MSC in Biomedical Science
(via Distance Learning)

Project Management

BES508 (half-module)
Project Management

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Module Introduction

In recent years we have witnessed a rapid growth in the use of project management methods and tools as a means by which organisations achieve their objectives. Projects drive business in industries as diverse as pharmaceuticals, banking, and hospitals. In the public sector, effective project management translates politicians’ promises of new roads, schools and hospitals into solutions that improve everyday life. Almost by definition, all innovation relies on project management. Irrespective of whether the innovation concerns a new product, or a new process, or indeed a contribution to pure science, better project management, on the whole, will see an outcome reached faster, cheaper, smarter and better. In light of this, concepts such as planning, scheduling, budgeting and controlling are some of the key issues that need to be understood and practiced by organisations if projects are to be implemented successfully.

Project management is a means to an end and not an end in itself. The purpose of project management is to foresee or predict as many of the potential pitfalls and problems as soon as possible and to plan, organise and control activities so that the project is successfully completed in spite of any difficulties and risks. This process starts before any resources are committed, and must continue until all the work is completed.

Module Aims, Objectives and Approach

The primary aim of this course is to improve the effectiveness of people engaged in project management. It focuses on the essential concepts and practical skills required for managing projects in dynamic environments. This course aims to provide learners with a solid understanding of the fundamentals of project management and to equip them with simple yet powerful tools that will empower them to meet their full potential in the area of project management thus enabling them to implement successful projects on time, within budget and to the highest possible standard. In summary the course will aim to:

• Present a curriculum in the area of project management that reflects the needs of the user.
• Provide easy to access, state of the art reference material in the area of project management to help learners to understand the essential fundamental concepts involved in the discipline.
• Equip participants with the best practices, skills and supporting tools necessary to effectively implement projects in their organisations and to empower users to autonomously apply these concepts and tools.
Module Learning Outcomes

The multidisciplinary nature of the project management activity within organisations demands an interdisciplinary and innovative approach to the courses structure and delivery. The cross functional nature of the project management process demands that course participants develop a holistic perspective on the nature of the organisation, its competitive strategy and the role and function of project management within that framework. Therefore central to this course is the development within participants of the knowledge and skills necessary to bridge functional areas, to span boundaries and to manage their associated interfaces. A strong focus is maintained on promoting action learning. For that reason action-refl ection-learning is at the core of the learning approach. Therefore, on completion of the course learners will be equipped with the knowledge and skills to enable them to:

- Understand the fundamentals of projects and project management.
- Understand the key reasons for failure and to comprehend the impact and implications of project failure on the individual, team and organisation.
- Be familiar with the project management process.
- Specify an effective project plan, which is consistent with the business plan of the company.
- Influence the key business functions of the organisation to ensure the implementation of the proposed project plan.
- Demonstrate the ultimate success of the plan through successful project implementation.
- Be capable of using appropriate tools to schedule a project and associated activities and tasks.
- Be familiar with budgeting methods.
- Be capable of estimating project costs.
- Understand the benefits of good project control.
- Be capable of designing and implementing a performance measurement strategy.
- Understand the concept and role of project teams and team leaders.
- Be capable of using tools to analyse the health of a project portfolio and to select relevant projects that align with the overall portfolio.
- Understand the dynamics of managing project risk.
- Understand the concept of cross functional team working.
- Gain a solid grounding in transferable skills such as problem specification, team working, and the ability to synthesise and apply acquired knowledge to the solution of problems.
- Understand the critical influencing factors for successful project management and execution.
- Be capable of writing an effective proposal to secure funding for projects.
# Structure of the Course

The structure of the course is presented in the Table below.

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1.1 Unit Introduction

The aim of this chapter is to provide the learner with a basic understanding of the fundamentals of projects and the project management process. To this end, a definition of a project is provided. The various types or mechanisms to classify a project are also presented. Key project attributes or characteristics are highlighted and discussed. The concept of project management is then introduced and the benefits of project management are explored. An important aspect of project management is recognising the fact that projects do fail, therefore the reasons why projects fail is explored in detail so that learners can learn from them. Finally, the key stages in the project management process are presented.

Unit Learning Objectives

When you have successfully completed this unit, you will be able to:

- Define what a project is
- Define project management
- Distinguish different types of projects
- State the key characteristics of a project
- State project life cycle
- List reasons why projects fail
- List the key stages of project management

1.2 Changing Business Environment

We are experiencing major change in the world economy. Organisations are moving from an economy based on manufacturing and commodities to one that places the greatest value on information, services, and support\(^1\). This transformation is described by various terms in the literature notably, “the move towards the post industrial society” (Toffler, 1991\(^2\)), “the emergence of the knowledge society” (Drucker, 1993\(^3\)), or “the rise of the knowledge based economy” (Leonard Barton, 1995\(^4\)). Work now consists of converting information to knowledge, using skills, competencies and expertise. Emphasis is shifting from visible assets (such as materials and machinery) to invisible assets (such as competence and creativity). This is illustrated in the virtual value chain (see figure 1.1).

![FIGURE 1.1 The Virtual Value Chain](image)
Here intangible activities such as generating, storing and transferring information are replacing traditional business processes. In other words, the ability to influence the control and flow of information is becoming more powerful and cost effective than moving and manufacturing physical products. Managing the organisation’s knowledge base and converting it into useful products and services is fast becoming a critical component of competitive success.

Consequently, we are experiencing a radical shift in the way organisations are designed, structured and organised. Organisations are transforming their structures and adopting more project based operations in order to fulfil customer needs, wants and expectations. Project focused organisations are lauded to promote knowledge sharing, learning and change. They are characterised by flexibility and specialisation. Project structures emphasise multidisciplinary work arrangements linking people and activities across formal organisational boundaries with less clearly defined authority pattern. They enable faster and more effective decision making as well as quick and efficient information sharing. In this scenario, effective project management becomes a very important and powerful tool in the hands of organisations that understand its use and have the competencies to apply it. Therefore it is imperative that we understand the dynamics of project and project management.

1.3 Understanding Projects

A project is a unique non-permanent goal-centred activity with a predefined life cycle and constrained by cost and resource availability.

A project is a temporary, organised effort that creates something unique. It has a clearly defined goal and a definite starting point and ending point. All projects have budgets and a temporary team assigned to them. It is important to remember that a project is a means to an end and not an end in itself. It results in a distinctive output or deliverable. This may be a tangible product or an intangible service, plan or initiative.

Projects range in size, scope, cost and time from large international projects costing millions of euro over many years to small projects with a low budget taking just a few hours to complete. They can be as simple as installing a new piece of office equipment (e.g. diagnostic machine) or as complex as developing a new product or service (e.g. an implantable cardioverter-defibrillator). Almost any human activity that involves carrying out a non-repetitive task can be labelled a project. But there is a big difference between carrying out a very simple project involving one or two people and one involving a complex mix of people, organisations and tasks.

A project can involve:

- Restructuring a business process or a department
- Installing a new software system
- Developing a new product
- Building a new road
- Producing a film
According to Wheelwright and Clark, (1992) new product development projects can be classified according to the levels of innovation. These include:

- **R&D or advanced development projects**: Such projects are visionary and speculative and explore where an organisation might like to be in five years or more.
- **Breakthrough or radical projects**: Breakthrough projects focus on radical changes involving the development of new innovations.
- **Next generation or platform projects**: Next generation or platform projects involve significant incremental improvements but are still linked to an organisation's basic product (or process) platform.
- **Incremental or derivative projects**: Incremental or derivative projects incorporate small-scale, incremental changes to the organisation's existing products and processes.

An organisation's project portfolio will contain a mix of project types. Some projects will represent incremental developments and improvements on existing and proven products and processes while others will focus on more radical innovations. While different firms put together different portfolios, most will have a combination of low risk, short-term projects and high risk longer term ones. Ideally, a company should have a portfolio of products whose life cycles overlap. This guarantees continuity of income and growth potential.

