IT & Supply Chain Management

Supply and Value Chains

Supply chain refers to the flow of materials, information, payments, and services from raw material suppliers, through factories and warehouses, to the final consumer. It includes tasks such as purchasing, payment flow, materials handling, production planning & control, logistics & warehousing, inventory control, and distribution.

- Supply Chain Flows
 - Materials flows are all physical products, new materials, and supplies that flow along the chain.
 - Information flows relates to all data associated with demand, shipments, orders, returns and schedules.
 - Financial flows include all transfers of money, payments, credit card information, payment schedules, e-payments and credit-related data.

Computerized Supply Chains

The supply chain process is intertwined with the computerization of its activities. People have wanted to automate the processes along the chain to reduce cost, expedite processing, and reduce errors.

- Material requirements planning (MRP) essentially integrates production, purchasing, and inventory management of interrelated products.
- Manufacturing resource planning (MRP II), enhanced MRP methodology by adding labor requirements and financial planning.
- Enterprise resource planning (ERP) further integrates the transaction processing as well as other routine activities in the entire enterprise.
- Integrations continues along several paths
 - functional areas
 - Combining transaction processing and decision support
 - Business intelligence
 - CRM software

Computerized Supply Chains



From Turban et al. (2004), Information Technology for Management.

Supply Chains Benefits

There are many benefits to integrating functional systems.

• Tangible benefits:

- Inventory reduction
- Personnel reduction
- Productivity improvement
- Order management improvement
- Financial-close cycle improvements
- IT cost reduction
- Procurement cost reduction
- Cash management improvements
- Revenue/profit increases
- Transportation logistics cost reduction
- Maintenance reduction
- On-time delivery improvement.

Supply Chains Benefits

- Intangible benefits:
 - Information visibility
 - New/improved processes
 - Customer responsiveness
 - Standardization
 - Flexibility
 - Globalization
 - Business performance
 - Reduction in duplication of entries
 - Controls and reconciliation are enhanced
 - Rapid assimilation of data into the organization

Systems can be integrated internally and externally. Internal integration refers to integration between applications inside a company, whereas external integration refers to integration of applications among business partners.

ERP and Supply Chains

ERP or **enterprise systems** control all major business processes with a single software architecture in real time.

- It is comprised of a set of applications that automate routine backend operations:
 - such as financial management
 - inventory management
 - Scheduling
 - order fulfillment
 - cost control
 - accounts payable and receivable,
- It includes front-end operations such as:
 - POS(Point of Sale) 판매시절관리
 - Field Sales
 - Service
- It also increases efficiency, improves quality, productivity, and profitability.

Evolution Is Continuing



From Turban et al. (2004), Information Technology for Management.

- Ethical issues.
- How much to integrate?
- Role of IT.
- Organizational adaptability.
- Going global.



Computing Power vs. Benefits

What does growth in computing power mean in economic terms? First, most organizations will perform existing functions at decreasing costs over time and thus become more efficient. Second, creative organizations will find new uses for information technology—based on the improving price-to-performance ratio and thus become more effective.

What is the payoff from IT investments? How can it be measured?

- Evaluate
 - the productivity
 - the benefits
 - the costs
 - other economic aspects of information technology

Productivity

Productivity is a ratio than measures outputs versus inputs. It is calculated by dividing outputs by inputs. On a company by company basis major benefits from information technology investments have been shown. However, it is very hard to demonstrate, at the level of a national economy, that the IT investments really have increased outputs or decreased inputs. The discrepancy between measures of investment in information technology and measures of output at the national level has been called the productivity paradox.

- Possible explanations of the paradox
 - problems with data or analyses hide productivity gains from IT
 - 2. gains from IT are offset by losses in other areas
 - 3. IT productivity gains are offset by IT costs or losses.

