By: Shweta Tiwari

SPM: SOFTWARE PROJECT MANAGEMENT

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Strategic Assessment

2.1 Strategic assessment

Project evaluation is a systematic method for collecting, analyzing, and using information to answer questions about projects, policies and programs, particularly about their effectiveness and efficiency.

✓ Project evaluation is a high level assessment of the project
- ❖ to see whether it is worthwhile to proceed with the project
- ❖ to see whether the project will fit in the strategic planning of the whole organization

- Project evaluation is normally carried out in step 0 of stepwise
- Project evaluation is a step by step process of collecting, recording and organizing information about
  - Project results
  - short - term outputs (immediate results of activities or project deliverables)
  - Long – term outputs (changes in behaviour , practice or policy resulting from the result.

Why is project evaluation important:

Project evaluation is important for answering the following questions-

- what progress has been made?
- were the desired outcomes achieved? Why?
- whether the project can be refined to achieve better outcomes?
- do the project results justify the project inputs?

Project evaluation is used to
- ❖ Want to decide whether a project can proceed before it is too late
- ❖ Want to decide which of the several alternative projects has a better success rate, a higher turnover, a higher ...
- ❖ Is it desirable to carry out the development and operation of the software system?

Project evaluation is done by

- Senior management
- Project manager/coordinator
- Team leader

Project evaluation

- Strategic assessment
- Technical assessment
- Economic assessment

STRATEGIC PLANNING

Strategic planning is defined as an organization's process of defining its strategy , or direction and making decisions on allocating its resources to pursue this strategy, including its capital and people

it deals with:

- what do we do?
- for whom do we do it?
- how do we excel?

STRATEGIC ASSESSMENT

Strategic assessment is the first criteria for project evaluation

- For evaluating and managing the projects, the individual projects should be seen as components of a programme. Hence need to do programme management.

Programme management:

- D.C. Ferns defined "a programme as a group of projects that are managed in a co-ordinated way to gain benefits that would not be possible were the projects to be managed independently".
- A programme in this context is a "collection of projects that all contribute to the same overall organization goals".
- Effective programme management requires that there is a well defined programme goal and that all the organization's projects are selected and tuned to contribure to this goal"

Evaluating of project is depends on:

- How it contributes to programme goal.
- It is viability [capability of developing or useful].
- Timing.
- Resourcing.

For successful strategic assessment, there should be a strategic plan which defines:

- Organization's objectives.
- Provides context for defining programme .
- Provides context for defining programme goals.
- Provide context for accessing individual project.

In large organization, programme management is taken care by programme director and programme executive, rather than, project manager, who will be responsible for the strategic assessment of project. Any potential software system will form part of the user organization's overall information system and must be evaluated within the context of existing information system and the organization's information strategy. If a well – defined information system does not exist then the system development and the assessment of project proposals will be based on a more "piece meal approach". Piece meal approach is one in which each project being individually early in its life cycle.

Typical issues and questions to be considered during strategic assessment

- Issue – 1: objectives:
  - How will the proposed system contribute to the organization's stated objectives? How, for example, might it contribute to an increase in market share?
- Issue – 2: is plan

  How does the proposed system fit in to the IS plan? Which existing system (s) will it replace/interface with? How will it interact with systems proposed for the later development?
- Issue – 3: organization structure:
  - What effect will the new system have on the existing departmental and organization structure?
  - For example, a new sales order processing system overlap existing sales and stock control functions?
- Issue – 4: MIS:
  - What information will the system provide and at what levels in the organization? In what ways will it complement or enhance existing management information system?
- Issue – 5: personnel:
  - In what way will the system proposed system affect manning levels and the existing employee skill base? What are the implications for the organization's overall policy on staff development.
- Issue – 6: image:
  - What, if any, will be the effect on customer's attitudes towards the organization? Will the adoption of, say, automated system conflict with the objectives of providing a friendly service?

Portfolio management

Project Portfolio management provides an overview of all the projects that an organization is undertaking or is considering. It prioritizes the allocation of resources to projects and decides which projects should be accepted and which existing ones should be dropped.

The concerns of Project Portfolio management include:

- Identifying which project proposals are worth implementation;
- Assessing the amount of risk of failure that a potential project has;
- Deciding how to share limited resources, including staff time and finance, between projects;
- Being aware of the dependencies between projects;
- Ensuring that projects do not duplicate benefits;
- Ensuring that necessary developments have been inadvertently been missed.

The three key aspects of Project Portfolio management are:

1. Portfolio definition
2. Portfolio management
3. Portfolio optimization

2.2 Technical Assessment

Technical assessment is the second criteria for evaluating the project.Technical assessment of a proposed system evaluates **functionality** against available:

- Hardware
- Software

- Limitations
  - Nature of solutions produced by strategic information systems plan
  - Cost of solution. Hence undergoes cost-benefit analysis.

It is also referred as Technology Evaluation. The Technology Assessment is a write up on the technical aspects of the project sector and planned technical purchases. Technology is defined broadly here to include: equipment, tools, products, processes, raw materials, skills, and ways of organizing production.

Assessing Technology Planning:

- Analyze Technology Needs
- Planning for Change and Technology
- Assessing a Technology Plan Before and After Implementation

Why it is important:

- It's a tool to Identify the Problem
  - At the core of any project is a series of big and small problems that need to be addressed (ex: not enough production capacity, staff lacks required skills, overly expensive transportation, etc.)
  - Reviewing the production process including the systems and equipment in place provides transparency into what some of the constraints are. Some will be obvious, but others may be hidden until you take a closer look.
  - Not all constraints will be technical, so this is just one investigative tool needed.
- It's a tool to Identify the Best Solution
  - Once you know what the technical problems are, you can start to look for solutions.
  - The Technology Assessment provides the opportunity to explore potential solutions (ex: new equipment choices, new crop varieties, new fertilizers, changes in process, etc.)
  - The grantee often has a solution in mind when they propose the project, but further analysis can lead to more creative, better fitting, and more cost effective solutions.

- The grant budget is limited, so looking at the options in a systematic way helps the grantee understand the tradeoffs with implementing one technical solution or another. Knowing this, they can make more informed decisions about using scarce budget resources.

➢ It's a tool for Communication

- The write-up documents the background work and thinking on technical issues that has gone into the project design and budget.

