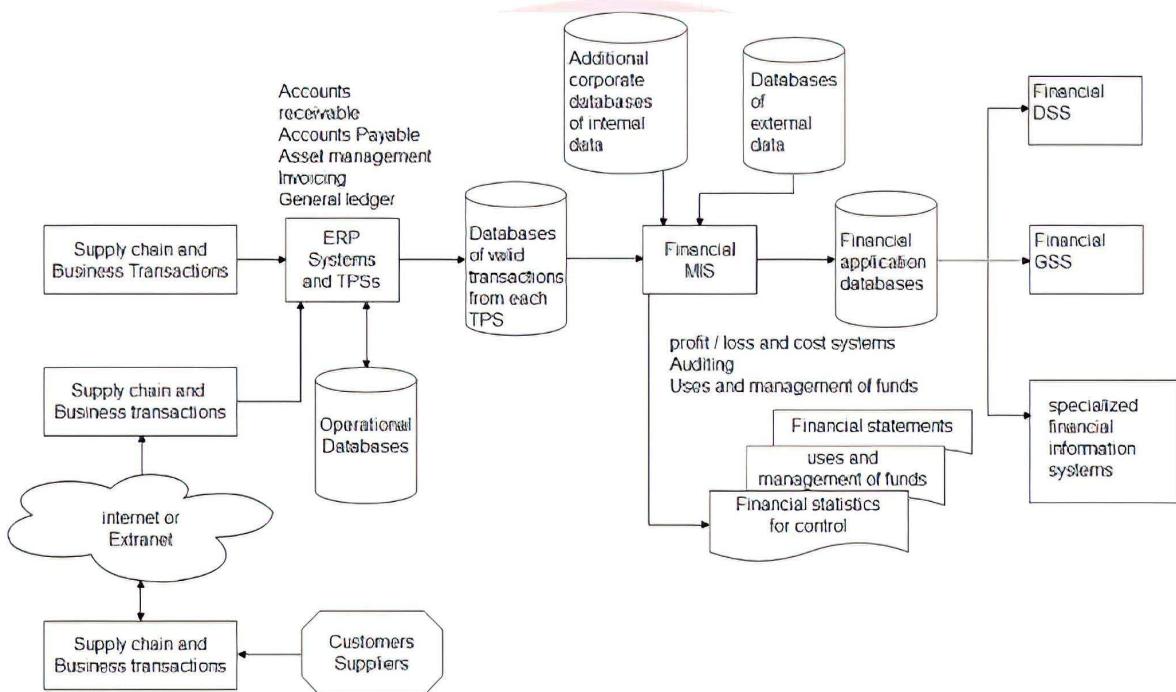
Following Figure shows typical inputs, function-specific subsystems, and outputs of a financial MIS, including profit and loss, auditing, and uses and management of funds. Some of the financial MIS subsystems and outputs are outlined below.

1. Profit/Loss and Cost Systems:

- Many departments within an organization are a profit center, which means that they focus on generating profits. An investment division of a large insurance or credit card company is an example of a profit center.
 - Other departments can be revenue centers, which are divisions within the company that focus primarily on sales or revenues, such as a marketing or sales department.
 - Still other departments can be cost centers, which are divisions within a company that do not directly generate revenue, such as manufacturing or research and development.
- In most cases, information systems are used to compute revenues, costs, and profits.

2. Auditing:

- Auditing involves analyzing the financial condition of an organization and determining whether financial statements and reports produced by the financial MIS are accurate, for this purpose internal auditing is performed by individuals within the organization.
- For example, the finance department of a corporation might use a team of employees to perform an audit. External auditing is performed by an outside group.



3. Uses and Management of Funds:

- Internal uses of funds include
 - Purchasing additional inventory,
 - Updating plants and equipment,
 - Hiring new employees,
 - Acquiring other companies,
 - Buying new computer systems,
 - Increasing marketing and advertising,
 - Purchasing raw materials or land,

- h) Investing in new products,
 - i) Increasing research and development.
- **External uses of funds** are typically investment related. Companies often invest excess funds in such external revenue generators as
 - a) Bank accounts,
 - b) Stocks,
 - c) Bonds,
 - d) Bills,
 - e) Notes,
 - f) Futures options,
 - g) Foreign currency using financial MIS.