Innovation projects require change yet project management methodologies are, in the main, based around a projection of limited and constrained resources and a very specific timeline. For this reason project management methodologies have been criticised for limiting the creativity and environment of pervasive change that is necessary to developing effective innovations (Kavanagh & Noughton, 2009). The authors observe empirically, however, that increasing levels of project management are correlated with innovation.

It is interesting to note that project management is the main methodology employed by innovative firms (Goffin & Mitchell, 2010) as they seek to implement change. The discipline of project management is changing and more rigid methodologies such as PRINCE (Projects In Conrtrolled Environments) are now giving way to methodologies such as AGILE which are more focussed on rapid-prototyping and delivering benefits and features rather than delivering to an exact specification.
be classified according to the levels of innovation. These include:
Goffin & Mitchell (2010) outline the key differences between traditional projects, such as
building a road, with innovation projects. Innovation projects are also delivered over the
phases of concept, planning, development and implementation although innovation
projects differ because:

- The Concept: The duration of the concept phase typically corresponds with
  the degree of innovation that a project represents. This stage of an innovation
  project, sometimes known as the ‘fuzzy front end’, involves processes such as
  research and pre-development.
- Risk of Failure: Despite the research and development activities at the ‘fuzzy front
  end’ failure is still a possibility throughout an innovation project and the planning
  and development activities develop a more real sense of the form of the final
  innovation.
- Learning and Experimentation: Differences in the approach to allocating project
  resources such as time, and money are apparent between organisations. The
  organisational willingness to learn from mistakes can sometimes underpin these
  decisions.

1.4 Project Characteristics

There are some important attributes that characterise projects. These
include:

(a) the aims and objectives or goals of the project
(b) the project’s life cycle
(c) the interdependencies or co-dependant activities that the project must consider
(d) the project’s individuality or uniqueness
(e) an element of conflict with other activities in an organisation

Each of these attributes is discussed in more detail in the subsections
which follow.

1.4.1 Goals

Each project has a set of goals or end results that the project must
accomplish. This is the prime purpose of the project. The project can
be sub-divided into tasks to achieve these goals. If the project is
complex then the subtasks require careful co-ordination and control.
The goals of a project are usually expressed in terms of operations
strategies or performance goals.

1.4.2 Life cycle

Every project must have a beginning and an end with a number of
distinct phases in between. The key phases in the project’s life cycle are:
(a) conception
(b) selection
(c) planning
(d) scheduling
(e) monitoring
(f) controlling
(g) evaluation
(h) termination

Projects begin slowly and progress to a build-up of size, then peak, begin to decline and finally all projects must come to an end. The pattern of slow-rapid-slow progress toward the project goal is common. It is usually the result of the changing levels of resources used during the successive stages of the life cycle. Figure 1.2 is important as it shows the cycle of the project with the project effort, usually in terms of person hours, plotted against time, where time is broken up into the several phases of the project’s life.

![Figure 1.2 Project Life Cycle](image)

1.4.3 Constraints

Constraints are aspects of all projects that are directly related to and influence each other. These include:

- **Time**: the length of time available to implement the project.
- **Cost**: the amount of funds allocated to the project.
- **Scope or quality**: the breath (range of activities) and depth (performance standard) of the project.
- **Resources**: the availability of material, equipment and tools.
It is inevitable in a project life cycle that there will be changes to certain elements of the project. Therefore, tradeoffs must be made between each of these elements. In other words, if one of the elements changes appropriate adjustments must be made to compensate for this change. For example, if a deadline is shortened, actions are needed with regards to either cost, resources or scope must be identified to ensure the deadline is met without compromising the quality of the output or deliverable.

1.4.4 Interdependencies

Projects are multidisciplinary in nature and often have many interdependencies that constrain the way they will be managed. They are dependant on people and their skills and competencies carrying out the project. For example, marketing may be involved at the start and end of a project but not in the middle, production may be involved throughout the project’s entire duration and finance is often involved at the beginning of the project.

1.4.5 Uniqueness

Every project has some elements that are distinctive or unique. In other words, some degree of customisation is typical for all projects. For example, projects may not be totally innovative but they may have new clients with individual requirements and expectations; they may have new team members who have a unique style of working or they may be executed in a different environment with unique constraints and pressures.

1.4.6 Conflict

There is always some degree of conflict in projects. Projects compete with other functions and departments for resources and people and depending on the number of projects in an organisation’s portfolio there may be a degree of project-versus-project conflict. There is often conflict between the members of the project team for scarce resources and for the leader’s attention to help solve problems.
1.5 Understanding Project Management

“A project is a problem scheduled for solution”
J.M. Juran (1989)*

*Joseph Moses Juran (1904 - present) is an American industrial engineer and philanthropist. He is best known as a quality guru.

According to the Project Management Institute project management is the application of knowledge, skills, tools and techniques to project activities in order to meet project requirements. In this view, project management

- is an art
- is a science
- has a set of tools and methods

More specifically, project management is the discipline of defining and achieving targets while optimising the use of resources such as time, money, people, space, etc. Thus, it is about setting clear goals, managing time, material, personnel and costs to deliver a result on time, within budget and to the highest possible standard. This involves applying knowledge, skills, tools and techniques to a broad range of activities in order to meet the requirements of the particular project. It is composed of several different types of activities and each of these activities must be effectively managed to ensure the success of a project. The key activities include:

- **Planning**: identifying requirements and targets and setting clear goals.
- **Scheduling**: co-ordinating activities from inception to completion and identifying deadlines and resources.
- **Budgeting**: estimating costs and allocating funds to specific activities and tasks over the project life cycle.
- **Controlling**: monitoring progress and ensuring it is completed on time, within budget and to required quality standards.

It is important to remember that project execution is multidisciplinary in nature; it brings together a number of people from different functions and disciplines and provides them with an opportunity to collaborate in a unique way. Some of the functions that are involved and their respective roles are presented in table 1.1.
### TABLE 1.1 Roles Involved in Project Management

<table>
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<tr>
<td>Customer/client</td>
<td>Identify specific requirements and performance standards</td>
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<td>Senior Management</td>
<td>Ensure that there is an effective process in place that the team can follow</td>
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<tr>
<td></td>
<td>Provide the resources necessary to implement the project</td>
</tr>
<tr>
<td>Functional Manager</td>
<td>Provide necessary resources from his or her discipline</td>
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<td>Liaise with sponsor and support project objectives</td>
</tr>
<tr>
<td>Sponsor</td>
<td>Ensure that goals of the project are clear and communicated to all</td>
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<tr>
<td></td>
<td>Ensure a charter or plan is developed and understood by all</td>
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<tr>
<td></td>
<td>Ensure that project aligns with the goals of the organisation and meets the customers’ needs, wants and expectations</td>
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<tr>
<td>Team Leader</td>
<td>Ensure that the project meets the goals and objectives specified</td>
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<tr>
<td></td>
<td>Ensure that the project is completed on time, within budget and to the required standard</td>
</tr>
<tr>
<td>Team Member</td>
<td>Ensure that all deliverables satisfy the needs of the project and are completed on time and within budget</td>
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The project manager sometimes referred to as the “team leader” or “project co-ordinator” bears the ultimate responsibility for the success or failure of the project. To do this a project manager must be able to successfully plan, manage and control the project work. A project manager must be capable of doing a wide variety of tasks in the project management process such as:

- Capture and prioritise customer requirements
- Define project goals and detailed plans
- Identify, monitor and resolve project issues
- Communicate project information to all stakeholders
- Identify and manage project risk
- Ensure that the solution is of acceptable quality
- Define and collect performance metrics
- Ensure work is assigned and completed on time and within budget and to the highest possible standard

Therefore a project manager should be well organised, be able to multi-task and have good self-discipline. In addition to process skills, a project manager must have good people management or interpersonal skills. This includes the ability to:
• Communicate a vision.
  • Encourage people follow the standard processes and procedures
  • Set reasonable, challenging and clear expectations for people
  • Generate good ideas and solve problems
  • Make decisions
  • Build effective teams
  • Communicate and listen
  • Work well under pressure (be able to laugh)

According to Meredith and Mantel (2006), the following list are some of the more popular attributes, skills and qualities that should be considered when selecting a project manager.