  (1) The more people understand the logic of the proposal, the more they can help brainstorm on solutions or help catch problems that might not have been fully addressed.
  (2) A clear presentation will reduce questions from ADFW on the project proposal and will help them better understand the design choices despite not being present for all of the partner discussions with the grantee.

- It serves as a record and resource for the grantee in case they need to go back and reconsider the options at a later date.

Purpose:

- Technology assessment provides an organization with information about the profitability of current technology as well as the benefits of implementing new technology.
- Ineffective technology needs to be upgraded or replaced for businesses to produce quality products or services.

Types of Assessments:

Technology assessment can happen on several levels: flexibility, longevity and upgrade and scale-assessments. To assure that an organization can remain competitive, every aspect of its technology system must be in excellent operating condition. Assessment on all four levels improves the chances of this happening.

- **Flexibility/Longevity**

  Flexibility assessment examines how technology will adapt to new levels of applications and other technology systems.

  Longevity assessment provides information on how long the technology will last.

- **Upgrade/Scale Assessments**

  An upgrade assessment determines the ability of the technology to function with the addition of new, advanced features and equipment.

  Scale assessment considers how well the technology can operate in a larger, ever-growing network of systems. The growth of an organization means developing a

larger technology system. New technology must be able to be incorporated into new, expanding networks.

Evaluate the technology options on the following factors:

- Fixed capital costs
- Source of equipment
- Operation, maintenance, and replacement costs
- Scale of production and expected capacity use rate
- Reliability
- Labor intensiveness (labor costs, productivity, and employment generation)
- Types and amounts of inputs required
- Raw material availability, sustainability, and cost
- Effects on product quality, cost and marketability
- Foreign exchange requirements and availability
- Natural resource requirements and sustainability
- Compatibility with existing technology in use
- Human resource requirement (training and technical assistance costs, management and supervision costs, etc)

2.3 Cost Benefit Analysis

Economic Assessment:

- Consider whether the project is the best among other options
- Prioritise the projects so that the resources can be allocated effectively if several projects are underway
- The economic assessment can be done by the following ways:
  - ✓ Cost-benefit analysis
  - ✓ Cash flow forecasting
  - ✓ Various cost-benefit evaluation techniques

Cost benefit analysis:

- It is one of the important and common way of carrying "economic assessment" of a proposed information system.

- This is done by comparing the expected costs of development and operation of the system with its benefits.
- Any project aiming at return on investment must provide a greater benefit than putting that investment in a bank.
- So it takes an account:
    - Expected cost of development of system
    - Expected cost of operation of system
    - Benefits obtained
- Assessment is based on:
    - Whether the estimated costs are executed by the estimated income.
    - And by other benefits
- For achieving benefit where there is a scarce resource, projects will be prioritized and resources are allocated effectively.
- The standard way of evaluating economic benefits of any project is done by "cost benefit analysis"
- Cost benefit analysis comprises of two steps:

    Step-1: identifying and estimating all of the costs and benefits of carrying out the project.

    Step-2: expressing these costs and benefits in common units.

Step-1:

It includes

- Development cost of system.
- Operating cost of system.
- Benefits obtained by system.

When new system is developed by the proposed system, then new system should reflect the above three as same as proposed system.

Example: sales order processing system which gives benefit due to use of new system.

Step-2:

- Calculates net benefit.
- Net benefit = total benefit = total cost.
- cost should be expressed in monetary terms.

Three types of cost

1. **Development costs:** includes salary and other employment cost of staff involved.
2. **Setup costs**: includes the cost of implementation of system such as hardware, and also file conversion, recruitment and staff training.
3. **Operational cost**: cost require to operate system, after it is installed.

Three categories of benefits:

1. **Direct benefits**: directly obtained benefit by making use of/operating the system.
   Example: reduction of salary bills, through the introduction of a new , computerized system.
2. **Assessable indirect benefits**: these benefits are obtained due to updation / upgrading the performance of current system. It is also referred as "secondary benefits".
   Example: "use of user – friendly screen", which promotes reduction in errors, thus

increases the benefit

3. **Intangible benefits:** these benefits are longer term, difficult to quantify. It is also referred as "indirect benefits".

   Example: enhanced job interest leads reduction of staff turnover, inturn leads lower recruitment costs.

Benefits management:

Benefit management encompasses the identification, optimization and tracking of the expected benefits from a business change in order to ensure that they are actually achieved. To do this, we must:

- Define the expected benefits from the programme;
- Analyze the balance between costs and benefits;
- Plan how the benefits will be achieved and measured;
- Allocate responsibilities for the successful delivery of the benefits;
- Monitor the realization of the of the benefits.

Benefits can be of many different types, including

- ❖ Mandatory compliance
- ❖ Quality of service
- ❖ Productivity
- ❖ More motivated work force
- ❖ Internal management benefits
- ❖ Risk reduction
- ❖ Economy
- ❖ Revenue enhancement/acceleration
- ❖ Strategic fit

A change could have more than one of these types of benefit. In fact, benefits are often inter-liked. An example of this is an insurance company which introduced a facility whereby when settling claims for damage to property, they directly arranged for constructors to carry out the remedial work. This improved quality of service for customers as it saved them the trouble of locating a reputable contractor, reduced costs to the insurance company because they could take advantage of the bulk purchase of services and improved staff morale because of the goodwill generated between the insurance company's front-line staff and the customer.

Quantifying benefits

We have already seen that benefits can be:

- **Quantified and valued** – that is, a direct financial benefit is experienced
- **Quantified but not valued** – for example, a decrease in the number of customer complaints
- **Identified but not easily quantified** – for example, public approval of the organization in the locality where it is based.

A particular activity might also have **disbenefits**. For example, increased sales might mean that more money has to be spent on expensive overtime working. The need for **benefit profiles** is that estimate when and how benefits will be experienced. Specific staff have to be allocated responsibility for ensuring that the planned benefits actually materialize.

Benefit cannot normally be monitored in a purely project environment because the project will almost certainly have been officially closed before the benefits start to filter through. Benefit management brings to the fore the powerful idea that developers and users are jointly responsible for ensuring the delivery of the benefits of projects.