MANUFACTURING MIS

- The manufacturing MIS is used to monitor and control the flow of materials, products, and services through the organization.
- As raw materials are converted to finished goods, the manufacturing MIS monitors the process at almost every stage. New technology could make this process easier.
- Using specialized computer chips and tiny radio transmitters, companies can monitor materials and products through the entire manufacturing process.
- Car manufacturers, which convert raw steel, plastic, and other materials into a finished automobile, also monitor their manufacturing processes.
- Auto manufacturers add thousands of dollars of value to the raw materials they use in assembling a car. If the manufacturing MIS also lets them provide additional service, such as customized paint colors, it has added further value for customers.
- In doing so, the MIS helps provide the company the edge that can differentiate it from competitors. The success of an organization can depend on the manufacturing function.

4. **Design And Engineering**

- Manufacturing companies often use computer-aided design (CAD) with new or existing

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products.

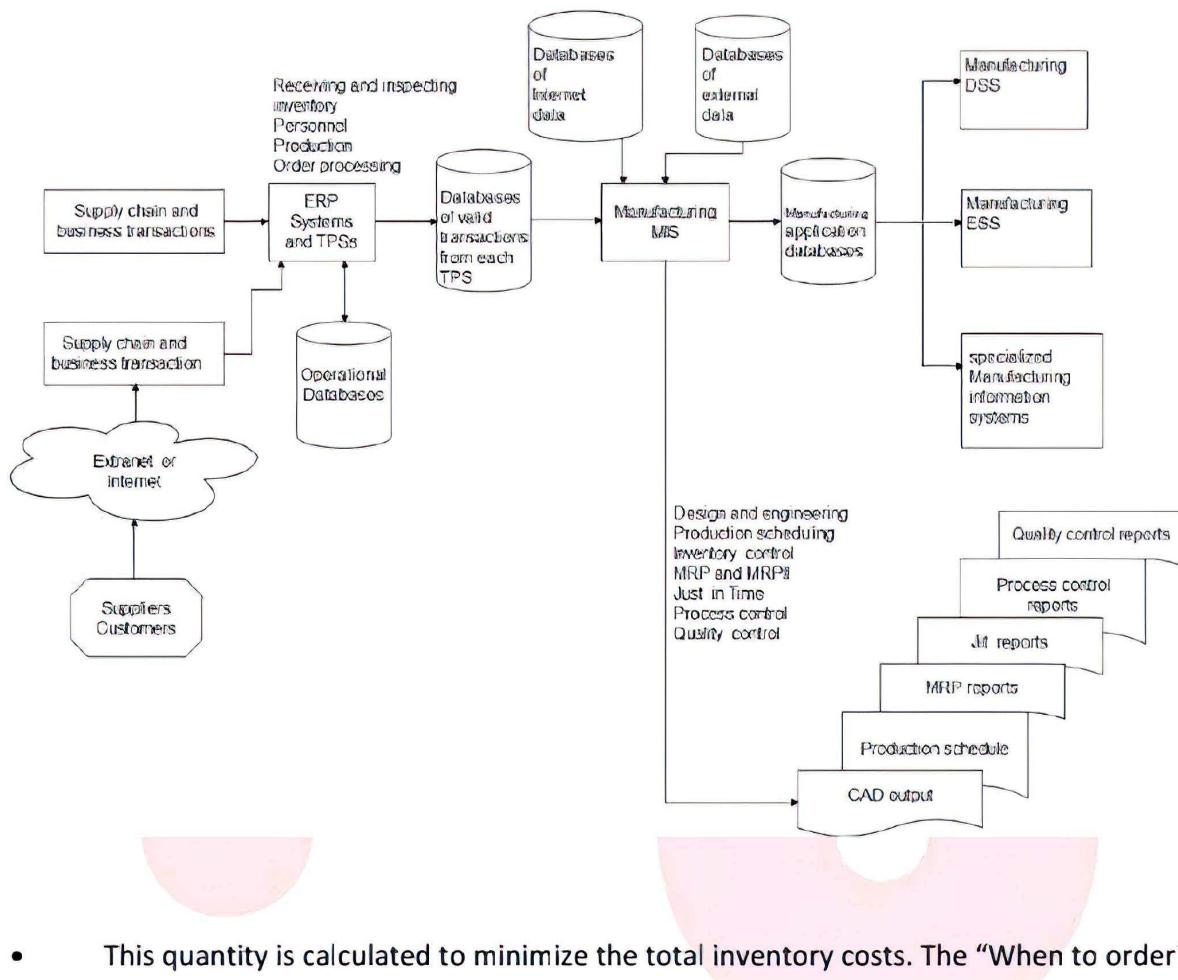
- **For example,** Boeing (www.boeing.com) uses a CAD system to develop a complete digital blue print of an aircraft before it begins the manufacturing process. As mock-ups are built and tested, the digital blue print is constantly revised to reflect the most current design.
- Using such technology helps Boeing reduce manufacturing costs and the time to design a new aircraft



