Chapter 2

Information Technology and Operations Management

Introduction

The potential and risk of I.T on O.M must be understood before adopting it because it impacts:

- Productivity
- Costs
- Flexibility
- Speed
- Quality
- Customer satisfaction
- Competitiveness
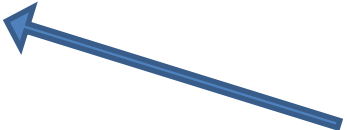- The making of operational decisions

Technology

Defined generally: the application of scientific discoveries to the development and improvement of goods and services. It may encompass knowledge, materials, methods and equipment.

'High technology' refers to the most advanced and developed machines and methods.

OM is basically concerned with 3 kinds of technology namely;
- product and service technology,
- process technology
- information technology.

P.P.I

Technology

Product and service technology - the discovery of and dev't of new products and services - by researchers and engineers using the scientific approach to develop and translate new knowledge into commercial applications.

Process technology - methods, procedures and equipment used to produce goods and provide services - Includes organizational and supply chain processes.

Information technology (IT) - the science and use of computers and other electronic equipment to store, process, and send information. – employed in: data processing, bar codes to identify and track goods, obtaining point-of-sale information, data transmission over internet, e-mail, e-commerce and more.

Technology

Business Intelligence

Applications and technologies used to gather (i.e. provide access to) and analyse data and information to support decision making efforts.

Electronic business or E-business

Involves the use of the internet to transact business with customers and their suppliers. Examples:

- e-commerce - consumer to business transactions (buying online)
- e-procurement – business-to-business represent an increasing portion of

- Owners and managers use it in developing strategies, planning and decision making.

Role of Technology in Operations

- Important enabler of business and innovation – (not a substitute for hardwork)

- Useful leveraging the talents of people. i.e. right persons knowing and manage its use effectively.

- IT facilitates the business function by applying information, people, technologies and procedures to solve business problems.

The Need for Technology

- Advances in technology are informing changes in manufacturing and service designing.

- Increasing complexity of managerial and operational

- It is an invaluable tool for achieving success.

- The need to maintain compatibility between technology and the organization's other activities.

- For continuous training in the use of technology.

How Technology Affects Operations

- Low costs

- Speed of delivery

- Quality of product/service

- Customization

- Enables firms compete on several dimensions at once.

Automation Development

- Machining Centers changed

  Operations where tools are automatically during production

- Numerically controlled (NC) machines

  Manufacturing equipment directly controlled by a computer

- Industrial robots

  Programmable machines that can perform multiple functions

- Computer aided or (Assisted) Design

  Designing products using specially equipped computers

Automation Development

- Computer Assisted Design & Manufacturing System (CAD / CAM)

  Integrated design and production using computers

- Flexible Manufacturing System

  Mfg. Facility automated to some extent and produces a wide variety of products

- **Computer-integrated manufacturing (CIM)**

  Integration of all aspects of mfg. through computers

- **Islands of automation**

  Automated factories/portions including NC equipment, automated storage or retrieval systems, robots and machining centres.

Automation - Software

- Enterprise Resource Planning (ERP)

  Provides a common software, infrastructure and database

- Supply Chain Management (SCM)

  Controls interaction with suppliers and overall supply chain

- New Product Development (NPD)

  Links the engineering and operations functions

- Customer Relationship Management (CRM)

  Manages the interface between the firm and its customers

Materials Requirement Planning (MRP)

A computer-based information system that translates the finished product requirement of the master schedule into time-phased requirements for subassemblies, components and raw materials. Basically designed to answer three questions:

- *What is needed?*
- *How much is needed?*
- *When it is needed?*

M.R.P

- Helps in **meeting due dates** by **accurately time-phasing acquisition** and **production of long lead-time items** needed to assemble the final output

- Automatically **provides information concerning capacity** and **financial requirement** for **upcoming periods** and updates this information when final demand need changes

- Helps eliminate waste,
- Improve productivity
- Foster quality.

M.R.P - Inputs

A management system for production and inventory . Its primary inputs are:

1. **Master production schedule:** indicates time and quantity of end items to be produced to meet firm and customers' demand.

2. **Bill of material file:** Indicates all raw mat., component parts, sub assemblies, assemblies and build-up of individual items, component parts into finished items.

3. **Inventory master file:** contains detailed info on quantity of each item on hand, on order and used in production at various time periods.

M.R.P - Benefits

Benefits of MRP

- A means of allocating production time
- Enables evaluation of capacity requirement to meet estimated demands generated by master schedule
- Low levels of process inventories, due to exact matching of supply to demand
- Enables easy determination of inventory usage by 'backflushing'

'Backflushing': a periodical explosion of an end item's bill of material to determine usage of various components in production thereby eliminating the need to collect detailed usage information on the manufacturing floor.

ENTERPRISE RESOURCE PLANNING (ERP)

- **Latest innovative system** for coordinating production decisions among functions within the firm and across functions outside the firm such as suppliers and customers.

- ERP attempts to integrate or harmonize activities of all functions and departments across an organisation into a single computer system using an integrated software programme that runs off a single database, to facilitate the sharing of information across all sections

- **Critical** - organizations must assess all their business processes to determine if they fit into a standard ERP package before acquiring and installing such expensive systems, lest risk abandoning them due to incompatibility issues.