2.4 Cash Flow Forecasting

Economic Assessment:

- Consider whether the project is the best among other options
- Prioritise the projects so that the resources can be allocated effectively if several projects are underway
- The economic assessment can be done by the following ways:
  - ✓ Cost-benefit analysis
  - ✓ Cash flow forecasting
  - ✓ Various cost-benefit evaluation techniques

We have already discussed about the cost benefit analysis. In this session, we are going to discuss about the Cash flow forecasting.

Cash flow forecasting

As important as estimating the overall costs and benefits of a project is producing a cash flow forecast which indicates when expenditure and income will take place. It estimate overall cost and benefits of a product with respect to time.

- Negative cash flow during development stage.
- Positive cash flow during operating life.

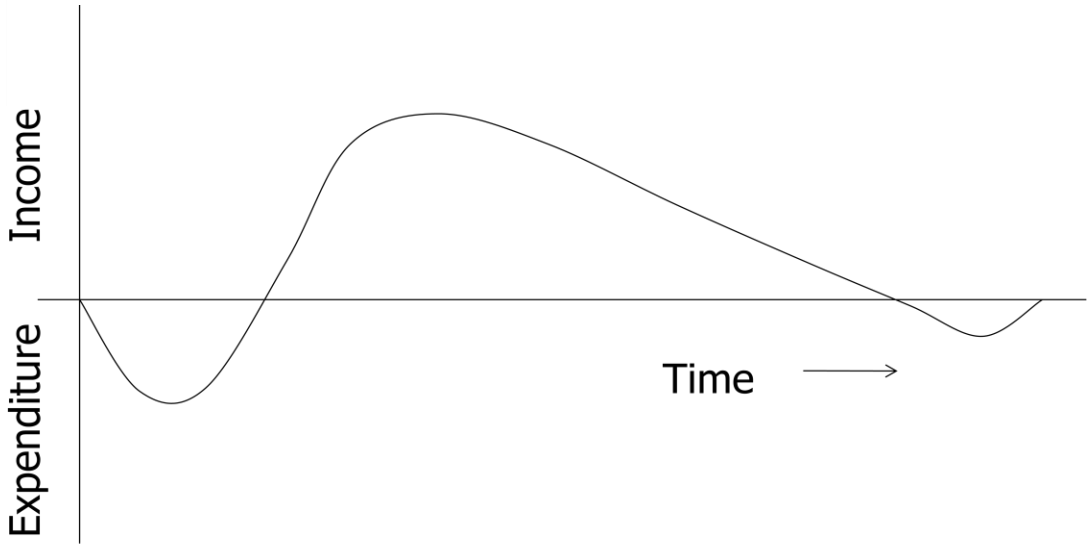
During development stage

- Staff wages
- Borrowing money from bank
- Paying interest to bank
- Payment of salaries
- Amount spent for installation, buying hardware and software

Income is expected by 2 ways.

- Payment on completion
- Stage payment

The difficulty and importance of cash flow forecasting is evidenced by the number of companies that suffer bankruptcy because, although they are developing profitable products or services, they cannot sustain an unplanned negative cash flow.



When estimating future cash flows, it is usual to ignore the effects of inflation. Forecasts of inflation rates tend to be uncertain. Moreover, if expenditure is increased due to inflation it is likely that income will increase proportionately.

Example:

The following table illustrates cash flow forecasts for three projects. In each case it is assumed that that the cash flows take place at the end of each year. Here negative values represent expenditure and positive values represent income.

Year	Project1	Project2	project3
0	-100000	-1,000,000	-120000
1	10,000	2,00000	30,000
2	10,000	2,00000	30,000
3	10,000	2,00000	30,000
4	20,000	2,00000	30,000
5	100000	3,00000	75,000

Cash flow forecasting or **cash flow management** is a key aspect of financial management of a business, planning its future cash requirements to avoid a crisis of liquidity.

Cash flow forecasting is important because if a business runs out of cash and is not able to obtain new finance, it will become insolvent. It is no excuse for management to claim that they didn't see a cash flow crisis coming. So in business, "cash is king". Cash flow is the life-blood of all businesses—particularly start-ups and small enterprises. As a result, it is essential that management forecast (predict) what is going to happen to cash flow to make sure the business has enough to survive. How often management should forecast cash flow is dependent on the financial security of the business. If the business is struggling, or is keeping a watchful eye on its finances, the business

owner should be forecasting and revising his or her cash flow on a daily basis. However, if the finances of the business are more stable and 'safe', then forecasting and revising cash flow weekly or monthly is enough. Here are the key reasons why a cash flow forecast is so important:

- Identify potential shortfalls in cash balances in advance—think of the cash flow forecast as an "early warning system". This is, by far, the most important reason for a cash flow forecast.
- Make sure that the business can afford to pay suppliers and employees. Suppliers who don't get paid will soon stop supplying the business; it is even worse if employees are not paid on time.
- Spot problems with customer payments—preparing the forecast encourages the business to look at how quickly customers are paying their debts. Note—this is not really a problem for businesses (like retailers) that take most of their sales in cash/credit cards at the point of sale.
- As an important discipline of financial planning—the cash flow forecast is an important management process, similar to preparing business budgets.
- External stakeholders such as banks may require a regular forecast. Certainly, if the business has a bank loan, the bank will want to look at the cash flow forecast at regular intervals.

Components that Should be Considered when Developing a Cash Flow Forecast

Development of Cash Forecasting Procedures

Cash forecasting procedures should be developed so that the most current information (such as accounts payable and accounts receivable) is reflected in the forecasts and that the forecasts are as accurate as possible. One component that should be considered is a cheque-clearing system that can derive statistics from the accounts payable system, and the bank clearing data.

Computerized Forecasting System

Information systems should be in place to ensure the current information can be gathered and updated promptly for accurate cash forecasts. Cash management systems and procedures should make use of appropriate and modern administrative practices. Staff involved in these positions should have the ability to work and maintain these systems.

Long-Term Cash Flows

Both short and long-term cash forecasts should be prepared to support short and long term investment decisions. It is important for those purchasing and selling investments to know when to match the maturity dates with the dates of cash requirements or surpluses. The cash forecasting system should provide at least a one-year rolling cash forecast that should be constantly updated for changes. The annual cash flow forecast will be changed to include all cash inflows in addition to outflows.