  • A strong technical background
  • A hard nosed manager
  • A mature individual
  • Someone who is currently available
  • Someone on good terms with senior executives
  • A person who can keep the project team happy
  • Someone who can work in several different departments
  • A person who can walk on (or part) the waters

1.6 Project Failure

"We learn wisdom from failure much more than from success. We often discover what will do by finding out what will not do; and probably he who never made a mistake never made a discovery."

Samuel Smiles (1816-1904)

*Samuel Smiles was a Scottish author and reformer. He is best known today as the writer of books extolling virtues of self help, and biographies lauding the achievements of 'heroic' engineers.

Each year organisations (e.g. large multinationals, small firms, government agencies) spend a significant amount of money on implementing complex projects. An organisation can typically invest between 0.01% and 20% of its annual turnover on projects that aim to change or improve its products or services, processes or system. The rate of investment can depend on whether the organisation is a corporate "shooting star" where investment can be as high as 20%, or a "cash cow" where it can be as low as 0.5%. A recent survey of European companies found that companies spend on average 4% on innovation. This budget is typically spread across various functions in an organisation including marketing, product design, information systems, manufacturing systems and quality assurance. The principal goals for this investment vary between organisations. Nevertheless, the following goals have been found across a large number of organisations. They are ranked in order of popularity, with the first goal being common to most organisations and so on;

  • Improve quality
  • Create new markets
  • Extend the product range
• Reduce labour costs
• Improve operating processes
• Conform to regulations

However, a very large percentage of these initiatives fail. Most research agrees that between 50-80% of complex projects fail to make any impact on organisational strategies and goals. A survey of Fortune 500 companies found that over 60% of change programmes fail to meet their goals. Some analysts argue that this could be as high as 80%. The causes of project failure have been widely researched and can vary considerably. Some causes will be external to the organisation and outside its influence or control. Others will be internal and ultimately within the control of the organisation. Internal causes of failure can be further subdivided into causes associated with the social infrastructure and causes associated with the project management process itself. Failure in the social infrastructure varies between issues such as bureaucracy, poor organisational structure and poor leadership to resistance to change, conflict, mistrust and other interpersonal issues. Many of these social causes of failure can be addressed by improving communication and sense of community within the organisation. Common causes of failure within the project management process in most organisations have been distilled into the following categories:

1.6.1 Lack of customer focus

Many project leaders often focus on internal procedures instead of focusing on the end user, client or customer. All projects must be customer driven to be successful. A clear understanding of user needs and expectations is critical for successful project implementation and all activities and tasks must be driven by these needs. An effective project manager must capture the voice of the customer from the outset and translate these requirements into the project specification.

1.6.2 Poor goal definition

Effective planning is imperative for success. Project teams comprise experts from a wide variety of functions and disciplines and this diversity can create serious barriers for shared understanding. Inadequate definition of the goal, work content, cost, schedule or technical requirements will quickly bring the project into trouble. The goals of the project must be clearly defined and communicated to all so that everyone can work towards a similar end. All team members must understand their role in the process. Detailed procedures should be developed by the team members to minimise resistance within the organisation.

1.6.3 Poor access to information

Effective project implementation involves synthesising and reusing existing knowledge and information. The ability to access and leverage knowledge and information creates value for the organisation. It improves decision making, stimulates innovation and helps sustain competitive advantage. Many organisations face difficulties in transferring knowledge and information from one organisational unit to another and consequently project team members are not equipped with all the necessary information to perform tasks and make informed decisions. In order to avoid repeating mistakes, reinventing solutions and
expending resources into solving problems that might have already been solved, it is important that the right information is available to the right people, in the right format, at the right time. Furthermore, it is essential that this information is reliable, accurate, complete and up to date.

1.6.4 Poor participation in teams

The lack of employee involvement limits the success of projects in an organisation. Participation fosters ownership and this has a major impact on a projects success. More specifically, employee participation enables problems to be identified early and key decisions made early in the process shape the purpose and intent of the project. In addition, projects with ownership reduce resistance to change and are easier to implement. It is also important to remember that team members with customer contact have a wealth of knowledge. Shared knowledge also stimulates the cross fertilisation of ideas and thus the quality of ideas and decisions.

1.6.5 Poor project control

Many organisations do not measure project progress effectively. Key performance indicators must be developed in order to help manage the performance of the projects activities relative to its goals. If this is not in place it is impossible to ascertain whether the project outcomes lead to the results envisioned. This feedback loop is essential for the organisation to develop a corporate conscience and learn from its experiences.

1.6.6 Poor portfolio management

Often an organisation's portfolio of projects is badly balanced in terms of optimal investment mix between risk versus return, maintenance versus growth, and short term versus long term projects. Frequently, there are too many marginal value or substandard projects in the organisations overall portfolio. Furthermore, many of these projects are unfocused. In other words, they are not aligned to the strategic direction of the organisation.

“One mistake will never kill you.
The same mistake over and over again will”
Harvey MacKay*


As a result of these factors organisations ultimately loose valuable time in implementing projects. Failure also has a negative impact on the morale of the employees and consequently promotes a higher (and often unnecessary) resistance to future change. In addition, by not having best practice initiatives in place organisations receive a poor return on investment. However, by tackling these root causes of failure an organisation can hope to significantly improve its project failure rate. In order to achieve this goal, leaders and managers must develop an approach to effectively manage the project management process and identify the best practice factors
necessary to support each stage in the process. Finding the correct project management process will greatly increase the probability of project activities meeting their targets. The approach should focus on addressing common causes of innovation failure and thus improve the operation of the innovation process.

1.7 The Project Management Process

By following a structured approach to project management, an organisation increases the likelihood of success. If an organisation has a clear understanding of what it is doing and why, and if it has an established mechanism in place to initiate and undertake innovation, development can happen quickly and predictably. Where such infrastructure is not in place, it has to be put in place for each initiative. This slows down the reaction time of individuals and organisations, and may limit the success of the project, as there is no pattern to follow and the process has to be re-invented each time, thereby the results are not always predictable. Research indicates that the majority of organisations using project management methods and tools are not only more efficient but are also more effective. Effective project management methods also:

- Ensures that customers’ wants, needs and expectations are met
- Allows more work to be accomplished in less time with fewer people
- Standardises routine project work and eliminates “reinventing the wheel”
- Ensures that all tasks are completed on time, within budget and to the highest possible standards
- Reduces duplication of effort and rework
- Reduces power struggles
- Optimises the use of resources

Therefore project managers must identify and integrate the most valuable and successful ways to plan and develop effective projects. This ensures that an organisation is focused on where it wants to be in the future. The key stages in the project management process are identified and discussed in more detail.

1.7.1 Define scope, strategy and goals

This stage of the project management process ensures that the organisation has a clear view, image or vision of where it would like to be in the future. In other words, it encourages the decision maker to create a clear picture of the desired outcome and communicate this vision to all relevant stakeholders in the process. A strategy is a coherent or consistent stream of actions, which an organisation takes to move towards this vision. The organisation’s goals should be linked to its strategy. They should be specific, well defined and measurable so that people know exactly what to accomplish. This stage also prompts the decision maker to establish the scope of the project in question. This should detail what the project will cover as well as what it will not cover.