2. Master Production Scheduling and Inventory Control.

- Scheduling production and controlling inventory are critical for any manufacturing company. The overall objective of master production scheduling is to provide detailed plans for both short-term and long-range scheduling of manufacturing facilities.
- Some companies hire outside companies to help them with inventory control. Delta Airlines, for example, has a long-term, \$1 billion agreement with Chromalloy Gas Turbine to help in providing inventory parts and maintenance of its jet engines. They determine when and how much inventory to order. One method of determining the amount of inventory to order is called the Economic order quantity (EOQ).

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- This quantity is calculated to minimize the total inventory costs. The “When to order?” question is based on inventory usage over time.
- When the inventory level for a particular item falls to the reorder point, or critical level, the system generates a report so that an order is immediately placed for the EOQ of the product.
- Another inventory technique used when demand for one item depends on the demand for another is called material requirements planning (MRP). The basic goal of MRP is to determine when finished products, such as automobiles or airplanes, are needed and then to work backward to determine deadlines and resources needed, such as engines and tires, to complete the final product on schedule.

- Just-in-time (JIT) inventory and manufacturing is an approach that maintains inventory at the lowest levels without sacrificing the availability of finished products. With this approach, inventory and materials are delivered just before they are used in a product.
- A JIT inventory system would arrange for a car windshield to be delivered to the assembly line only a few moments before it is secured to the automobile, rather than storing it in the manufacturing facility while the car's other components are being assembled. JIT, however, can result in some organizations running out of inventory when demand exceeds expectations.

3. Process Control

- Managers can use a number of technologies to control and simplify the manufacturing process.
- For example, computers can directly control manufacturing equipment, using systems called computer-assisted manufacturing(CAM).
- CAM systems can control drilling machines, assembly lines, and more.
- Computer-integrated manufacturing (CIM) uses computers to link the components of the production process into an effective system. CIM's goal is to tie together all aspects of production, including order processing, product design, manufacturing, inspection and quality control, and shipping.
- A flexible manufacturing system (FMS) is an approach that allows manufacturing facilities to rapidly and efficiently change from making one product to another. In the middle of a production run, for example, the production process can be changed to make a different product or to switch manufacturing materials.
- By using an FMS, the time and cost to change manufacturing jobs can be substantially reduced, and companies can react quickly to market needs and competition.