Variance Reporting of Cash Forecasts

Significant variances between actual and forecasted cash flows should be measured, monitored, and reported on an on-going basis to management. The performance indicators should be included in the appropriate program overview. The variances should be recorded and explained – what caused the variance to happen, along with solutions if required to correct the variance, and establish actions to avoid a recurrence if required.

Steps to Preparing a Cash Flow Forecast

1. Examine previous years monthly financial data

- For an accurate prediction, previous monthly financial data should be examined when forecasting the succeeding year's potential receipts and disbursements.

2. Design a cash flow work sheet

- Helps organize cash flows through projected receipts and accounts receivable.

3. Consider cash flow receipts

- For new operations (i.e. programs), the average monthly revenues of a similar size municipality or operation in Nova Scotia can be compared as a benchmark.

- For existing operations, receipts from the same month in a previous year, adjusting for any current circumstances for that month in the succeeding year.

- Cash receipts can be predicted by taking into consideration tax bill due dates, tax sale dates, and expected payment dates of transfers from other governments.

4. Consider cash flow disbursements

- Municipalities should only show the cash you expect to pay out each month.

  - Cash disbursements can be predicted by using past year's payroll information and pay dates for the coming year, information on transfers to other governments and their due dates, and information on other contractual payments (for example: debt charges or rental charges).

- For example, if the municipality is paying the supplier in 30 days, the cash payouts for January's purchases will be shown in February. If you can obtain trade credit for longer terms, then cash outlays will appear two or even three months after the purchase has been received and invoiced.

5. Reconciliation of the cash receipts to cash disbursements

- The reconciliation section of the cash flow worksheet begins by showing the balance carried over from the previous months' operations.

- The total of the current months' receipts are added and the total of the current month's disbursements are subtracted. This adjusted balance will be carried forward to the next months' disbursements. This adjusted balance will be carried forward to the first line of the reconciliation portion of the next month to become the base where the next month's cash flow activity will be added and/or subtracted.

- Cash flows should be managed to maintain minimum balance requirements.

6. Cash flow maintenance

- Cash flow forecasts should be revised on an ongoing basis and should be constantly modified to current circumstances and new conditions.

- At the end of each month, actual cash flow figures should be compared to the planned figures to determine if there is a great discrepancy between the two sets of figures.

- If significant variances exist, they should be analyzed, and assumptions should be adjusted to reflect the actual figures more closely.

2.5 cost-benefit evaluation techniques

Economic Assessment:

- Consider whether the project is the best among other options
- Prioritise the projects so that the resources can be allocated effectively if several projects are underway
- The economic assessment can be done by the following ways:
  - ✓ Cost-benefit analysis
  - ✓ Cash flow forecasting
  - ✓ Various cost-benefit evaluation techniques

We have already discussed about the cost benefit analysis and Cash flow forecasting. In this session, we are going to discuss about the various cost-benefit evaluation techniques.

Cost-benefit evaluation techniques:

It consider

- the timing of the costs and benefits
- the benefits relative to the size of the investment

Common method for comparing projects on the basic of their cash flow forecasting.

1) Net profit
2) Payback Period
3) Return on investment
4) Net present Value
5) Internal rate of return

Net profit

- ❖ Net profit is calculated by subtracting a company's total expenses from total income.
- ❖ Showing what the company has earned (or lost) in a given period of time (usually one year). **also called** net income or net earnings.

Net profit= total incomes - total costs

Example:

The following table illustrates cash flow forecasts for three projects. In each case it is assumed that that the cash flows take place at the end of each year. Here negative values represent expenditure and positive values represent income.

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5	100000	3,00000	75,000

Calculate net profit.(-ive total cost or total investment)

Net profit= total incomes - total costs

- For project1, total income = 10,000+10,000+10,000+20,000+1,00000=1,50000
  Total cost = 1,00000
  Net profit = 1,50000-1,00000=Rs.50000
- For project2, total income = 2,00000+2,00000+2,00000+2,00000+3,00000=1,100,000
  Total cost = 1,000,000
  Net profit = 1,100,000-1,000,000=Rs.100000
- For project2, total income = 30,000+30,000+30,000+30,000+30,000+75,000=1,95000
  Total cost = 1,20000
  Net profit = 1,95000-1,20000=Rs.75,000

Year	Project1	Project2	project3
0	-100000	-1,000,000	-120000
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2	10,000	2,00000	30,000
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4	20,000	2,00000	30,000
5	100000	3,00000	75,000

Net profit	**50,000**	**1,00,000**	**75,000**

Payback Period

- The payback period is the time taken to recover the initial investment or it is the length of time required for cumulative incoming returns to equal the cumulative costs of an investment

Advantages

- simple and easy to calculate.
- It is also a seriously flawed method of evaluating investments

Disadvantages

- It attaches no value to cash flows after the end of the payback period.
- It makes no adjustments for risk.
- It is not directly related to wealth maximisation as NPV is.
- It ignores the time value of money.
- The "cut off" period is arbitrary.

Example:

The following table illustrates cash flow forecasts for three projects. In each case it is assumed that that the cash flows take place at the end of each year. Here negative values represent expenditure and positive values represent income.

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5	100000	3,00000	75,000

Calculate Payback Period

Project1 **=10,000+10,000+10,000+20,000+1,00,000**=1,50,000
Project 2= **2,00,000+2,00,000+2,00,000+2,00,000+3,00,000=11,000,00**
Project 3= **30,000+30,000+30,000+30,000** + 75,000 =1,95,000

It ignores any benefits that occur after the payback period and, therefore, does not measure profitability. And it ignores the time value of money.

RETURN ON INVESTMENT or ACCOUNTING RATE OF RETURN

- It provides a way of comparing the net profitability to the investment required.

  Or

- A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments

Disadvantages

- It takes no account of the timing of the cash flows.
- Rate of returns bears no relationship to the interest rates offered or changed by bank.

$$\textbf{ROI} = \frac{\textbf{average annual profit}}{\textbf{total investment}} * 100$$

$$\textbf{Average annual profit} = \frac{\textbf{net profit}}{\textbf{total no. of years}}$$

Example:

The following table illustrates cash flow forecasts for three projects. In each case it is assumed that that the cash flows take place at the end of each year. Here negative values represent expenditure and positive values represent income.

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5	100000	3,00000	75,000

- Calculate ROI for project 1.

