UNIT 7

UNDERSTANDING THE BUSINESS VALUE OF SYSTEMS

LESSON STRUCTURE

Contents

7.0 Objective

After going through this unit you should be able to

- Understand the several different values for business firms
- Know about the traditional capital budgeting model
- Learn Strategic Considerations and Portfolio analysis.

7.1 Introduction

Information systems can have several different values for business firms. A consistently strong information technology infrastructure can, over the long term, play an important strategic role in the life of the firm. Considered less grandly, information systems can simply facilitate a firm's survival.

It is important also to realize that systems can have value but that the firm may not capture all or even some of the value. Although system projects can result in firm benefits, such as profitability and productivity, some or all of the benefits can go directly to the consumer in the form of lower prices or more reliable services and products (Hitt and Brynjolfsson, 1996). Society can reward firms that enhance consumer surplus by allowing them to survive or by rewarding them with increases in business revenues. But from a management point of view, the challenge is to retain as much of the benefit of systems investments as is feasible in current market conditions.

The worth of systems from a financial perspective essentially revolves around the question of return on invested capital. The value of systems comes down to one question: Does a particular IT investment produce sufficient returns to justify its costs? There are many problems with this approach, not the least of which is how to estimate benefits and count the costs.

7.2 Capital Budgeting Models

Capital budgeting models are one of several techniques used to measure the value of investing in long-term capital investment projects. The process of analyzing and selecting various proposals for capital expenditures is called **capital budgeting**. Firms invest in capital projects to expand production to meet anticipated demand or to modernize production equipment to reduce costs. Firms also invest in capital projects for many noneconomic reasons, such as installing pollution control equipment, converting to a human resources database to meet some government regulations, or satisfying nonmarket public demands. Information systems are considered long-term capital investment projects.

Six capital budgeting models are used to evaluate capital projects:

- The payback method
- The accounting rate of return on investment (ROI)
- The cost-benefit ratio
- The net present value
- The profitability index
- The internal rate of return (IRR)

All capital budgeting methods rely on measures of cash flows into and out of the firm. Capital projects generate cash flows into and out of the firm. The investment cost is an immediate cash outflow caused by the purchase of the capital equipment. In subsequent years, the investment may cause additional cash outflows that will be balanced by cash inflows resulting from the investment. Cash inflows take the form of increased sales of more products (for reasons such as new products, higher quality, or increasing market share) or reduced costs in production and operations.

The difference between cash outflows and cash inflows is used for calculating the financial worth of an investment. Once the cash flows have been established, several alternative methods are available for comparing different projects and deciding about the investment.

Financial models assume that all relevant alternatives have been examined, that all costs and benefits are known, and that these costs and benefits can be expressed in a common metric, specifically, money. When one has to choose among many complex alternatives, these assumptions are rarely met in the real world, although they may be approximated.

The given below table lists some of the more common costs and benefits of systems. Tangible benefits can be quantified and assigned a monetary value. Intangible benefits, such as more efficient customer service or enhanced decision making, cannot be immediately quantified but may lead to quantifiable gains in the long run.

Costs	**Intangible Benefits**
Hardware	Improved asset utilization
Telecommunications	Improved resource control
Software	Improved organizational planning
Services	Increased organizational flexibility
Personnel	More timely information

Tangible Benefits (cost savings)	More information
Increased productivity	Increased organizational learning
Lower operational costs	Legal requirements attained
Reduced workforce	Enhanced employee goodwill
Lower computer expenses	Increased job satisfaction
Lower outside vendor costs	Improved decision making
Lower clerical and professional costs	Improved operations
Reduced rate of growth in expenses	Higher client satisfaction
Reduced facility costs	Better corporate image

Limitations of Financial Models

Many well-known problems emerge when financial analysis is applied to information systems . Financial models do not express the risks and uncertainty of their own cost and benefits estimates. Costs and benefits do not occur in the same time frame—costs tend to be upfront and tangible, whereas benefits tend to be back loaded and intangible. Inflation may affect costs and benefits differently. Technology—especially information technology—can change during the course of the project, causing estimates to vary greatly. Intangible benefits are difficult to quantify. These factors play havoc with financial models.

The difficulties of measuring intangible benefits give financial models an application bias: Transaction and clerical systems that displace labor and save space always produce more measurable, tangible benefits than management information systems, decision-support systems, or computer-supported collaborative work systems

There is some reason to believe that investment in information technology requires special consideration in financial modeling. Capital budgeting historically concerned itself with manufacturing equipment and other long-term investments, such as electrical generating facilities and telephone networks. These investments had expected lives of more than one year and up to 25 years. However, information systems differ from manufacturing systems in that their life expectancy is shorter. The very high rate of technological change in computer-based information systems means that most systems are seriously out of date in five to eight years.

The high rate of technological obsolescence in budgeting for systems means simply that the payback period must be shorter and the rates of return higher than typical capital projects with much longer useful lives.

7.2.1 The Payback Method

The payback method is quite simple: It is a measure of the time required to pay back the initial investment of a project. The payback period is computed as

Original investment / Annual net cash inflow = number of years payback

The payback method is a popular method because of its simplicity and power as an initial screening method. It is especially good for high-risk projects in which the useful life of a project is difficult to determine. If a project pays for itself in two years, then it matters less how long after two years the system lasts.

