Chapter 9

Enterprise Systems
Principles and Learning Objectives

- An organization must have information systems that support the routine, day-to-day activities that occur in the normal course of business and help a company add value to its products and services
  - Identify the basic activities and business objectives common to all transaction processing systems
  - Identify key control and management issues associated with transaction processing systems
Principles and Learning Objectives (continued)

• Traditional TPSs support the various business functions of organizations that have not yet implemented enterprise systems
  – Describe the inputs, processing, and outputs for the transaction processing systems associated with the order processing, purchasing, and accounting business functions
Principles and Learning Objectives (continued)

• A company that implements an enterprise resource planning system is creating a highly integrated set of systems, which can lead to many business benefits
  – Discuss the advantages and disadvantages associated with the implementation of an enterprise resource planning system
  – Identify the challenges multinational corporations must face in planning, building, and operating their TPSs
Why Learn About Enterprise Systems?

- Many organizations use enterprise systems to perform business processes and to keep records
- Support a wide range of business activities
  - Supply chain management
  - Customer relationship management
- Used by large, medium, and small companies
Introduction

• **Enterprise system**: 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
  – Enterprise resource planning systems
  – Customer relationship management systems

- Transaction processing systems (TPSs)
  - Process detailed data necessary to update records about fundamental business operations
  - Include order entry, inventory control, payroll, accounts payable, accounts receivable, general ledger, etc.
  - Provide data for other business processes
    - Management information system/decision support system (MIS/DSS)
    - Special-purpose information systems

Figure 9.1: TPS, MIS/DSS, and Special Information Systems in Perspective
Traditional Transaction Processing Methods and Objectives

• **Batch processing system**
  – Computerized processing in which business transactions are accumulated over a period of time and prepared for processing as a single unit or batch

• **Online transaction processing (OLTP)**
  – Computerized processing in which each transaction is processed immediately
Traditional Transaction Processing
Methods and Objectives (continued)

Figure 9.2: Batch Versus Online Transaction Processing
Traditional Transaction Processing Methods and Objectives (continued)

Figure 9.3: Integration of a Firm’s TPSs

Traditional Transaction Processing Methods and Objectives (continued)

- Organizations expect their TPSs to:
  - Process data generated by and about transactions
  - Maintain a high degree of accuracy and integrity
  - Avoid processing fraudulent transactions
  - Produce timely user responses and reports
Traditional Transaction Processing Methods and Objectives (continued)

• Organizations expect their TPSs to (continued):
  – Increase labor efficiency
  – Help improve customer service
  – Help build and maintain customer loyalty
  – Achieve competitive advantage
Transaction Processing Activities

• TPSs
  – Capture and process data that describes fundamental business transactions
  – Update databases
  – Produce a variety of reports
Figure 9.4: A Simplified Overview of a Transaction Processing System

Transaction Processing Activities (continued)

Data entry and input

Internally Generated Transactions
- Shipped orders
- Purchase orders
- Employee time cards

Externally Generated Transactions
- Customer orders
- Vendor invoices
- Customer payments

Processing

Databases
- Customer orders
- Inventory
- Purchase orders
- Customers
- Suppliers

Database Update

Documents
- Pick list
- Checks to vendors
- Receiving notices
- Paychecks

Operational Reports
- Finished product
- Inventory status
- Inventory status of raw materials, packing materials, and spare parts

Documents and reports
Transaction Processing Activities (continued)

• Transaction processing cycle
  – Data collection
  – Data editing
  – Data correction
  – Data manipulation
  – Data storage
  – Document production
Transaction Processing Activities (continued)

Figure 9.5: Data-Processing Activities Common to Transaction Processing Systems
Data Collection

• Capturing and gathering all data necessary to complete the processing of transactions

• Data collection can be:
  – Manual
  – Automated via special input devices (such as scanners, point-of-sale devices, and terminals)

• Data should be:
  – Collected at source
  – Recorded accurately, in a timely fashion
Data Editing