  Total investment =1,00,000
  Net profit = 50,000
  Total no. of year = 5

  Average annual profit=50,000/5=10,000rs
  ROI= (10,000/1,00,000) *100 = **10%**

- Calculate ROI for project 2.

  Total investment =1,000,000

Net profit = 1,00,000
Total no. of year = 5

Average annual profit=1,00,000/5=20,000rs

ROI= (20,000/1,000,000) *100 = **2%**

- Calculate ROI for project 3.

  Total investment =1,20,000
  Net profit = 75,000
  Total no. of year = 5

  Average annual profit=75,000/5=15,000rs

  ROI= (15,000/1,20,000) *100 = **12.5%**

2.6 Net present value and internal rate of return

Cost-benefit evaluation techniques:

It consider

- the timing of the costs and benefits
- the benefits relative to the size of the investment

Common method for comparing projects on the basic of their cash flow forecasting.

1) Net profit
2) Payback Period
3) Return on investment
4) Net present Value
5) Internal rate of return

Net present value (NPV)

- It is the sum of the present values of all future amounts.
- *Present value* is the value which a future amount is worth at present
- It takes into account the profitability of a project and the timing of the cash flows
- **Discounted Cash Flow (DCF)** is a cash flow summary adjusted to reflect the time value of money. DCF can be an important factor when evaluating or comparing investments, proposed actions, or purchases. Other things being equal, the action or investment with the larger DCF is the better decision. When discounted cash flow events in a cash flow stream are added together, the result is called the **Net Present Value (NPV).**
- When the analysis concerns a series of cash inflows or outflows coming at different future times, the series is called a **cash flow stream**. Each future cash flow has its own value today (its own present value). The sum of these present values is the **Net Present Value** for the cash flow stream.

- The size of the discounting effect depends on two things: the amount of time between now and each future payment (the number of discounting periods) and an interest rate called the **Discount Rate.** *Discount rate* is the annual rate by which we discount future earning

$$\text{Discount factor} = \frac{1}{(1 + r\%)^t}$$

- The example shows that:
- As the number of discounting periods between now and the cash arrival increases, the present value decreases.
- As the discount rate (interest rate) in the present value calculations increases, the present value decreases.

Discount Factor Table

DISCOUNT FACTOR (p.a.) FOR A RANGE OF DISCOUNT RATES

Present Value of $1 in the Future at Discount Rate r%

Year	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
0	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696
2	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561
3	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575
4	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718
5	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972
6	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323
7	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759
8	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269
9	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843
10	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472
11	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149
12	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869
13	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625
14	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413
15	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229
16	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069

Issues in NPV

- Choosing an appropriate discount rate is difficult
- Ensuring that the rankings of projects are not sensitive to small changes in discount rate

Guidelines:

- Use the standard rate prescribed by the organization
- Use interest rate + premium rate
- Use a target rate of return
- Rank the projects using various discount rates

Applying discount factors

NPV is the sum of the discounted cash flows for all the years of the 'project' (note that in NPV terms the lifetime of the completed application is included in the 'project')

The figure of RM618 means that RM618 more would be made than if the money were simply invested at 10%. An NPV of RM0 would be the same amount of profit would be generated as investing at 10%.

Year	Cash-flow	Discount factor(discount rate 10%)	Discounted cash flow
0	-100,000	1.0000	-100,000
1	10,000	0.9091	9,091
2	10,000	0.8264	8,264
3	10,000	0.7513	7,513
4	20,000	0.6830	13,660
5	100,000	0.6209	62,090
		NPV	**618**

The figure of RM618 means that RM618 more would be made than if the money were simply invested at 10%. An NPV of RM0 would be the same amount of profit would be generated as investing at 10%.

Example: Comparing Competing Investments with NPV.

Consider two competing investments in computer equipment. Each calls for an initial cash outlay of $100, and each returns a total a $200 over the next 5 years making net gain of $100. But the timing of the returns is different, as shown in the table below (Case A and Case B), and therefore the present value of each years return is different. The sum of each investments present values is called the Discounted Cash flow (DCF) or Net Present Value (NPV). Using a **10%** discount rate

		CASE A		**CASE B**	
Timing	Discount Rate(10%)	**Net Cash Flow**	**Present Value**	**Net Cash Flow**	**Present Value**

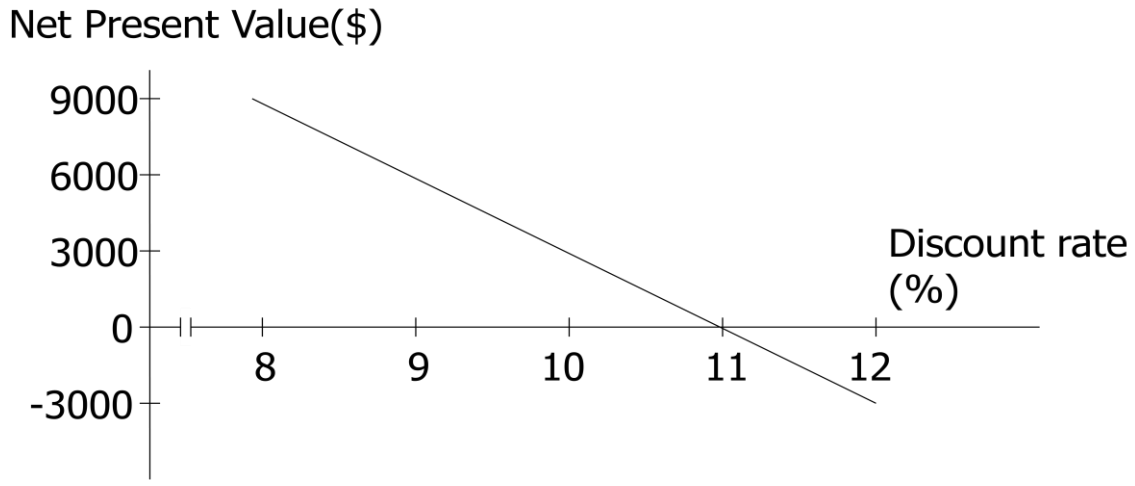
Now 0	**1**	– $100.00	– $100.00	– $100.00	– $100.00
Year 1	**0.9091**	$60.00	$54.54	$20.00	$18.18
Year 2	**0.8264**	$60.00	$49.59	$20.00	$16.52
Year 3	**0.7513**	$40.00	$30.05	$40.00	$30.05
Year 4	**0.6830**	$20.00	$13.70	$60.00	$41.10
Year 5	**0.6209**	$20.00	$12.42	$60.00	$37.27
Total		**Net CF_A = $100.00**	**NPV_A = $60.30**	**Net CF_B = $100.00**	**NPV_B = $43.12**

Disadvantage

- May not be directly comparable with earnings from other investments or the costs of borrowing capital

Internal Rate of Return (IRR)

- The percentage discount rate that would produce a NPV of zero
- A relative measure. Use Excel to demonstrate the calculation of NPV and IRR
- The IRR being a relative measure does not indicate the absolute size of the return.