The weakness of this measure is its virtues: The method ignores the time value of money, the amount of cash flow after the payback period, the disposal value (usually zero with computer systems), and the profitability of the investment.

7.2.2 Accounting Rate of Return on Investment (ROI)

Firms make capital investments to earn a satisfactory rate of return. Determining a satisfactory rate of return depends on the cost of borrowing money, but other factors can enter into the equation. Such factors include the historic rates of return expected by the firm. In the long run, the desired rate of return must equal or exceed the cost of capital in the marketplace. Otherwise, no one will lend the firm money.

The accounting rate of return on investment (ROI) calculates the rate of return from an investment by adjusting the cash inflows produced by the investment for depreciation. It gives an approximation of the accounting income earned by the project..

To find the ROI, first calculate the average net benefit. The formula for the average net benefit is as follows

(Total Benefits - Total Cost – Depreciation) /Useful Life = Net Benefit

This net benefit is divided by the total initial investment to arrive at ROI.
The for-mula is :

Net Benefit / Total Initial Investment = ROI

7.2.3Net Present Value

Evaluating a capital project requires that the cost of an investment (a cash outflow usually in year 0) be compared with the net cash inflows that occur many years later. But these two kinds of inflows are not directly comparable because of the time value of money. Money you have been promised to receive three, four, and five years from now is not worth as much as money received today. Money received in the future has to be discounted by some appropriate percentage rate—usually the prevailing interest rate, or sometimes the cost of capital. Present value is the value in current dollars of a payment or stream of payments to be received in the future. It can be calculated by using the following formula:

$$Payment * (1-(1+1*interest)^{-n}) /interest = Present\ Value$$

Thus, to compare the investment (made in today's dollars) with future savings or earnings, you need to discount the earnings to their present value and then calculate the net present value of the investment. The net present value is the amount of money an investment is worth, taking into account its cost, earnings, and the time value of money. The formula for net present value is

Present value of expected cash flows – Initial investment cost = Net present value

7.2.4 Cost-Benefit Ratio

A simple method for calculating the returns from a capital expenditure is to calculate the cost-benefit ratio, which is the ratio of benefits to costs. The formula is

(Total Benefits)/ (Total Cost) = Cost Benefit ratio

7.2.5 Profitability Index

One limitation of net present value is that it provides no measure of profitability. Neither does it provide a way to rank order different possible investments. One simple solution is provided by the profitability index. The profitability index is calculated by dividing the present value of the total cash inflow from an investment by the initial cost of the investment. The result can be used to compare the profitability of alternative investments.

(Present value of Cash inflows)/investment = Profitability index

7.2.6 Internal Rate of Return (IRR)

Internal rate of return is a variation of the net present value method. It takes into account the time value of money. Internal rate of return (IRR) is defined as the rate of return or profit that an investment is expected to earn. IRR is the discount (interest) rate that will equate the present value of the project's future cash flows to the initial cost of the project

7.3Strategic Considerations

Other methods of selecting and evaluating information system investments involve strategic considerations that are not addressed by traditional capital budgeting methods. When the firm has several alternative investments from which to select, it can employ portfolio analysis and scoring models. It can apply real options pricing models to IT investments that are highly uncertain or use a knowledge value-added approach to measure the benefits of changes to business processes. Several of these methods can be used in combination.

7.4 Portfolio Analysis

Rather than using capital budgeting, a second way of selecting among alternative projects is to consider the firm as having a portfolio of potential applications. Each application carries risks and benefits. The portfolio can be described as having a certain profile of risk and benefit to the firm. Although there is no ideal profile for all firms, information-intensive industries (e.g., finance) should have a few high-risk, high-benefit projects to ensure that they stay current with technology. Firms in non-information-intensive industries should focus on high-benefit, low-risk projects. Risks are not necessarily bad. They are tolerable as long as the benefits are commensurate.

Once strategic analyses have determined the overall direction of systems development, a portfolio analysis can be used to select alternatives. Obviously, one can begin by focusing on systems of high benefit and low risk. These promise early returns and low risks. Second, high-benefit, high-risk systems should be examined; low-benefit, high-risk systems should be totally avoided; and low-benefit, low-risk systems should be reexamined for the possibility of rebuilding and replacing them with more desirable systems having higher benefits.

The Importance of Change Management in Information System Success and Failure

Benefits from information technology investments will be reduced if firms do not consider the costs of organizational change associated with a new system or make these changes effectively (Ryan and Harrison, 2000; Irani and Love, 2000–2001). The introduction or alteration of an information system has a powerful behavioral and organizational impact. It transforms how

various individuals and groups perform and interact. Changes in the way that information is defined, accessed, and used to manage the organization's resources often lead to new distributions of authority and power. This internal organizational change breeds resistance and opposition and can lead to the demise of an otherwise good system.

A very large percentage of information systems fail to deliver benefits or to solve the problems for which they were intended because the process of organizational change surrounding system-building was not properly addressed. Successful system-building requires careful change management.