1.7.2 Plan project and select sponsor
A project's outcomes are largely decided in the early stages of the project management process; in other words in the stages that precede the actual implementation or execution of the project. Ironically, these activities often receive little attention. Yet, comprehensive project planning significantly increases new product success and is strongly correlated with financial performance. It is at this point in the process where costs start to rise dramatically as resources for development are needed. Therefore, it is imperative to plan appropriately from the outset. Assigning a sponsor (normally a senior member of the organisation) is also essential for successful results. The sponsoring manager has a pivotal role in the process. He/she must be responsible and accountable for the success of the project. It is his/her responsibility to initiate the project and to ensure that adequate resources are allocated to it. The sponsor is responsible for a wide and continuous set of responsibilities throughout the life of the project such as:

- Developing a concise set of agreed goals, based on customer requirements and aligning them with corporate strategies
- Ensuring that each team has appropriate and sufficient resources to enable them to carry out their activities
- Emphasising the absolute importance of meeting major milestones on schedule
- Providing support to the team throughout the development process

1.7.3 Prioritise project and assign teams

Projects require a substantial investment in terms of resources such as time, money and personnel, all of which are limited. Therefore, it is vitally important that the projects that are selected for implementation provide good returns on the resources and capital invested. Project prioritisation can be defined as a method for providing relevant information, as a basis for ranking projects, in order to determine how significant a particular project is in meeting the organisation's goals relative to others in the portfolio. Prioritisation is carried out by senior management in order to decide which projects best fulfil the current organisational objectives. This process helps to eliminate projects that require extensive resources but are not justified by current business strategies. It also helps to position projects so that efforts can focus on the critical few. Therefore, benefits obtained by ranking and prioritising projects affect, not only the particular project, but also the entire portfolio or programme within which it resides. Following this decision, the individual project will have time schedules and budgets put in place. Specific teams are then assigned to individual projects and management should strive to appoint a well-balanced team in terms of composition and mix.

1.7.4 Monitor and control performance

The project's progress must be continuously monitored to assess its performance relative to its goals and schedule. Actions may have to be altered in order to keep in line with goals developed from the outset. This stage involves recognising warning signs and problems identifying their cause and then applying the appropriate treatment or remedies. Continuous feedback and on-going training should be
provided for all team members in order to sustain their energy and enthusiasm. Many industries utilise variations on these stages. For example, in bricks and mortar architectural design, projects typically progress through the following stages like:

- Pre-planning
- Conceptual design
- Schematic design
- Design development
- Construction
- Drawings (or contract documents)
- Construction administration

Ideally development methodologies will be tailor made for each organisation taking into account their culture and value systems. As this is not always feasible existing methodologies should be carefully chosen by the organisation. Appropriate methodologies should have specific characteristics that will provide an organisation with an effective and efficient tool. Remember a methodology should:

- Address business processes not functions
- Identify value-added processes
- Focus on the customer
- Be aligned with organisational goals and strategies
- Help provide information and arguments to decision makers
- Consider solutions in which employee empowerment are the basis for implementing the changes
- Make appropriate use of proven and available management techniques and tools
- Develop an actionable implementation plan to specify tasks, resources and timing of events
1.8 Summary

This chapter outlined the basic characteristics of projects and the key concepts of project management. We learned that all projects have (a) predefined and agreed goals; (b) a structured lifecycle; (c) certain constraints; (d) interdependencies with other functions and disciplines and finally (e) an element of customisation or uniqueness. The benefits of projects management were also explored. Then the key reasons for failure were outlined and discussed. These included; (a) lack of customer focus; (b) poor goal definition; (c) poor access to information; (d) poor participation in teams; (e) poor project control and (f) poor portfolio management. Each of these issues will be explored further in subsequent chapters and solutions will be highlighted in an effort to minimise their occurrence and impact. Finally, the key stages in the project management process were presented. These include; (a) define scope, strategy and goals; (b) plan project and select sponsor; (c) prioritise project and assign teams; (d) monitor and control performance. The next chapter focuses on an essential element of project management namely project planning.
Unit 1 Progress Check

Q1. What is a project and what are the characteristics of a project?

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Q2. (i) Draw a diagram showing the key phases in a project’s life cycle.

(ii) Identify critical tasks that must be accomplished in each phase.

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Q3. "People don't plan to fail they just fail to plan". Discuss this statement with respect to project planning.

Q4. What are the implications of project failure for (a) the project team and (b) the organisation?
Unit 1 Answers to Progress Check

Answer to Q1
A project is a temporary task, undertaken to achieve a specific goal and which utilises human and technical resources in a planned and organised manner to achieve this goal. Examples include roads, installing equipment, change management. Project characteristics are:

- It is unique
- It has a definite life-span (Time Constraints)
- It has set goals (Performance needs)
- It is constrained by definite Cost and Resource limitations

Answer to Q2
(i) A project’s life cycle can be broken down into a number of phases from planning to implementation.

(ii) Your answer should discuss the key stages of the project’s life cycle i.e. conceptual phase, definition, production, operational and termination. Key tasks, decision points and personnel responsible should be highlighted for each phase.

Answer to Q3 - Guideline answer
Key reasons for failure include:

- Lack of customer focus
- Poor definition of goals
- Poor alignment of actions to goals
- Poor access to information
- Poor communications
- Poor participation by employees in teams
- Poor project control/monitoring of results
- Poor portfolio management

Your answer should discuss these.
Answer to Q4

a) The impact of project failure on the team include loss of morale, greater resistance to future change.

b) The impact on the organisation generally includes loss of revenue, poor return on investment, possibly loss of face in the public arena and loss of customers/contract
2.1 Introduction

Planning is a process that establishes what must be done in order to accomplish a goal. This chapter highlights the importance of project planning. The advantages of project planning are then identified so too are the limitations and potential drawbacks of the process. Planning a project involves a number of steps, regardless of the size and nature of the project. Almost all project planning techniques have the same basic elements, they differ only in the way they approach the process of planning. A five stage planning process is presented to ensure best practice techniques are employed. The importance of developing a project charter is also emphasised and so templates are provided to help construct a project charter. Finally, guidelines for successful planning are provided.

Unit Learning Objectives

When you have successfully completed this unit, you will be able to:

- State why project planning is important
- State the advantages of good project planning, and the possible problems involved
- List the five steps in project planning
- Discuss the guidelines for successful project planning presented in this unit

2.2 The Importance of Project Planning

“
A dream is just a dream.  
A goal is a dream with a plan and a deadline.”  
Harvey MacKay

It is important to remember that goals will remain dreams unless a plan of action is created and executed to accomplish them. A rationally planned effort is imperative for a project’s success. The primary purpose of planning is to establish a set of directions in sufficient detail to tell the project team exactly what must be done, when it must be done, and what resources to use in order to produce the deliverables of the project successfully. Effective project planning ensures that projects meet objectives on time and within budget. There are several reasons why considerable care should be afforded to the planning process. For example, the planning process;

- helps to formulate sound objectives
- defines and frames the project from the outset
- helps to anticipate problems in advance
- improves efficiency in the project;
- secures ownership and buy in
- lays the foundations for co-ordination and control
- generates documentation
• improves the process of planning in the future.

A project plan acts as a map to guide people on the project team and therefore a good project plan makes it easier for the project team to successfully execute the goals of the project. If the task is understood before being performed, then much of the work can be pre-planned. If the task is not understood, then more knowledge is gained when carrying out the task and this leads to changes in resource allocations, schedules and priorities. The more uncertain the task then more information must be processed to ensure effective performance. This has a negative impact on the project’s budget and time lines.

**Sensible planners do not drown the plan with over analysis.**
*This leads to “paralysis by analysis”.*

Effective project planning is down to the project team, and how well the project team has developed the plan contributes to the success or failure of the project. It is important to note the following:

• Experienced people must be involved in the planning process
• Members of the project team who will execute the project should contribute to the development of the plan
• The project plan must have the support of a senior sponsor in the organisation
• The project team must be committed to the plan
• The plan must be comprehensive

It is also important to remember that the development of a project plan is not a panacea; there are certain drawbacks or limitations to the process. These include:

• Creativity may be stifled if the plan is too rigid.
• The planning process can be inflexible and not allow for contingencies.
• Plans may be over optimistic and not take into account unforeseen events.
• Constraints or limitations may not be considered.
• The process can be time consuming and delay action.
• Each project is unique and it may be impossible to plan for certain events.