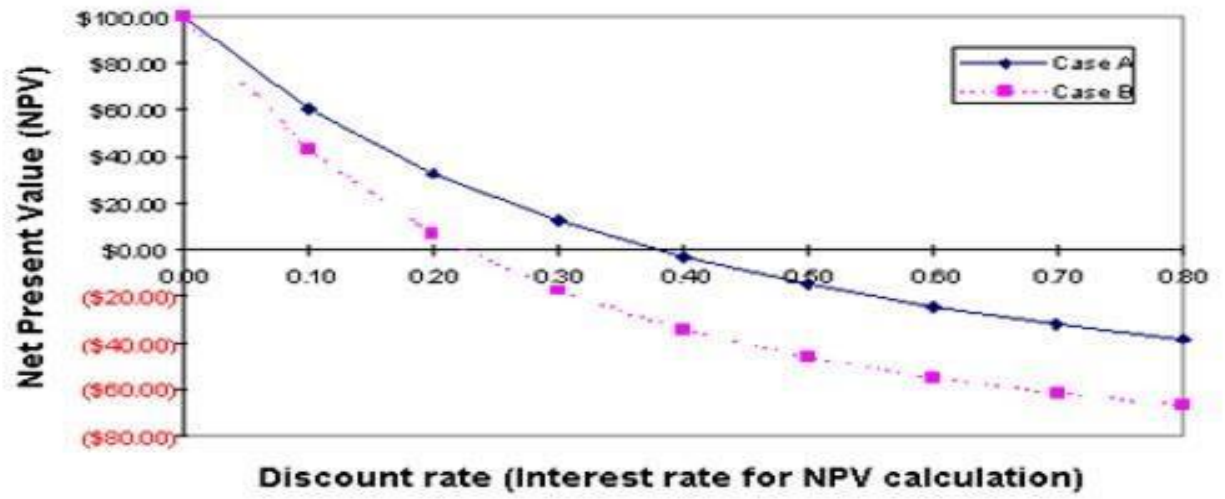


The IRR compares returns to costs by asking: **"What is the discount rate that would give the cash flow stream a net present value of 0?"**

		CASE A		**CASE B**	
Timing	Discount Rate(10%)	**Net Cash Flow**	**Present Value**	**Net Cash Flow**	**Present Value**
Now 0	**1**	– $100.00	– $100.00	– $100.00	– $100.00

Year 1	**0.9091**	$60.00	$54.54	$20.00	$18.18
Year 2	**0.8264**	$60.00	$49.59	$20.00	$16.52
Year 3	**0.7513**	$40.00	$30.05	$40.00	$30.05
Year 4	**0.6830**	$20.00	$13.70	$60.00	$41.10
Year 5	**0.6209**	$20.00	$12.42	$60.00	$37.27
Total		**Net CF_A = $100.00**	**NPV_A = $60.30**	**Net CF_B = $100.00**	**NPV_B = $43.12**

IRR asks a different question of the same two cash flow streams. Instead of proposing a discount rate and finding the NPV of each stream (as with NPV), IRR starts with the net cash flow streams and ***finds*** the interest rate (discount rate) that produces an NPV of zero for each. The easiest way to see how this solution is found is with a graphical summary:



- These curves are based on the Case A and Case B cash flow figures in the table above. Here, however, we have used nine different interest rates, including 0.0 and 0.10, on up through 0.80.
- As you would expect, as the interest rate used for calculating NPV of the cash flow stream increases, the resulting NPV decreases.
- For Case A, an interest rate of 0.38 produces NPV = 0, whereas
- Case B NPV arrives at 0 with an interest rate of 0.22.
- **Case A therefore has an IRR of 38%, Case B an IRR of 22%.**
- IRR as the decision criterion, the one with the **higher IRR is the better choice.**

2.7 Risk Evaluation

Every project involves risk. Risk is "an uncertain event or condition that, if it occurs has a positive or negative effect on a project objectives", include transferring the risk to another party, avoiding the risk, reducing the negative effect of the risk, and accepting some or all of the consequences of a particular risk.There are two types of risks.

1. Project risk – which prevent the project from being completed successfully.
2. Business risk – delivered products are not profitable.

- Risk evaluation is meant to decide whether to proceed with the project or not, and whether the project is meeting its objectives.

Risk Occurs:

- When the project exceed its original specification
- Deviations from achieving it objectives and so on.

Risk evaluation describe the following

1. Risk Identification and ranking
2. Risk and Net Present Value
3. Cost benefit Analysis
4. Risk profile analysis
5. Decision trees

Risk Identification and ranking

- Identify the risk and give priority.
- Could draw up draw a project **risk matrix** for each project to assess risks
- Project risk matrix used to identify and rank the risk of the project

Example of a project risk matrix

Risk	*Importance*	*Likelihood*
Software never completed or delivered	H	—
Project cancelled after design stage	H	—
Software delivered late	M	M
Development budget exceeded ≤ 20%	L	M
Development budget exceeded > 20%	M	L
Maintenance costs higher than estimated	L	L
Response time targets not met	L	H

In the table 'Importance' relates to the cost of the damage if the risk were to materialize and 'likelihood' to the probability that the risk will actual occur. 'H' indicates 'High', 'M' indicates 'medium' and 'L' indicates 'low'. The issues of risk analysis are explored in much more depth in lecture/chapter 7.