4. Quality Control and Testing

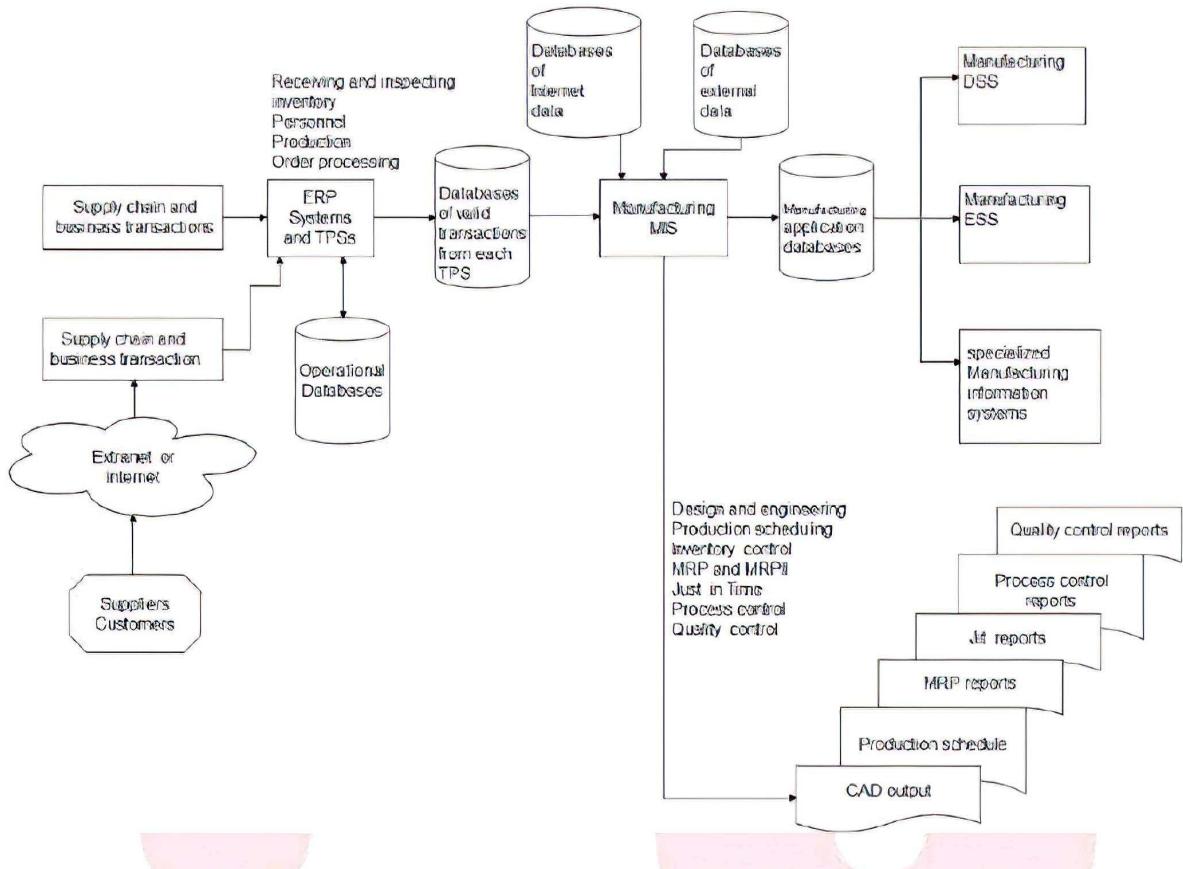
- With increased pressure from consumers and a general concern for productivity and high quality, today's manufacturing organizations are placing more emphasis on quality control, a process that ensures that the finished product meets the customers' needs.
- Information systems are used to monitor quality and take corrective steps to eliminate possible quality problems.

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MARKETING MIS

- ✓ A marketing MIS supports managerial activities in product development, distribution, pricing decisions, promotional effectiveness, and sales forecasting. Marketing functions are increasingly being performed on the Internet.
- ✓ Customer relationship management (CRM) programs, available from some ERP vendors, help a company manage all aspects of customer encounters. CRM software can help a company in
 1. Collection of customer data,
 2. Contact customers,
 3. Educate customers on new products,
 4. Sell products to customers through a Web site, etc.

- Subsystems for the marketing MIS include:
 - 1) Marketing Research,
 - 2) Product Development,
 - 3) Promotion and Advertising,
 - 4) Product Pricing.



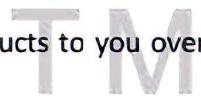
- These subsystems and their outputs help marketing managers and executives in increasing sales, reduce marketing expenses, and develop plans for future products and services to meet the changing needs of customers.

Above figure shows the inputs, subsystems, and outputs of a typical marketing MIS.

1. Marketing Research:

- ✓ The purpose of marketing research is to conduct a formal study of the market and customer preferences.
- ✓ Computer systems are used to conduct and analyze the results of surveys, questionnaires, pilot studies, and interviews. Courier, for example, uses Crystal Reports from Business Objects to determine customer habits and preferences.

- ✓ The Company can perform marketing research using its Web site to determine which customers are happy and still buying and which ones might switch to another company. In addition to knowing what you buy, market research can determine where you buy.
- ✓ This can help in developing new products and services and tailoring ads and promotions. With the use of GPS positioning systems, marketing firms can promote products to you over cell phones and other mobile devices by knowing your location.

The logo consists of the letters "TM" in a bold, italicized font, with a small circle around the "T".

2. Product Development:

- ✓ Product development involves the conversion of raw materials into finished goods and services.
- ✓ Many factors, including plant capacity, labor skills, engineering factors, and materials are important in product development decisions. In many cases, a computer program analyses these factors and selects the appropriate mix of labor, materials, plant and equipment, and engineering designs.
- ✓ Make-or-buy decisions can also be made with the assistance of computer programs. To get additional revenues, some TV programs and movies promote products and services during their programs. Movies, for example, can show actors driving luxury cars and wearing expensive watches.
- ✓ Food companies can sponsor food and cooking TV programs that give their products more exposure. The approach is called “branded entertainment.”