Cost-Benefits Analyses

IRR: NPV가 O이 되도록 하는 할인율 NPV: 현재의 화폐가치로 효과를 평가 EA: 생애주기비용을 년단위로 치환하여 평가 Payback period: Breakeven point를 찾는 평가

Method	Advantages	Disadvantages
Internal rate of return (IRR)	Brings all projects to common footing. Conceptually familiar.	Assumes reinvestment at same rate. Can have multiple roots. No assumed discount rate.
Net present value or net worth (NPV or NW)	Very common. Maximizes value for unconstrained project selection.	Difficult to compare projects of unequal lives or sizes.
Equivalent annuity (EA)	Brings all project NPVs to common footing. Convenient annual figure.	Assumes projects repeat to least common multiple of lives, or imputes salvage value.
Payback period	May be discounted or nondiscounted. Measure of exposure.	Ignores flows after payback is reached. Assumes standard project cash flow profile.
Benefit-to-cost ratio	Conceptually familiar. Brings all projects to common footing.	May be difficult to classify outlays between expense and investment.

Source: Compiled from Capital Budgeting and Long-Term Financing Decisions, 2nd ed., by N. E. Seitz © 1995. Reprinted with permission of South-Western College Publishing, a division of Thomson Learning.

"Costing" IT Investments

- Placing a dollar value on the cost of IT investments is not a simple task. One of the major issues is to allocate fixed costs among different IT projects. Fixed costs are those costs that remain the same in total regardless of change in the activity level.
- Another area of concern is the Life Cycle Cost; costs for keeping it running, dealing with bugs, and for improving and changing the system. Such costs can accumulate over many years, and sometimes they are not even anticipated when the investment is made.
- There are multiple kinds of values (tangible and intangible)
 - improved efficiency
 - improved customer relations
 - the return of a capital investment measured in dollars or percentage
 - many more ...
- Probability of obtaining a return depends on probability of implementation success

Intangible Benefits

• IT projects generate intangible benefits such as increased quality, faster product development, greater design flexibility, better customer service, or improved working conditions for employees. These are very desirable benefits, but it is difficult to quantify them with a monetary value. Intangible benefits can be very complex and substantial.

IT Economics - Business Case Approach

One method used to justify investments in projects is referred to as the business case approach. A business case is a written document used by managers to garner(모으다) funding for specific applications or projects. Its major emphasis is the justification for the required investment. It also provides the bridge between the initial plan and its execution by incorporating the foundation for tactical decision making and technology risk management.

- The business case helps:
 - clarify how the organization will use its resources
 - justify the investment
 - manage the risk
 - determine the fit of an IT project with the organization's mission

Investment Justification



- Constant growth and change.
- Shift from tangible to intangible benefits.
- Not a sure thing.
- Risk.
- Outsourcing.
- Increasing returns.

Increasing returns

Industries whose primary focus is IT, or that include large amounts of IT in their products, often operate under a paradigm of increasing returns. In contrast, industries that primarily produce physical outputs are subject to diminishing returns. Managers need to understand which paradigm applies to the products for which they are responsible and apply management strategies that are most appropriate.

Increasing return: 규모의 확대에 따라 이익이 점차적으로 증가

Diminishing return: 일정 크기의 토지에 노동력을 추가로 투입할 때, 수확량의 증가가 노동력의 증가를 따라가지 못하는 현상, 제조업의 경우, 제품을 더 많이 생산하기 위해 드는 단위당 비용이 점차 증가하는 현장



System Vulnerability (취약성)

The vulnerability of information systems is increasing as we move to a world of networked and especially wireless computing. Theoretically, there are hundreds of points in a corporate information system that can be subject to some threats.

- These threats can be classified as:
 - Unintentional
 - Human errors
 - Environmental hazards
 - Computer system failures

System Vulnerability

- Intentional
 - Theft of data
 - Inappropriate use of data
 - Theft of equipment and/or programs
 - Entering data
 - Processing data
 - Transferring data
 - Programming data
 - Labor strikes
 - Sabotage 일부러 파괴하는 것
 - Malicious damage to computer resources
 - Destruction from viruses and similar attacks
 - Internet fraud
 - Terrorists' attack

Difficulties - Protecting

TABLE 15.5 The Difficulties in Protecting Information Resources

- Hundreds of potential threats exist.
- Computing resources may be situated in many locations.
- Many individuals control information assets.
- Computer networks can be outside the organization and difficult to protect.
- Rapid technological changes make some controls obsolete as soon as they are installed.
- Many computer crimes are undetected for a long period of time, so it is difficult to learn from experience.
- People tend to violate security procedures because the procedures are inconvenient.
- Many computer criminals who are caught go unpunished, so there is no deterrent effect.
- The amount of computer knowledge necessary to commit computer crimes is usually minimal. As a matter of fact, one can learn hacking, for free, on the Internet.
- The cost of preventing hazards can be very high. Therefore, most organizations simply cannot afford to protect against all possible hazards.
- It is difficult to conduct a cost-benefit justification for controls before an attack occurs since it is difficult to assess the value of a hypothetical attack.