Risk and Net Present Value

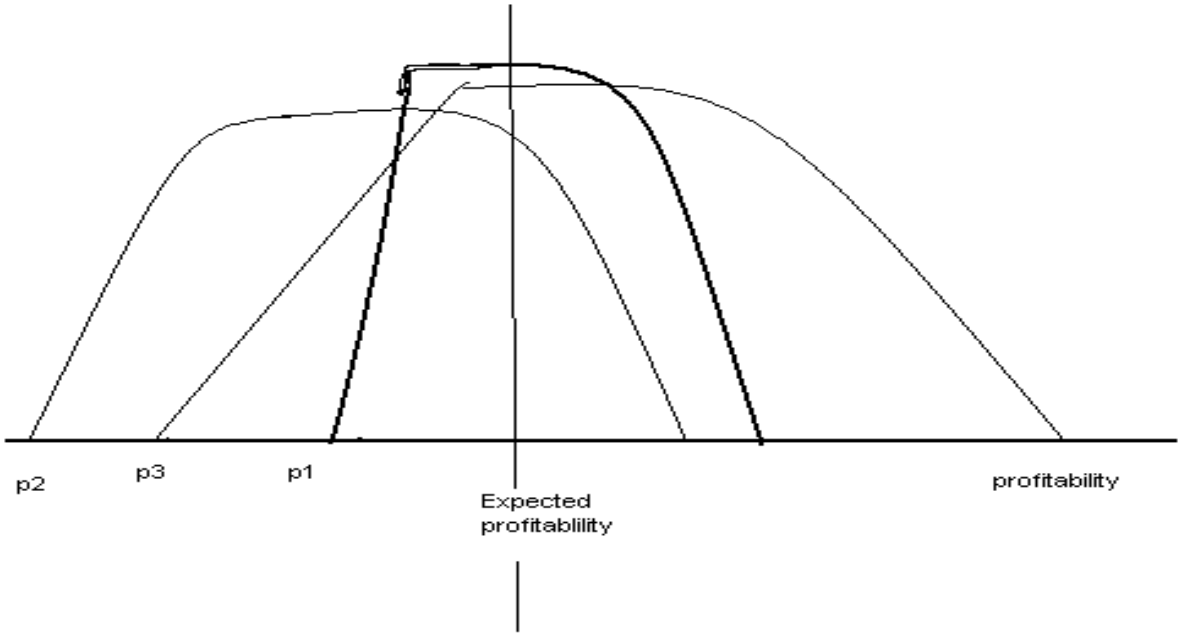
- For riskier projects could use higher discount rates
- **Ex:** Can add 2% for a Safe project or 5 % for a fairly risky one.

Cost benefit Analysis

It is one of the important and common way of carrying "economic assessment" of a proposed information system. This is done by comparing the expected costs of development and operation of the system with its benefits.

Risk profile analysis

- This make use of "risk profiles" using sensitivity analysis.
- It compares the sensitivity of each factor of project profiles by varying parameters which affect the project cost benefits.
- Eg:
- Vary the original estimates of risk plus or minus 5% and re-calculate the expected cost benefits.



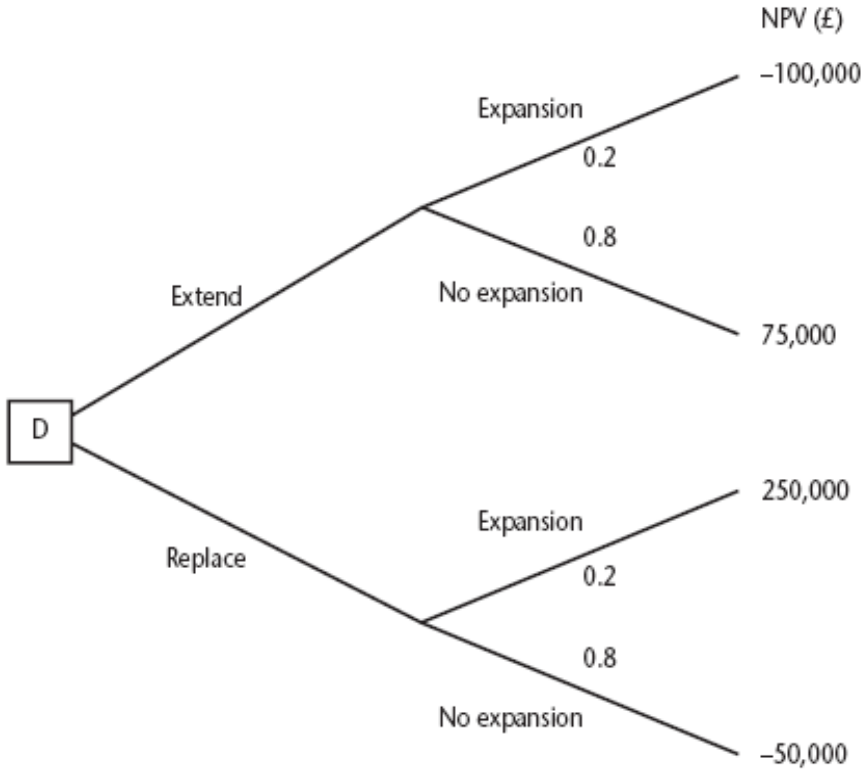
- P1 depart far from p2,have large variation
- P3 have much profitable than expected
- All three projects have the same expected profit
- Compare to p2 , p1 is less risky.

Decision trees

- Identify over risky projects
- Choose best from risk
- Take suitable course of action

Decision tree of analysis risks helps us to

1. Extend the existing system
   - increase sales
   - improve the management information
2. Replace the existing system
   - Not replacing system leads in loss
   - Replace it immediately will be expensive.



- The expected value of Extending system=
  (0.8*75,000)-(0.2*100,000)=40,000 Rs.
- The expected value of Replacing system=
  (0.2*250,000)-(0.8*50,000)=10,000 Rs.

Therefore, organization should choose the option of **extending the existing system**.

The diagram here is figure 3.8 in the text.

This illustrates a scenario relating to the IOE case study. Amanda is responsible for extending the invoicing system. An alternative would be to replace the whole of the system. The decision is influenced by the likelihood of IOE expanding their market. There is a strong rumour that they could benefit from their main competitor going out of business: in this case they could pick up a huge amount of new business, but the invoicing system could not cope. However replacing the system immediately would mean other important projects would have to be delayed.