3. Promotion And Advertising:

- ✓ One of the most important functions of any marketing effort is promotion and advertising. Product success is a direct function of the types of advertising and sales promotion done. Increasingly, organizations are using the Internet to advertise and sell products and services.

- ✓ For example, Johnson & Johnson used Internet cartoons instead of extensive TV advertising to promote a popular baby lotion.
- ✓ Companies are also trying to measure the effectiveness of different advertising approaches, such as TV and Internet advertising.
- ✓ Some individuals and companies are willing to accept advertising to get free software or Internet service. Companies are also using blogs on the Internet to advertise products.

4. Product Pricing:

- ✓ Product pricing is another important and complex marketing function. Retail price, wholesale price, and price discounts must be set.
- ✓ Most companies try to develop pricing policies that will maximize total sales revenues. Computers are often used to analyze the relationship between prices and total revenues.
- ✓ Traditionally, executives used costs to determine prices. They simply added a profit margin to total costs to guarantee a decent profit.

5. Sales Analysis:

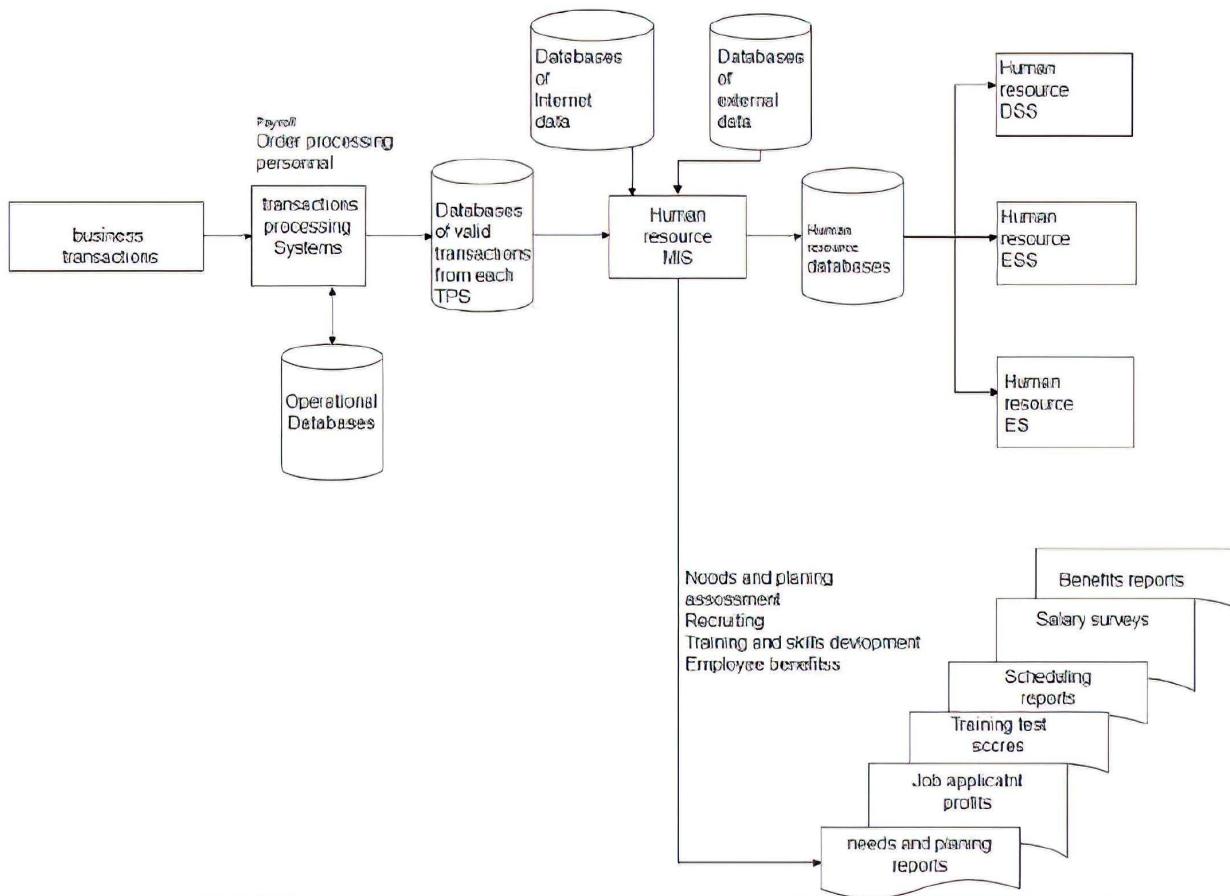
- ✓ Computerized sales analysis is important to identify products, sales personnel, and customers that contribute to profits and those that do not.
- ✓ Several reports can be generated to help marketing managers make good sales decisions.
- ✓ The sales-by-product report lists all major products and their sales for a specified period of time. This report shows which products are doing well and which need improvement or should be discarded altogether.