Defense Strategy – Internet Security

The major objective of border security is access control. Then authentication or proof of identity and finally authorization which determine the action or activities a user is allowed to perform.

1st layer



Network layer security

- Virus scanning
- Firewalls
- Intrusion
- Virtual private networking
- Denial-of-service protection



Proof of identity

- Username/passworg
- Password synchronization
- Public key
- Tokens
- Biometrics
- Single sign on

_	3rd layer	_
	Authorization	

Permissions based on identity

- User/group permissions
- Enterprise directories
- Enterprise user administration
- Rules-based access control

IT Security Trends

- Increasing the reliability of systems
- Self-healing computers
- Intelligent systems for early intrusion detection
- Intelligent systems in auditing and fraud detection
- Expert systems for diagnosis, prognosis, and disaster planning
- Smart cards

- To whom should the IS department report? This issue is related to the degree of IS decentralization and to the role of the CIO. Having the IS department reporting to a functional area may introduce biases in providing IT priorities to that functional area, which may not be justifiable.
- Who needs a CIO? This is a critical question that is related to the role of the CIO as a senior executive in the organization. Giving a title without authority can damage the ISD and its operation. Asking the IS director to assume a CIO's responsibility, but not giving the authority and title, can be just as damaging. Any organization that is heavily dependent on IT should have a CIO.
- End users are friends, not enemies, of the IS department. The relationship between end users and the ISD can be very delicate. In the past, many ISDs were known to be insensitive to end-user needs. This created a strong desire for end-user independence, which can be both expensive and ineffective.
- Ethical issues. The reporting relationship of the ISD can result in some unethical behavior. For example, if the ISD reports to the finance department, the finance department will have access to information about individuals or other departments that could be misused.

- Responsibilities for security should be assigned in all areas. The more organizations use the Internet, extranets, and intranets, the greater are the security issues. It is important to make sure that employees know who is responsible and accountable for what information and that they understand the need for security control. The vast majority of information resources is in the hands of end users. Therefore, functional managers must understand and practice IT security management and other proper asset management tasks.
- Security awareness programs are important for any organization, especially if it is heavily dependent on IT. Such programs should be corporate wide and supported by senior executives. In addition, monitoring security measures and ensuring compliance with administrative controls are essential to the success of any security plan. For many people, following administrative controls means additional work, which they prefer not to do.
- Auditing information systems should be institutionalized into the organizational culture. Organizations should audit IS because it can save considerable amounts of money. Conversely, over-auditing is not cost-effective.

Multinational corporations. Organizing the ISD in a multinational corporation is a complex issue. Some organizations prefer a complete decentralization, having an ISD in each country or even several ISDs in one country. Others keep a minimum of centralized staff. Some companies prefer a highly centralized structure. Legal issues, government constraints, and the size of the IS staff are some factors that determine the degree of decentralization.

Organizational Issues

IT Positive Effects Only?

We assume that organizations will reap the fruits of new technology and that computers have no major negative impact. But is this really true?

- Will society have any control over the deployment of technology?
- Who will investigate the costs and risks of technologies?
- What impact will IT have on employment levels?
- What impact will IT have on the quality of life?

Impacts on Organizations

The use of computers and information technology has brought many changes to organizations.

- The manager's job
- Organizational structure, authority and power
- Job content
- Employee career paths
- Supervision

The Manager's Job

The most important task of managers is making decisions. IT changes the manner in which many decisions are made.

- Automation of routine decisions
- More rapid identification of problems and opportunities
- Less reliance on experts to provide support to top executives.
- Thinner organizations.
- Organizational intelligence that is more timely, comprehensive, accurate, and available