• Checking data for validity and completeness to detect any problems

• Examples
  – Quantity and cost data must be numeric
  – Names must be alphabetic
  – Verification that codes associated with an individual transaction are present in a database containing valid codes
Data Correction

• Reentering data that was not typed or scanned properly
• If invalid data is detected, system should provide error messages
  – Error messages must specify the problem so proper corrections can be made
• Software tools can be used to identify bad data
  – Example: Business Objects IQ Insight
Data Manipulation

• Performing calculations and other data transformations related to business transactions
• Can include the following:
  – Classifying data
  – Sorting data into categories
  – Performing calculations
  – Summarizing results
  – Storing data in the organization’s database for further processing
Data Storage

- Updating one or more databases with new transactions
- After being updated, this data can be further processed and manipulated by other systems
Document Production and Reports

• Generating output records, documents, and reports
  – Hard-copy paper reports
  – Displays on computer screens
• Results from one TPS can be inputs to another system
• Typical uses
  – Checks and invoices, management information, decision support, and compliance with local, state, and federal regulations
Control and Management Issues

• TPSs are critical to the operation of most firms
• Many business activities would come to a halt if supporting TPSs failed
• To ensure reliable operation of their TPSs, firms must engage in disaster recovery planning and TPS audits
Disaster Recovery Plan

• A firm’s plan to recover data, technology, and tools that support critical information systems and necessary information systems components
  – Necessary information systems components: network, databases, hardware, software, operating systems, etc.
  – Critical information systems: TPSs that directly affect the cash flow of the firm

• Some firms that provide disaster recovery services
  – SunGuard, Hewlett-Packard, AppRiver
Transaction Processing System Audit

• Checks a firm’s TPS systems to prevent accounting irregularities and/or loss of data privacy
  – Does the system meet the business need for which it was implemented?
  – What procedures and controls have been established?
  – Are these procedures and controls being used properly?
  – Are the information systems and procedures producing accurate and honest reports?
Traditional Transaction Processing Applications

Table 9.2: Systems That Support Order Processing, Purchasing, and Accounting Functions

<table>
<thead>
<tr>
<th>Order Processing</th>
<th>Purchasing</th>
<th>Accounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order processing</td>
<td>• Inventory control (raw materials, packing materials, spare parts, and supplies)</td>
<td>• Budget</td>
</tr>
<tr>
<td>Sales configuration</td>
<td>• Purchase order processing</td>
<td>• Accounts receivable</td>
</tr>
<tr>
<td>Shipment planning</td>
<td>• Receiving</td>
<td>• Payroll</td>
</tr>
<tr>
<td>Shipment execution</td>
<td>• Accounts payable</td>
<td>• Asset management</td>
</tr>
<tr>
<td>Inventory control (finished product)</td>
<td></td>
<td>• General ledger</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Principles of Information Systems, Eighth Edition
Figure 9.7: Traditional TPS Systems That Support the Order Processing Business Function
## Order Processing Systems (continued)