HUMAN RESOURCE MIS

- ✓ An information system that is concerned with activities related to employees and potential employees of an organization, also called a personnel MIS.

- ✓ Human Resource Management Information Systems (HRMIS) also called the personnel MIS, is concerned with activities related to previous, current, and potential employees of the organization.
- ✓ Because the personnel function relates to all other functional areas in the business, the human resource (HR) MIS plays a valuable role in ensuring organizational success.
- ✓ An effective human resource MIS allows a company to keep personnel costs at a minimum, while serving the required business processes needed to achieve corporate goals. Although human resource information systems focus on cost reduction, many of today's HR systems concentrate on hiring and managing existing employees to get the total potential of the human talent in the organization.
- ✓ Human resource subsystems and outputs range from the determination of human resource needs and hiring through retirement and outplacement.
- ✓ Outputs of the human resource MIS include reports, such as human resource planning reports, job application review profiles, skills inventory reports, and salary surveys.
- Most medium and large organizations have computer systems to assist with
 - a) Human resource planning
 - b) Hiring,
 - c) Training and skills inventorying,
 - d) Wage and salary administration.

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Above Figure shows some of the inputs, subsystems, and outputs of the human resource MIS.

1. Human Resource Planning:

- ✓ Human resource MIS is determining personnel and human needs. The overall purpose of this MIS subsystem is to put the right number and types of employees in the right jobs when they are needed, including internal employees that work exclusively for the organization and outside workers that are hired when they are needed.
- ✓ Some experts believe that workers should be managed like a supply chain, using supply chain management (SCM) and just-in-time techniques.

2. Personnel Selection And Recruiting:

- ✓ It handles the logical step of recruiting and selecting personnel.
- ✓ Companies seeking new employees often use computers to schedule recruiting efforts

and trips and to test potential employees' skills. Many companies now use the Internet to screen for job applicants.

- ✓ Applicants use a template to load their résumé onto the Internet site. HR managers can then access these résumés and identify applicants they are interested in interviewing.

3. Training and Skills Inventory:



- ✓ Some jobs, such as programming, equipment repair, and tax preparation, require very specific training for new employees.
- ✓ Other jobs may require general training about the organizational culture, orientation, dress standards, and expectations of the organization.
- ✓ When training is complete, employees often take computer-scored tests to evaluate their mastery of skills and new material.

4. Scheduling and Job Placement:

- ✓ Employee schedules are developed for each employee, showing his job assignments over the next week or month.
- ✓ Job placements are often determined based on skills inventory reports showing which employee might be best suited to a particular job.
- ✓ Complicated scheduling programs are often used in the airline industry, the military, and many other areas to get the right people assigned to the right jobs at the right time.

5. Wage and Salary Administration:

- ✓ Another human resource MIS subsystem involves determining wages, salaries, and benefits, including medical payments, savings plans, and retirement accounts.
- ✓ Wage data, such as industry averages for positions, can be taken from the corporate database and manipulated by the human resource MIS to provide wage information and reports to higher levels of management.

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6. Outplacement:

- ✓ Employees leave a company for a variety of reasons. Outplacement services are offered by many companies to help employees make the transition.
- ✓ Outplacement can include job counseling and training, job and executive search, retirement and financial planning, and a variety of severance (separation) packages and options.
- ✓ Many employees use the Internet to plan their future retirement or to find new jobs, using job sites such as www.naukri.com.

Question Bank**Short Questions:**

1. List out activities of TPS
2. List out objectives of TPS
3. Define Batch Processing System

Long Questions:

1. Explain in detail Online & Batch Processing system. Give example of each.
2. List out the various activities involved in TPS.
3. Explain Order Processing System as traditional transaction processing application.
4. Explain objectives of TPS
5. Explain Purchase System
6. Write short note on Transaction Processing activities.
7. Explain Traditional Transaction Processing methods.
8. Explain Accounting System