The NPV of extending the invoicing system is assessed as £75,000 if there is no sudden expansion. If there were a sudden expansion then there would be a loss of £100,000. If the whole system were replaced and there was a large expansion there would be a NPV of £250,000 due to the benefits of being able to handle increased sales. If sales did not increase then the NPV would be -£50,000.

The decision tree shows these possible outcomes and also shows the estimated probability of each outcome.

The value of each outcome is the NPV multiplied by the probability of its occurring. The value of a path that springs from a particular decision is the sum of the values of the possible outcomes from that decision. If it is decided to extend the system the sum of the values of the outcomes is £40,000 (75,000 x 0.8 – 100,000 x 0.2) while for replacement it would be £10,000 (250,000 x 0.2 – 50,000 x 0.80). Extending the system therefore seems to be the best bet.

2.8 Programme management

Definitions:

- D.C. Ferns defined “a programme as a group of projects that are managed in a co-ordinated way to gain benefits that would not be possible were the projects to be managed independently”.
- A programme in this context is a “collection of projects that all contribute to the same overall organization goals”.
- Effective programme management requires that there is a well defined programme goal and that all the organization’s projects are selected and tuned to contribure to this goal”

Program management or **programme management** is the process of managing several related projects, often with the intention of improving an organization's performance. In practice and in its aims it is often closely related to systems engineering and industrial engineering.

The Program Manager has oversight of the purpose and status of all projects in a Program and can use this oversight to support project-level activity to ensure the overall program goals are likely to be met, possibly by providing a decision-making capacity that cannot be achieved at project level or by providing the Project Manager with a program perspective when required, or as a sounding board for ideas and approaches to solving project issues that have program impacts. Typically in a program there is a need to identify and manage cross-project dependencies and often the PMO (Program or Project Management Office) may not have sufficient insight of the risk, issues, requirements, design or solution to be able to usefully manage these. The Program manager may be well placed to provide this insight by actively seeking out such information from the Project Managers although in large and/or complex projects, a specific role may be required. However this insight arises, the Program Manager needs this in order to be comfortable that the overall program goals are achievable.

There are two different views of how programmes differ from projects.

On one view, projects deliver outputs, discrete parcels or "chunks" of change; programs create outcomes. On this view, a project might deliver a new factory, hospital or IT system. By combining these projects with other deliverables and changes, their programs might deliver increased income from a new product, shorter waiting lists at the hospital or reduced operating costs due to improved technology.

The other view is that a program is nothing more than either a large project or a set (or portfolio) of projects. On this second view, the point of having a program is to exploit economies of scale and to reduce coordination costs and risks. The project manager's job is to ensure that their project succeeds. The program manager, on the other hand, may not care about individual projects, but is concerned with the aggregate result or end-state. For example, in a financial institution a program may include one project that is designed to take advantage of a rising market, and another to protect against the downside of a falling market. These projects are opposites with respect to their success conditions, but they fit together in the same program.

According to the view that programs deliver outcomes but projects deliver outputs, program management is concerned with doing the right projects. The program manager has been described as 'playing chess' and keeping the overview in mind, with the pieces to be used or sacrificed being the projects. In contrast, project management is about doing projects right. And also according to this view, successful projects deliver on time, to budget and to specification, whereas successful programs deliver long term improvements to an organization. Improvements are usually identified through benefits. An organization should select the group of programs that most take it towards its strategic aims while remaining within its capacity to deliver the changes. On the other hand, the view that programs are simply large projects or a set of projects allows that a program may need to deliver tangible benefits quickly.

Consider the following set of projects:

- design of the new product - this delivers a design specification,
- modifications to the production line or factory - delivers a manufacturing capability,
- marketing - delivers advertisements, brochures and pamphlets,
- staff training - delivers staff trained to sell and support the new product.

One view has it that these are different projects within a program. But in practice they can just as well be managed as sub-projects within a single project. Which approach to choose? Program and project management are both practical disciplines, and the answer to such a question must be "whatever works." What works depends very much on the nature of the organization in which the project or program is run. Typically a program is broken down into projects that reflect the organization's structure. The design project will be run by the design team, the factory will manage the modifications to the production line, and so on. Organizational structure and organizational culture are key factors in how to structure a program.

The distinction between the terms "outcome" and "output" is far from clear, except in a trivial sense. Each of the projects listed in the example above is designed to deliver some 'thing', known as a 'deliverable' or an 'output', and together they improve the organization. Where one draws the line between the complete single benefit that causes the improvement and its component parts is partly a matter of preference and partly a matter of the culture and structure of the organization. Either way, benefits will normally be enjoyed long after the end of the program and all of its component projects. The point is that to achieve maximum benefits, there must be an integration of parts into a whole. Whether this integration is managed in something that is called a project or a program is of secondary importance to understanding the benefits and managing the process of integration well.

Many programs are concerned with delivering a capability to change. Only when that capability is transferred to the line management and utilized by the host organization will the benefits actually be delivered. On this view, a program team cannot, on their own, deliver benefits. Benefits can only be delivered through the utilization of a new capability.

Programs are normally designed to deliver the organization's strategy, such as an ambition to be the fourth biggest supermarket in a region by 2015 or reduce wastage by 5% in two year's time.

According to Project Management Institute (PMI), *The Standard for Program Management, 2nd Ed.,* "A Program is a group of related projects managed in a coordinated manner to obtain

benefits and control NOT available from managing them individually. Programs may include elements of related work outside of the scope of the discreet projects in the program... Some projects within a program can deliver useful incremental benefits to the organization before the program itself has completed."

Program management also emphasizes the coordinating and prioritizing of resources across projects, managing links between the projects and the overall costs and risks of the program.

Program management may provide a layer above the management of projects and focuses on selecting the best group of projects, defining them in terms of their objectives and providing an environment where projects can be run successfully. Program managers should not micromanage, but should leave project management to the project managers.

In public sector work in Europe, the term normally refers to multiple change projects: projects that are designed to deliver benefits to the host organization. For example, the Office of Government Commerce for the UK government. An alternative to the Office of Government Commerce's methodology for program management is that of the private sector Project Management Institute.

Many organizations only run one program at a time, a program containing all their projects. In Project Management Institute terminology, this is more likely to be a project portfolio than a program. Some larger organizations may have multiple programs each designed to deliver a range of improvements. Some organizations use the concept of Systems Engineering where others use program management.