Information System Problem Areas

The problems causing information system failure fall into multiple categories. The major problem areas are design, data, cost, and operations.

Design

The actual design of the system may fail to capture essential business requirements or improve organizational performance. Information may not be provided quickly enough to be helpful; it may be in a format that is impossible to digest and use; or it may represent the wrong pieces of data.

The way in which nontechnical business users must interact with the system may be excessively complicated and discouraging. A system may be designed with a poor user interface. The user interface is the part of the system with which end users interact. For example, an input form or an on-line data entry screen may be so poorly arranged that no one wants to submit data. The procedures to request on-line information retrieval may be so unintelligible that users are too frustrated to make requests. Web sites may discourage visitors from exploring further if Web pages are cluttered and poorly arranged or users can't easily find the information they are seeking. The Manager's Toolkit provides some guidelines for effective Web page design.

An information system will be judged a failure if its design is not compatible with the structure, culture, and goals of the organization as a whole. Historically, information system design has been preoccupied with technical issues at the expense of organizational concerns. The result has often been information systems that are technically excellent but incompatible with their organization's structure, culture, and goals. Without a close organizational fit, such systems create tensions, instability, and conflict.

Data

The data in the system may have a high level of inaccuracy or inconsistency. The information in certain fields may be erroneous or ambiguous; or it may not be organized properly for business purposes. Information required for a specific business function may be inaccessible because the data are incomplete.

Cost

Some systems operate quite smoothly, but their cost to implement and run on a production basis may be way over budget. Other system projects may be too costly to complete. In both cases, the excessive expenditures cannot be justified by the demonstrated business value of the information they provide.

Operations

The system does not run well. Information is not provided in a timely and efficient manner because the computer operations that handle information processing break down. Jobs that abort too often lead to excessive reruns and delayed or missed schedules for delivery of information. An on-line system may be operationally inadequate because the response time is too long.

Some of these problems can be attributed to technical features of information systems but most stem from organizational factors. System builders need to understand these organizational issues and learn how to manage the change associated with a new information system.

Change Management and the Concept of Implementation

To effectively manage the organizational change surrounding the introduction of a new information system, one must examine the process of implementation. Implementation refers to all organizational activities working toward the adoption, management of an innovation such as a new information system. In the implementation process, the systems analyst is a change agent. The analyst not only develops technical solutions but also redefines the configurations, interactions, job activities, and power relationships of various organizational groups. The analyst is the catalyst for the entire change process and is responsible for ensuring that the changes created by a new system are accepted by all parties involved. The change agent communicates with users, mediates between competing interest groups, and ensures that the organizational adjustment to such changes is complete.

One model of the implementation process is the **Kolb/Frohman model** of organizational change. This model divides the process of organizational change into a seven-stage relationship between an organizational consultant and his or her client. (The consultant corresponds to the information system designer and the client to the user.) The success of the change effort is determined by how well the consultant and client deal with the key issues at each stage (Kolb and Frohman, 1970). Other models of implementation describe the relationship as one between designers, clients, and decision makers, who are responsible for managing the implementation effort to bridge the gap between design and utilization (Swanson, 1988).

Causes of Implementation Success and Failure

Implementation outcome can be largely determined by the following factors:

- The role of users in the implementation process
- The degree of management support for the implementation effort
- The level of complexity and risk of the implementation project
- The quality of management of the implementation process

7.5 Summary

Managers must link systems development to the organization's strategy and identify precisely which systems should be changed to achieve large-scale benefits for the organization as a whole. Two principal reasons for system failure are inadequate management support and poor management of the implementation process. Managers should fully understand the level of complexity and risk in new systems projects as well as their potential business value.

Building an information system is a process of planned organizational change. Many levels of organizational change are possible. Global systems, enterprise systems, supply chain and customer relationship management systems, and business process reengineering projects are high-risk implementations because they require far-reaching organizational changes that are often resisted by members of the organization. Eliciting user support and maintaining an appropriate level of user involvement at all stages of system building are essential.

Selecting the right technology for a system solution that fits the problem's constraints and the organization's information technology infrastructure is a key business decision. Systems sometimes fail because the technology is too complex or sophisticated to be easily implemented or because system builders lack the requisite skills or experience to work with it. Managers and systems builders should be fully aware of the risks and rewards of various technologies as they make their technology selections.

7.6 Questions for Exercise

Q1) Define Capital Budgeting. Define Tangible and Intangible benefits for an Information System.

Q2) Discuss the six capital budgeting models which are used to evaluate capital projects.

Q3) what are the limitation of Financial Model.

Q4) Discuss Portfolio Analysis.

Q5) Discuss the Importance of Change Management in Information System Success and Failure.

7.7 Further Reading

1) Management Information Systems, Loudon and Loudon, 10th edition, Pearsons Educations
2) J. O'Brian, Management Information Systems: Managing Information Technology in the Networked Enterprise (3rd Ed), Irwin, 1996.
3) Management Information Systems, Jaswal Oxford Press
4) Robert Schultheis & Mary Sumner, Management Information Systems-The Manager's View, Tata McGraw Hill, New Delhi