### 2.3 Why do Plans Fail?

What all planners must keep in mind is that no matter how hard they try, planning is not a perfect science and sometimes plans fail. Some reasons why this happens are:

• Plans encompass too much in too little time
• Plans were based on insufficient data
• The objectives are not clear
• People are constantly being taken in and out of the project
• The staffing resources are unclear
• The major milestone dates are unclear.
There are a number of reasons why these situations occur and who should be to blame. Sometimes the project manager may often take on too much work and can not afford the time required to the project. He or she may also be afraid or unwilling to delegate responsibility to others. On many occasions the project manager is too optimistic and the project fails because the level of risk is not properly assessed. Research findings can prove that people are overconfident about their knowledge. People tended to be only 70% to 80% correct when they reported to being 100% sure of their answer. People without knowledge of a topic are often unable to differentiate between 30% and 98% confidence intervals. Asking for a 95% interval typically gets about a 65% confidence range. Therefore it is important to:

- Recalibrate all confidence judgements, if necessary
- Avoid being anchored by initial estimates
- Challenge all estimates
- Challenge any expert’s advice
- Automatically convert judgments of 100% confidence to a lesser degree.

The only real solution to overconfidence bias is practice and feedback.

**Overconfidence and the experts**

- “The odds of a meltdown are one in 10,000 years”- Vitali Skylarov, Minister of Power, two months before Chernobyl
- “We know on the authority of Moses, that longer ago than six thousand years, the world did not exist”- Martin Luther (1483-1546)
- “Regan doesn’t have the presidential look”- United Artist Executive dismissing the idea that Ronald Regan be offered the starring role in the movie THE BEST MAN, 1964
- “The world market for personal computers is about 5 computers a year”- Thomas J. Watson, CEO IBM (1914-1956)

### 2.4 The Planning Process

There is no one perfect planning model for any organisation. Each organisation ends up developing its own model or process for project planning, often by selecting an approach and modifying it as they go along. The following details a set of best practice steps or stages which an organisation should consider when embarking on a planning process. The steps in the process are; (a) identify stakeholder requirements; (b) determine project goals; (c) establish tasks and schedules; (d) ascertain resources and budgets and finally; (e) determine evaluation methods (see figure 2.1). Each of these stages is discussed in more detail.
2.4.1 Identify stakeholder requirements

All stakeholder requirements must be identified and prioritised from the outset. A clear understanding of end user needs is critical to the project plan and all operations must be driven by these needs. Team members must work with customers, clients and other key stakeholders in order to establish the voice of the customer and translate this value into the project concept and proposed solution. In order to do this, user expectations, voiced desires and as yet unperceived needs must be identified, understood and interpreted. This process is often referred to as requirements engineering. It enables organisations to be proactive rather than reactive and assures that standards and quality are delivered as defined by the customer and/or key stakeholder.

2.4.2 Determine the project goals

During the planning process, the project team must keep in mind the overall purpose or desired result that the project is expected to achieve. Planners must establish a set of goals that exploit the project team's strengths to take advantage of opportunities, while building up weaknesses and warding off potential threats. These goals should be SMART. In other words they must be:

- **Specific**: Goals must be clear and unambiguous to all project stakeholders in order to manage expectations. Specific goals have a much greater chance of being accomplished than ambiguous or loosely defined goals. To set a specific goal the following questions should be considered:
  a) Who are the end users of the project result?
  b) What do they require?
  c) What must we do to accomplish these requirements?
  d) How should this be done?
  e) Why should it be done?

- **Measurable**: Concrete criteria for measuring progress toward the attainment of each goal must be established. When progress is measured
it helps project team members to stay on track and reach target dates. To determine if a goal is measurable, the following questions should be considered:

a) Does the goal have a definite due date or specific time frame in which it must be achieved?

b) Is the goal linked to a specific number (e.g. increase sales by 20%; reduce costs by 13%; reduce number of accidents from 7 to 3 etc.)

c) Is there someone in the organisation or some defined role responsible and accountable for the achievement of the goal?

- **Attainable**: Goals must be realistic and attainable by team members. The best goals require employees to stretch a bit to achieve them, but are not too extreme. That is, the goals are neither out of reach nor below standard performance. Goals that are set too high or too low become meaningless, and employees naturally come to ignore them.

- **Realistic**: To be realistic, a goal must represent an objective toward which the project team is both willing and able to work. A goal can have a high standard and also be realistic. A high goal is frequently easier to reach than a low one because people often stretch to attain a higher goal while a low goal exerts low motivational force.

- **Time-bound**: Goals must have starting points, ending points, and fixed durations. Commitment to deadlines helps team members to focus their efforts on completion of the goal on or before the due date. Goals without deadlines or schedules for completion tend to be overtaken by the day-to-day crises that invariably arise in an organisation.

- **SMART goals make for smart organisations.** However, many supervisors and managers neglect to work with their employees to set goals together. For those that do, goals are often unclear, ambiguous, unrealistic, unrelated to the organisation’s vision, unmeasurable, and demotivating. These traps can be avoided by developing SMART goals with team members.

### 2.4.3 Establish tasks and schedules

In this step, the project team should brainstorm all the tasks and conditions required to carry out the project. All essential information must be identified. For example, there may be some special requirements, or contractual aspects such as those from the Food and Drinks Administration (FDA) or ISO standards that should be taken into account. It is also important to consider when each task must be started and completed. A helpful approach is to use “backward planning.” This involves examining each goal and deciding what must be done to reach it. In this way you plan from the moment of the project ending point and then work your way back to the present in order to determine what must be done. Backward planning simply means looking at the big picture first, and then planning all tasks, conditions, and details in a logical sequence to make the big picture happen. Details such as key people, time schedule, equipment, support needed, and required checks should be included. A to-do list can be created for each of these. This list will become the checklist to ensure everything is progressing.
as planned. Finally, don’t forget to associate responsibilities for each task – a specific person must be accountable for the delivery of a task or deliverable.

The particular strategies (or methods to reach the goals) chosen depend on matters of affordability, practicality and efficiency. It is important to remember that the project team cannot do everything at once; and that some things are more important than others. Furthermore, some tasks are dependant on others i.e. some tasks must be accomplished before another can start. Priorities should therefore be set.

2.4.4 Ascertain resources and budgets

Plan for obtaining all the resources required to implement the project and allocate them out. Not having the required resources can stop a project dead in its tracks. Describe the personnel requirements for the project. Consider the training needs, possible recruitment problems, legal or policy restrictions on the staff, security and any other special requirements. Remember, people may be enlisted in a time-phased manner as their contributions are required. The budget is then calculated based on the capital and expense requirements of each task. Non-recurring costs (i.e. specific, one off costs) should be separated (i.e. weekly or monthly) from recurring project costs.

2.4.5 Determine evaluation methods

Planners regularly reflect on the extent to which the goals are being met and whether action plans are being implemented. Standards against which to judge the project should therefore be established at the project’s inception. The project can then be monitored and evaluated based on the specified data. Perhaps the most important indicator of success is positive feedback from the organisation’s customers.