E.R.P - Purpose

Three major reasons why organizations undertake ERP project

- **To integrate financial data –** Single reliable source for all information required for financial decision making and evaluation of financial performance etc

- **To standardize production process -** Standardizing production decision-making methods using a single integrated computer system can save time, money, increase productivity and reduce cost.

- **To standardized human resources (HR) information –** ERP tracks and communicates with employees of organizations with multiple business units.

E.R.P –Hidden Costs

Commonly overlooked /underestimated costs likely to result in budget overrun.

- **Training –** Elusive (indefinable) training costs to teach workers both a new set of processes and use of software interface

- **Integration and testing –**the complexity of existing applications skyrocket the costs of integrating, testing, and maintaining a customized the system to skyrocket. – Not dummy but real tests, e.g. from order placement, through shipping to receipt of payment.

- **Data conversion –**Costs of Even cleaning and overhauling data to match process modifications necessitated by the ERP implementation.

E.R.P –Hidden Costs

- **Data analysis –**Cost of setting up, maintenance and continual analysis of combined data from ERP system and external systems such as suppliers and customers.

- **Consultants ad infinitum –** Consultants' cost of training internal staff on ERP usage with 'no specific area of concentration' coupled with the lack of a disengagement plan for consultants, hikes consulting fees.

- **Replacing your best and brightest –**The complexity of the ERP system and the attendant dramatic changes to business processes require engaging the best and brightest employees available and that comes at a cost.

ERP Service & Mfg. Packages

ERP's **service** industry applications include:
- Professional services   Postal services
- Logistics services   Security services
- Real estate management.

In a **manufacturing** environment, ERP applications cover:
- Production planning and scheduling
- Inventory management
- Product costing and
- Sales and distribution

ERP – Approaches to Implementation

- **"Big Bang" approach.** All-at-once ERP implementation - scrap all existing systems - most ambitious & difficult approach – originally most frequently used - now rarely used.

- **The "United federation" approach.** Maintain independent systems – use ERP for common processes such as Management, Audit, financial reporting - currently most commonly used approach.

- **The "Test the Waters".** A subset of available ERP system introduced to few key processes – no drastic change in overall business processes – limits risks with ERP implementation – commonly adopted by smaller business units.

ERP systems in Universities

ERP may be used to integrate and access:

- Student data and information
- Course prerequisites
- Course outlines and schedules.
- Time tables and room allocation
- Human resources management
- Accounting and financial information

E.R.P - Benefits

- Reduction in database errors

- Faster customer response

- Faster order fulfillment

- Better overall communication

E.R.P Systems – Why they Fail

Why ERP Systems Fail

- Lack of top management commitment to its full implementation
- Lack of adequate resources
- Lack of proper training
- Lack of communication

Criticisms of ERP Systems

- Constraints of a single ERP system versus a mixture of Best of Breed software products
- Inflexibility of the built-in business model of ERP systems

Technology & Services

Technology Trends in Services

- Increase in self-service, reduces labor costs and speeds up service

- Decrease in the importance of location (i.e. lower delivery costs increases remote points of access thereby reducing the need for specific service locations)

Integrating Technology into Services - Benefits

- Efficiency in operations

- Effectiveness in serving customers

Technology & Services

Areas for Integration

- Strategic planning
- Increased efficiency from economies of scale after consolidating operations.
- Reduction in labour costs through replacement of manpower and increased labour productivity.
- Improved performance in terms of faster service n' enhanced customer knowledge
- Increased product customization

Categories of E- Services

Category	Function
• Internet	World-wide web presence with open access to all
• Intranet	Internal network providing limited access to employees.
• Extranet	A resource limited network open to specified internal and external users
• Electronic Data Interchange (EDI)	A network designed to support data exchange with suppliers and vendors.
• Value Added Network (V.A.N)	A third party service used with EDI to connect customers & suppliers

Types of E-Service

Broad Categories

- Business-to-Consumer B2C
- Consumer-to-Consumer C2C
- Business-to-Business B2B
- Government-to-Business G2B
- Government-to-Consumer G2C

Specific Service Types

E-tailors (Goods n' Services)

Customer

Network Providers

Information Providers

Application Service Providers (ASPs)

Challenges for E-tailers

- **Infrastructure** - developing a structure to efficiently and quickly deliver goods to customers
- **Lack of tangibility** - having no physical presence to which customers can turn with problems
- **Differentiation** - difficulty in creating a unique on-line presence that sustains growth
- Overcoming Barriers to Entry (Customer)

Challenges for E-tailers

- "Fear of the unknown"
- Lack of knowledge by the customer
- Training and Support
- Worker skill development through hands-on training in the new technology.
- Customer familiarization with technology.

Self Assessment Questions

1. Discuss how ERP improves a company's business performance

2. State and explain four unforeseen costs of enterprise ERP.

3. Explain how companies implement their ERP projects

4. Write short notes on the following

i.   Bill of material file

ii.   Master production schedule

iii. Business intelligence

iv.   Inventory material file

Self Assessment Questions

5. E- commerce has been supplanted by e-business. What is the basic difference between the two.

6. In what ways can an ERP system enhance an organisation's competitive position?

7. In what ways might an ERP erode an organisation's competitive position.

8. Discuss why the choice of an ERP system is best viewed as a strategic decision as opposed to a technology or information systems decisions.