<table>
<thead>
<tr>
<th>System</th>
<th>Input</th>
<th>Processing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order entry</td>
<td>Customer order information via a variety of means: data entry by sales</td>
<td>Order is checked for completeness and accuracy. On-hand inventory is checked to ensure each item can be shipped in the</td>
<td>An open order record</td>
</tr>
<tr>
<td></td>
<td>rep, customer input, mail, phone, e-commerce, or computer to computer</td>
<td>quantity ordered or a substitute item is suggested.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>via EDI or XML formats</td>
<td>Review customer order information and ensure the configuration will meet the customer’s needs; suggest additional</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>options and features when appropriate.</td>
<td></td>
</tr>
<tr>
<td>Sales configuration</td>
<td>Customer order information including model and options desired</td>
<td>Pick list for each order to be filled from each shipping location showing the items and quantities needed to fill the</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>each order.</td>
<td></td>
</tr>
<tr>
<td>Shipment planning</td>
<td>Open orders, i.e., orders received but not yet shipped</td>
<td>Determine which open orders will be filled when and from which location each order will be shipped to minimize</td>
<td>Pick list for each order to be filled from each shipping location showing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>delivery costs and meet customer desired delivery dates.</td>
<td></td>
</tr>
<tr>
<td>Shipment execution</td>
<td>Pick list and data entered by warehouse operations personnel as they</td>
<td>Data entered by warehouse operations personnel captured and used to update record of what was shipped to the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fill the order</td>
<td>customer—this can be different than what was ordered</td>
<td></td>
</tr>
<tr>
<td>Inventory control</td>
<td>Record of each item picked to fill a customer order</td>
<td>Inventory records are updated to reflect current quantity of each item.</td>
<td>Updated inventory database and various management reports</td>
</tr>
<tr>
<td>(finished product)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>Shipped order records received from shipment execution that show</td>
<td>Determine amount owed by each customer for each order placed</td>
<td>Invoice statement containing details of each order and its associated costs; customers’ accounts receivable data is updated</td>
</tr>
<tr>
<td></td>
<td>precisely what was shipped on each order; payments from customers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Purchasing Systems

Figure 9.8: Traditional TPS Systems That Support the Purchasing Business Function
Purchasing Systems (continued)

<table>
<thead>
<tr>
<th>System</th>
<th>Input</th>
<th>Processing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory control</td>
<td>Records reflecting any increase or decrease in the inventory of specific items of raw materials, packing materials, or spare parts</td>
<td>Withdrawals are subtracted from inventory counts of specific items; additions are added to the inventory count</td>
<td>The inventory record of each item is updated to reflect its current count</td>
</tr>
<tr>
<td>Purchase order processing</td>
<td>Inventory records, employee-prepared purchase order requests, information on preferred suppliers</td>
<td>Items that need to be ordered are identified, quantities to be ordered are determined, qualified supplier with whom to place the order is identified</td>
<td>Purchase orders are placed with preferred suppliers for items</td>
</tr>
<tr>
<td>Receiving</td>
<td>Information on the quantity and quality of items received</td>
<td>Receipt is matched to purchase order, input data is edited for accuracy and completeness</td>
<td>Receiving report is created, inventory records are updated to reflect new receipts</td>
</tr>
<tr>
<td>Accounts payable</td>
<td>Purchase orders placed, information on receipts, supplier invoices</td>
<td>Supplier invoice matched to original purchase order and receiving report</td>
<td>Payment generated to supplier</td>
</tr>
</tbody>
</table>

Table 9.4: IPO of the Traditional TPS Systems That Support Purchasing
Figure 9.9: Traditional TPS Systems That Support the Accounting and Finance Business Function
### Table 9.5: IPO of the Traditional TPS Systems That Support Accounting

<table>
<thead>
<tr>
<th>System</th>
<th>Input</th>
<th>Processing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget</td>
<td>Amounts budgeted for various categories of expense</td>
<td>Accumulates amount spent in each budget category</td>
<td>Budget status report showing amount under/over budget</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>Shipment records specifying exactly what was shipped to a customer</td>
<td>Determines amount to be paid by customer including delivery costs and taxes</td>
<td>Customer bills and monthly statements, management reports summarizing customer payments</td>
</tr>
<tr>
<td>Payroll</td>
<td>Number of hours worked by each employee, employee pay rate, employee tax and withholding information</td>
<td>Calculates employee gross pay and net pay and amount to be withheld for various taxing agencies and employee benefit programs</td>
<td>Payroll check and stub, payroll register (a summary report of all payroll transactions), W-2 forms</td>
</tr>
<tr>
<td>Asset management</td>
<td>Data regarding the purchase of capital assets</td>
<td>Calculates depreciation and net value of all corporate assets</td>
<td>Listing of all assets showing purchase price and current value after depreciation</td>
</tr>
<tr>
<td>General ledger</td>
<td>All transactions affecting the financial standing of the firm</td>
<td>Posts financial transactions to appropriate accounts specified in the firm's chart of accounts (see Table 9.6)</td>
<td>Financial reports such as the profit and loss statement, balance sheet</td>
</tr>
</tbody>
</table>
Enterprise Resource Planning, Supply Chain Management, and Customer Relationship Management

• **Enterprise resource planning (ERP):** set of integrated programs that manage a company’s vital business operations for an entire multisite, global organization.