2.5 Creating a Project Charter

A good plan must:

- meet project objectives
- be deliverable based
- have short activities
- have realistic time estimates
- calculate contingency
- identify dependencies
- be easy to use

Activities in the planning process are vitally important. If customer requirements and project goals are not identified, communicated and understood by the key stakeholders the project has little chance of success. Yet many organisations pay insufficient attention to these activities and there are not many tools available to help
project managers with this. Organisations are beginning to appreciate the importance of these activities and more and more organisations are creating project charters to help manage these fuzzy stages. A project charter is an agreement between the customer requesting and receiving the project deliverable and the organisation providing the product or service. It helps to obtain commitment from all key stakeholders in the project. The charter defines:

- The goals, objectives and scope of the project;
- The project rationale
- Partners and affected stakeholders
- Roles, responsibilities and activities of the team members
- The approach adopted
- Potential risks
- Specific management commitments (e.g. communication and control)
- Key due dates and deadline

The project charter is not only an effective project planning tool; it is a communication vehicle that can be referenced throughout the project. It is created at the beginning of the project, approved by the key project stakeholders, and is available for reference throughout the project life cycle. The charter is a single source of information about the project in terms of initiation and planning, and provides information about project scope, objectives, deliverables, risks, and other critical issues. It also lays the foundation for how the project will be structured, and how it will be managed in terms of change control, as well as risk and issue resolution. It does not, or at least should not, change throughout the project life cycle. Having a project charter provides the following benefits:

- Helps to manage expectations
- Enables better client relationships
- Facilitates better communications
- Helps to deliver projects on time and within budget

Since the charter outlines an agreement between the project stakeholders of what the project will deliver and how it should be developed (or at least agreed) by all project members and stakeholders. A project charter will contain some or all of the following items:

- **Background to the Project**: Clearly define where you are now (as-is), where the project will be taking you (to-be) and what the benefits of the project will be
- **Project Goals**: Set out exactly what it is that the project is aiming to achieve
- **Criteria of Success**: Identify exactly what constitutes a successful outcome
- **Consequences of Failure**: Identify the impact and implications of not meeting the project goals
- **Assumptions**: List any assumptions so that there can be no confusion or breakdown in communication. Remember if things go unsaid they can go unnoticed.
- **Constraints**: Clearly identify all factors impacting on the project plan and the steps you have taken to accommodate them
- **Risks**: List project risks and try to determine the probability of them occurring as well as the potential impact upon the project
- **Contingency plans**: Identify what you will do if the project does not go according to
• **Project Documentation**: Identify the documents relating to your project and where they are kept. Typical documents would include
  - Phone book and diary
  - Meeting minutes
  - Technical specifications
  - MS Project .mpp files
  - Gantt charts
  - Budget
  - Quality Plan

• **Key Dates in the Project**: Identify Milestone events and dates and detail any key decision points and their deadlines.

• **Project Control**: Clearly define how you intend to monitor and control the project.

• **Team members**: Identify the key people involved and their roles in the project.

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**Project Charter**

**Project Title:**

**Prepared by:**

**Date:**

**Version:**

**Background and Overview**

- Project History
- Project purpose
- Project scope
- Project objectives
- Key references

**Project Approach**

- Project deliverables
- Quality indicators and performance standards
- Roles and responsibilities
- Precedence and dependencies
- Risk management
- Approach or methodology
- Project control
- Project schedule
- Project cost estimate

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**2.6 Guidelines for Successful Planning**

A common failure in many kinds of planning is that the plan is never really implemented. Instead, all focus is on writing a plan document. Too often, the plan sits collecting dust on a shelf. The following guidelines will help to ensure that the planning process is implemented completely and that deviations from the intended plan are recognised and managed accordingly.
2.6.1 Involve the right people in the planning process

It is critical that all people and roles involved in the project exchange information and feedback in order for it to function effectively. When planning, get input from everyone who is involved in delivering parts of the plan as well as with representative from groups who will be affected by the plan. Those who are responsible for reviewing and authorising the plan should also be involved.

2.6.2 Make sure the plan is written down and communicated widely

New managers, in particular, often forget that others don’t know what these managers know. Even if managers do communicate their intentions and plans verbally, chances are great that others won’t completely hear or understand what the manager wants done. Also, as plans change, it is extremely difficult to remember who is supposed to be doing what and according to which version of the plan. Key stakeholders (employees, management, board members, funders, investors, customers, clients, etc.) may request copies of various types of plans. Therefore, it’s critical to write plans down in a project charter and communicate them widely.

2.6.3 Build in accountability

Plans should specify who is responsible for achieving each result, including goals and objectives. Dates should also be set for the completion of each result. Responsible parties should regularly review the status of the plan. Be sure to have someone of authority “sign off” on the plan. They should put their signature on the plan to indicate they agree with and support its contents.

2.6.4 Deviate from the plan if necessary

It is perfectly acceptable to deviate from the plan if required. The plan is not a set of rules. It is an overall guideline. As important as following the plan is, it is imperative to notice and accept deviations and adjust the plan accordingly.

2.6.5 Evaluate the planning process and the plan

Regularly collect feedback from participants during the planning process. Try to ascertain if they agree with the planning process. Try to establish what they don’t like about it and how could it be done better. Also assess if the goals are being achieved. Try to assess if the goals are realistic. Ascertain if the responsible parties have the resources necessary to achieve the goals and objectives. Determine if the goals should be changed. Try to ascertain if more priority should be placed on achieving the goals. Finally, take ten minutes to write down how the planning process could have been done better. File it away and be sure to read it the next time a plan is being developed.
2.6.6 Acknowledge and celebrate results

It is easy for planners to become tired and even cynical about the planning process. One of the reasons for this problem is very likely that far too often, emphasis is placed on achieving the results. Once the desired results are achieved, new ones are quickly established. The process can seem like having to solve one problem after another, with no real end in sight. Yet it is a major accomplishment to carefully analyse a situation, involve others in a plan to do something about it, work together to carry out the plan and actually see some results. So acknowledge this and celebrate your accomplishment.
2.7 Summary

This unit highlighted the importance of project planning. You learned why plans often fail, so that you can avoid these potential pitfalls when you are planning projects yourself. You learned a simple five-stage planning process. The steps in this process include:

(a) identify stakeholder requirements;
(b) determine the project goals;
(c) establish tasks and schedules;
(d) ascertain resources and budgets;
(e) determine evaluation methods.

Finally, guidelines for successful planning were provided. These include:

(a) involve the right people in the planning process;
(b) make sure the plan is written down and communicated widely;
(c) build in accountability;
(d) deviate from the plan if necessary;
(e) evaluate the planning process and the plan;
(f) acknowledge and celebrate results.
Unit 2 Progress Check

Q1. Is it safe to assume that, because most managers don’t spend much time planning, the activity is a waste of time?

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Q2. Research findings can prove that people are overconfident about their knowledge. Discuss this statement and identify strategies to overcome overconfidence in project planning.

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**Q3.** List the five steps in project planning.

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____________________________________________________

**Q4.** What are the guidelines for successful project planning?

____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________

**Q5.** What part does a plan play in controlling a project?

____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
Unit 2 Answers to Progress Check

Answer to Q1 - Guideline answer
Your answer should discuss the importance of effective planning and how it impacts on the bottom line. For example, they might consider the following benefits (helps to formulate sound objectives, helps to anticipate problems in advance, secures ownership and buy in, lays the foundations for co-ordination and control, generates documentation, improves the process of planning in the future).

The discussion should also include limitations to project planning (levels and range not uniform, creativity may be stifled, process can be inflexible, plans (time and cost) may be over-optimistic, constraints not considered, can be time consuming and delay action).

You should also highlight the importance of each stage in the project plan and how it impacts on operations.

1. Goals and objectives (goals, performance measures)
2. General approach (methodology)
3. Contractual aspects (special requirements, FDA, FAA, ISO etc)
4. Schedules (Key milestones, delivery dates)
5. Resources (people, equipment, money)
6. Evaluation methods (time, cost, quality)
7. Potential Problems (contingency plans)

Answer to Q2
To tackle the problem of overconfidence, the following steps are recommended in Unit 1:
Don’t take confidence judgments at face value – reassess them.
Don’t rush in with an estimate of cost too soon – such estimates are often incorrect, and too low.
Don’t accept ‘expert advice’ too readily. Check everything.
If people say they are 100% confident of any aspect of the project – don’t accept this. Always reduce this to a lower level of certainty.