• **Business process:** set of coordinated and related activities that takes one or more kinds of input and creates an output of value to the customer of that process.

• At the core of the ERP system is a database that is shared by all users.
Enterprise Resource Planning, Supply Chain Management, and Customer Relationship Management (continued)

![Diagram of Enterprise Resource Planning System]

**Figure 9.10: Enterprise Resource Planning System**
An Overview of Enterprise Resource Planning

- 1970s: ERP systems evolved from materials requirement planning systems (MRP)
  - MRPs tied together production planning, inventory control, and purchasing business functions for manufacturing organizations
- Late 1980s-early 1990s: recognition that legacy transaction processing systems lacked necessary integration for information sharing
  - Y2K provided impetus to upgrade systems
Advantages of ERP

- Improved access to data for operational decision making
- Elimination of costly, inflexible legacy systems
- Improvement of work processes based on best practices
- Upgrade of technology infrastructure
Disadvantages of ERP Systems

- Expense and time in implementation
- Difficulty implementing change
- Difficulty integrating with other systems
- Risks in using one vendor
- Risk of implementation failure
Disadvantages of ERP Systems (continued)

• Tips for avoiding failed ERP implementations
  – Assign a full-time project manager
  – Appoint an experienced, independent resource to oversee 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 wary of modifying ERP software to conform to firm’s business practices
Production and Supply Chain Management

• ERP production plan process: draws on the information available in the ERP system database
  – Sales forecasting: estimates future customer demand
  – Sales and operations plan: takes demand and current inventory levels to determine production for future demands
  – Demand management: develops master production schedule
Production and Supply Chain Management (continued)

- ERP production plan process (continued)
  - Detailed scheduling: schedules production run for each product and from one product to the next
  - Materials requirement planning: determines amount and timing of raw material orders with suppliers
  - Purchasing: purchases raw materials and transmits to qualified suppliers
  - Production: plans details of running and staffing production operation
Customer Relationship Management and Sales Ordering

• Customer relationship management (CRM) system: helps a company manage all aspects of customer encounters, including:
  – Marketing and advertising
  – Sales
  – Customer service after the sale
  – Programs to retain loyal customers
Customer Relationship Management and Sales Ordering (continued)

Figure 9.11: Customer Relationship Management System
Customer Relationship Management and Sales Ordering (continued)

• **Sales ordering**: set of activities that must be performed to capture a customer sales order, including the following:
  – Recording items to be purchased
  – Setting sales price
  – Recording order quantity
  – Determining total cost of the order including delivery costs
  –Confirming customer’s available credit
Financial and Managerial Accounting

• General ledger: main accounting record of a business
  – Assets, liabilities, revenue, expenses, and equity

• ERP system
  – Captures transactions entered by workers in all functional areas of the business
  – Creates associated general ledger record to track the financial impact of the transaction
Financial and Managerial Accounting (continued)

- Financial accounting
  - Captures and records all transactions that affect a company’s financial state
  - Uses these documented transactions to prepare financial statements to external decision makers

- Managerial accounting
  - Provides data to enable the firm’s managers to make decisions about current and future operations, and develop overall business strategies
Hosted Software Model for Enterprise Software

• Hosted software model offers many benefits to small to medium businesses
  – No need to make a major financial investment
  – No need to employ a full-time IT person
  – Reduced hardware costs and costs associated with maintaining an appropriate computer environment
• Some large companies are also experimenting with hosted software
  – Provides common systems platform and business processes for transition to global centers
International Issues Associated with Enterprise Systems