Answer to Q3
The five stages in the planning process are:
Identify stakeholder requirements.
Determine project goals.
Establish tasks and schedules.
Ascertain resources and budgets.
Determine evaluation methods.
Answer to Q4
Involve the right people in the planning process.
Make sure the plan is written down and communicated widely.
Build in accountability.
Be prepared to deviate from the plan if necessary.
Evaluate the planning process and the plan.
Acknowledge and celebrate results.

Answer to Q5
The plan provides the criteria by which to set up the control system for the project. It lists the tasks to be done, the start and end dates, the people, equipment and materials required and the projected costs. These all flow into the control and measuring systems to ensure that the project is on track.
3.1 Introduction

Whenever a project has to be completed according to a time deadline, then both the client or customer and the project manager or contractor must have an accurate picture of the relationship between the time allowed to execute the plans and the time needed. A schedule is the conversion of a project action plan into an operating timetable. It helps to determine when the project must start and finish as well as important issues and risks to be considered throughout the project. A schedule details the main tasks to be accomplished, the time allowed for each of these tasks and the people and skills required to execute the tasks. A project schedule serves as a fundamental basis for monitoring and controlling project activity and, taken together with the plan, is probably the major tool of the management of projects.

<table>
<thead>
<tr>
<th>Project Scheduling is about:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying how long it will take to do the work</td>
</tr>
<tr>
<td>Identifying the main tasks to be accomplished</td>
</tr>
<tr>
<td>Identifying who will do the work</td>
</tr>
<tr>
<td>Identifying what resources are needed</td>
</tr>
<tr>
<td>Identifying important issue and risks</td>
</tr>
<tr>
<td>Checking work progress vs. work scheduled</td>
</tr>
<tr>
<td>Monitoring and reporting progress and results</td>
</tr>
</tbody>
</table>

Because of the unique nature of projects and the potentially high number of interrelated tasks involved, an effective way is needed to communicate project plans and progress across the project team. The customer, project manager and team members must have an accurate picture of the relationship between parameters such as time, cost and quality allowed and needed for each phase and activity. There are many tools and techniques that can facilitate this. The most commonly used are (a) Work breakdown structure (WBS); (b) Gantt Charts and (c) network techniques such as the Critical Path Method and the Programme Review and Evaluation Technique. Each of these is presented in more detail in this chapter.

Unit Learning Objectives

When you have successfully completed this unit you will be able to:

- Develop and use a Work Breakdown Structure to scope a project
- Create and use a Gantt Chart to plan and track project activities
- Use network techniques to assist project management

3.2 Work Breakdown Structure (WBS)

In planning a project, it is normal to be overwhelmed and confused when trying to grasp the details and scope of even a modest sized project. The way to alleviate this is to break the project into pieces and organise the pieces in a logical way. Large, complex projects can be better managed and understood if they are broken down into smaller “work packages” or components that may include a number of activities and tasks. For example, a €10 million research and development project can be viewed as is simply a lot of €50,000 projects joined together.

Psychologists say our brains can normally comprehend around 7-9 items simultaneously. A
A project with thousands or even dozens of tasks goes way over our ability to grasp all at once. The solution is to divide and conquer. The Work Breakdown Structure (WBS) is a tool that can provide the framework required for organising and managing a complex project. It helps to break innumerable tasks into chunks that can be understood and assimilated. It is a results-oriented diagram that captures all the work of a project in an organised way. It is often portrayed graphically as a hierarchical tree. The WBS is commonly used at the beginning of a project for defining the project scope, organising schedules and estimating costs. Preparing and understanding a WBS for a project is a big step towards managing and mastering its inherent complexity. Figure 3.1 illustrates a WBS hierarchical tree.

FIGURE 3.1 WBS Tree Diagram

The WBS is a communications tool that provides information to different people. If it does not contain enough levels then the integration of activities may be difficult. If too many levels exist then unproductive time will be made to have the same number of levels for all projects. The following steps explain the procedure for designing and using the WBS structure for small or moderate sized projects.

- Identify all tasks from the project overview.
- Identify relevant data for each task i.e. personnel required and responsibilities, equipment and specifications etc.
- Review all the information relevant to each task with the individuals who are going to do the work in order to verify the accuracy of the WBS.
- Schedule significant events and key milestones.

As the project is being carried out the project manager can continually examine actual resource use against planned resource usage for each task. Actual progress is also compared to scheduled progress by task to identify problems and determine corrective actions. Additional resources may then be assigned to tasks falling behind schedule.
3.3 Gantt Charts

The Gantt chart shows planned and actual progress for a number of tasks displayed against a horizontal time scale. It is an effective method of indicating the actual status for each set of tasks against the planned progress for each task. This helps to keep track of how things are going. Gantt charts can be used to:

- Set up a project
- Enter tasks, identify deliverables, milestones and durations
- Schedule tasks, establish precedence and sequential relationships between tasks
- Assign resources such as people, equipment
- Enter costs
- View and adjust the schedule

A simple Gantt chart is illustrated in figure 3.2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Define Problem</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gather Information</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Search for Solutions</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Design Preliminary System</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Evaluate &amp; Cost</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Document New System</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Implement New System</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Manage Project</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Start</td>
<td>²</td>
<td></td>
</tr>
<tr>
<td>Management Review</td>
<td>²</td>
<td></td>
</tr>
<tr>
<td>Project End</td>
<td>²</td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>²</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 3.2 Gantt Chart

Gantt charts can help to capture critical project information such as:

- Project title, start date, end date, precedents, conflicts, As-Is, To-Be
- Leader, team, sponsor, users
- Areas affected: Requirements, strategies, measures
- Capital cost, recurrent cost, annual savings, payback, return on investment
- Score, priority, progress, % complete, decision
- Total mandays, mandays assigned, unassigned mandays, mandays completed, mandays remaining

There are a number of advantages to the use of Gantt charts. For example; they are easily understood, despite containing much information; they are easy to construct; they are easy to maintain and they can be produced on paper or on computer e.g. Microsoft Project.
3.4 Network Techniques

Network techniques graphically convey the relationships between the tasks in the project. Two techniques that are commonly used are (a) Critical Path Method (CPM) and (b) Programme Evaluation and Review Technique (PERT). CPM was specifically designed for construction projects while PERT was initially used for research and development (R&D) projects. The two methods are quite similar. Both techniques break down the project into a number of identifiable activities. This enables individuals to be assigned responsibility to particular tasks which have well defined start and finish times. Performance measures such as the time and cost allowed as well as the expected level of quality can then be associated with each activity. Information concerning the duration of the tasks involved in the project can also be assigned to each activity. This can be collated from a number of sources such as previous experience, documentation and interviewing. The accuracy of the project plan will depend on the accuracy of these estimates.

Any relationships between the tasks in the projects are then identified. For instance, a particular task may not be able to begin until another task has finished. Thus the task waiting to begin is dependant on the former task. Other tasks may not have a dependant relationship and thus may occur simultaneously. Precedence notation is used as a means of describing these relationships. Two types of notation are commonly used to describe the relationship between activities i.e. activity-on-node notation and activity-on-arrow notation. In activity-on-node notation, nodes represent activities and arrows show the precedence relationships. This is illustrated in figure 3.3.

![Figure 3.3 Project Work Flow Using Precedence Notation](image)

An example of activity-on-arrow notation is illustrated in figure 3.4. Here arrows represent activities and nodes are events. An event is a particular milestone or point in time such as the beginning or completion of an activity.

![Figure 3.4 Activity on Arrow Network](image)
Let's construct a network diagram for a simple project such as building a house. Table 3.1 lists key activities involved. It also estimates the amount of time each activity is expected to take. Dependencies or precedence relationships are also determined. In other words it identifies which activities that must take place before others can begin. For example, when building a house it is important to design the house before the foundations are laid. From this a network diagram can be constructed (see figure 3.5).