• Challenges that must be met by an enterprise system of a multinational company include:
  – Different languages and cultures
  – Disparities in IS infrastructure
  – Varying laws and customs rules
  – Multiple currencies

• ERP software vendors help meet these challenges
Different Languages and Cultures

• Multinational companies sometimes roll out standard IS applications for all to use
• To meet the needs of business partners and employees operating in other parts of the world, standard applications sometimes require extensive and costly customization
Disparities in Information System Infrastructure

• Lack of a robust or a common information infrastructure can create problems
• Many countries’ telecommunications services are controlled by a central government or operated as a monopoly
  – No incentives to provide fast and inexpensive customer service
Varying Laws and Customs Rules

• Numerous laws can affect collection and dissemination of data

• Examples
  – Labor laws in some countries prohibit recording of worker performance data
  – Some countries have laws limiting the trans-border flow of data linked to individuals

• Trade custom rules between nations
  – North American Free Trade Agreement (NAFTA)
Multiple Currencies

• Enterprise system of multinational companies must conduct transactions in multiple currencies
• Systems must:
  – Be current with foreign currency exchange rates
  – Handle reporting and other transactions
  – Issue vendor payments and customer statements
  – Record retail store payments
  – Generate financial reports in the currency of choice
# Comparison of Several ERP Systems

## Table 9.9: Some ERP Software Vendors

<table>
<thead>
<tr>
<th>Software Vendor</th>
<th>Product</th>
<th>Industries Where Used</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFS</td>
<td>IFS Applications™</td>
<td>Aviation and defense, automotive, medical device, process industries</td>
<td>Offers many software components so users can avoid large-scale upgrades</td>
<td>Lacks global recognition, firm not profitable</td>
</tr>
<tr>
<td>Microsoft (Axapta)</td>
<td>Dynamics AX 4.0</td>
<td>Too soon to tell who will adopt this software</td>
<td>Has easy linkages to other Microsoft tools</td>
<td>Too new to have full functionality needed by many firms</td>
</tr>
<tr>
<td>Oracle</td>
<td>Oracle E-business Suite</td>
<td>Aerospace and defense, automotive, consumer packaged goods, industrial manufacturing, oil and gas</td>
<td>Strong manufacturing functionality</td>
<td>Likely to be replaced by completely new Oracle product by 2013</td>
</tr>
<tr>
<td>Oracle</td>
<td>JDE Edwards Enterprise One</td>
<td>Chemical industries, consumer packaged goods, life sciences, oil and gas</td>
<td>Product widely used in target industries</td>
<td>Likely to be replaced by completely new Oracle product by 2013</td>
</tr>
<tr>
<td>QAD</td>
<td>QAD Global Enterprise Edition</td>
<td>Automotive supply, food and beverage, and medial instrumentation</td>
<td>Noted for global reach, ease of implementation at individual plant level, and industry experience</td>
<td>Product not well aligned with Microsoft or IBM</td>
</tr>
</tbody>
</table>
Summary

• Enterprise system: ensures information can be shared across all business functions and all levels of management to support the running and managing of a business

• Transaction processing systems (TPSs): process detailed data necessary to update records about fundamental business operations

• Batch processing system: accumulate transactions over a period of time and then process them

• Online transaction processing (OLTP): process each transaction immediately
Summary (continued)

- Transaction processing cycle: data collection, data editing, data correction, data manipulation, data storage, and document production
- Disaster recovery plan: plan to recover data, technology, and tools that support critical information systems and necessary information systems components
- Many types of transaction processing systems support order processing, purchasing, and accounting business functions
Summary (continued)

- Enterprise resource planning (ERP): set of integrated programs that manage a company’s vital business operations for an entire multisite, global organization
- Customer relationship management (CRM) system: helps a company manage all aspects of customer encounters
- Enterprise system of a multinational company must meet many challenges