**TABLE 3.1 Example Building a House**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
<th>Predecessor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design house and acquire loan</td>
<td>3 weeks</td>
<td>None</td>
</tr>
<tr>
<td>Lay foundation</td>
<td>2 weeks</td>
<td>Design house and acquire loan</td>
</tr>
<tr>
<td>Order and receive materials</td>
<td>1 week</td>
<td>Design house and acquire loan</td>
</tr>
<tr>
<td>Build house</td>
<td>3 weeks</td>
<td>Design house and acquire loan, Lay foundation, Order and receive materials</td>
</tr>
<tr>
<td>Select fittings</td>
<td>1 week</td>
<td>Design house and acquire loan, Lay foundation, Order and receive materials</td>
</tr>
<tr>
<td>Select and buy furniture</td>
<td>1 week</td>
<td>Design house and acquire loan, Lay foundation, Order and receive materials</td>
</tr>
<tr>
<td>Finish house</td>
<td>1 week</td>
<td>Design house and acquire loan, Lay foundation, Order and receive materials, Build house, Select and buy furniture</td>
</tr>
</tbody>
</table>

**FIGURE 3.5 Project Network for a House**
As you can see from figure 3.5 each activity necessary to build the house is identified. This network diagram follows the “activity-on-arrow” style. In other words, the tasks are shown by arrows. Here the task name is written beside the arrow. The circles on the diagram are called nodes. The nodes indicate the start or end of tasks. Task durations are shown by the numbers. As two or more activities cannot share the same start and end nodes, a dummy is inserted (see activity 3-4) to give two activities separate end nodes and thus two separate identities. It does not represent any actual passage of time.

3.4.1 Critical Path Method (CPM)

Critical Path Method or CPM diagrams are used to illustrate the activities undertaken during a project and the dependencies between these activities as well as the duration of each activity. CPM adopts an activity-on-node network construction. Here each node represents the activities in the project. A completed network will consist of a number of nodes (one for each task) connected by lines, between a start and an end node. An example of node notation is illustrated in figure 3.6 and an example of a connected network is shown in figure 3.7.

<table>
<thead>
<tr>
<th>Early Start</th>
<th>Duration</th>
<th>Early Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late Start</td>
<td>Slack</td>
<td>Late Finish</td>
</tr>
</tbody>
</table>

FIGURE 3.6 Node Notation

The information shown on this node includes:
- The task name
- The early start time (ES) i.e. the earliest possible time a task can start
- The normal duration time i.e. the estimated or expected time to implement an activity or task
- The early finish time (EF) i.e. the earliest possible time a task can start. This assumes the task starts on time and it is not delayed
- The late start time (LS) i.e. the latest time a task can start and not delay project
- The slack or float i.e. an activity with slack or float can be slightly delayed and not interfere with the overall schedule of the project. Any activity that has no slack or a total slack equal to zero is said to be a critical activity, this means that any delay in the finish time of this activity will cause the entire project to be delayed
- The late finish time (LF) i.e. the latest time a task must finish so as not to delay project
Once the network diagram has been constructed it is possible to follow a sequence of activities called a “path” throughout the network from start to end. The length of time it takes to follow the path is the sum of all the durations of activities on that path. The path with the longest duration gives the project completion time. This is called the “critical path” because any change in duration in any activity on this path will cause the whole project duration to either become shorter or longer.

Activities on the critical path therefore have the least amount of scheduling flexibility. In other words, all activities on the critical path must be completed on time for the entire project to be completed on schedule. If the end date for the project has slipped, it is because at least one activity on the critical path did not complete on time. It is important to understand the critical path sequence to know where you have flexibility and where you do not. For instance, a whole series of activities may end up running late, yet the overall project will still be completed on time. On the other hand, if a project is falling behind, placing additional resources on non-critical activities will not result in the overall project completing earlier.

On every project, no matter how complicated, there are always some activities that can be started earlier or completed later without jeopardising the final completion date for the project. This flexibility between the earliest time an activity can be completed and the latest time when it must be completed is called float or slack. By definition, if an activity has flexibility, or float, associated with its start and end date, then it is not on the critical path. Activities with no flexibility in the start and end dates cannot be completed earlier because they are pending the completion of another activity. They also cannot be completed later than scheduled without causing all the succeeding activities to be late. That’s because none
of the activities that follow have any flexibility, or float, in their start and end date. All of these activities back up tightly against other activities that precede or succeed them. The critical path consists of the longest sequence of activities that must be started and completed as scheduled or the entire project will be delayed. In other words, it is the longest sequence of activities with zero float. If any activity on the critical path is late, the entire project will be late (unless the time can be made up somewhere else on the critical path).

The project end date is what it is because of the critical path. If there were not a critical path, then there would be at least some float in all the activity paths from start to finish. If there were float everywhere, you could squeeze the float out and finish the project earlier. As you moved the end date to finish earlier, you would start to remove some of the float. However, at some point, the float would be gone from one of the paths. This would be a point where each activity on the path would have start and end dates that backed up one against the other. There would be no more float on this sequence of activities. This would be the critical path.

For example, if a construction company wanted to use network techniques to monitor the progress of its new development, the project manager would first identify the activities, duration and the relationships between the activities specifically the prerequisite tasks. An example of such data is outlined in table 3.2. From this a network diagram is developed (see figure 3.8). We can see based on these data that the project will finish in 11 months and the critical path is B-D-E i.e. the longest path.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
<th>Prerequisite Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Select site</td>
<td>3 months</td>
<td>None</td>
</tr>
<tr>
<td>B Design building</td>
<td>4 months</td>
<td>None</td>
</tr>
<tr>
<td>C Close old office</td>
<td>3 months</td>
<td>A</td>
</tr>
<tr>
<td>D Construct new building</td>
<td>5 months</td>
<td>A, B</td>
</tr>
<tr>
<td>E Move to new building</td>
<td>2 months</td>
<td>C, D</td>
</tr>
</tbody>
</table>

Critical Path

- A path is a sequence of connected activities running from start to end node in network
- The critical path is the path with the longest duration in the network
- The critical path has no float or slack
- Project cannot be completed in less than the time of the critical path

TABLE 3.2 Data for Construction Example
Programme Evaluation and Review Technique (PERT) like CPM is another project management technique for determining how much time a project needs before it is completed. It adopts activity-on-arrow network construction. However, while CPM is a deterministic method that uses fixed time estimates, PERT is a probabilistic method. In other words it can deal with uncertainty in activity durations. PERT assigns a best, worst, and most probable completion time estimate for each activity. These estimates are used to determine the average completion time. The average times are then used to figure the critical path and the standard deviation of completion times for the entire project.

1. Identify key activities and specific milestones. Milestones are events – they normally mark the beginning and end of an activity.

2. Determine the sequence of the activities. Present activities in a logical sequence and remember no activity can start until its immediately preceding event is completed.

3. Construct a network diagram.

4. Estimate the time required for each activity. Weeks are a commonly used unit but any unit can be used as long as it is the same across the entire network. PERT is based on probabilistic estimates which

   - Optimistic time (O): the minimum possible time required to accomplish a task, assuming everything proceeds better than is normally expected
   - Pessimistic time (P): the maximum possible time required to accomplish a task, assuming everything goes wrong (but excluding major catastrophes).
   - Most likely time (M): the best estimate of the time required to accomplish a task, assuming everything proceeds as normal.
   - Expected time (TE): the best estimate of the time required to accomplish a task, assuming everything proceeds as normal (the implication being that the expected time is the average time the task would require if the task were repeated on a number of occasions over an extended period of time).
   
   \[ TE = \frac{(O + 4M + P)}{6} \]

   An example is illustrated in Table 3.3 below.
Table 3.3 Example PERT Activity Times

<table>
<thead>
<tr>
<th>Activity</th>
<th>Predecessor</th>
<th>Optimistic</th>
<th>Most likely</th>
<th>Pessimistic</th>
<th>TE ( \frac{(a + 4m + b)}{6} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>--</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>4.00</td>
</tr>
<tr>
<td>b</td>
<td>--</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>5.33</td>
</tr>
<tr>
<td>c</td>
<td>a</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>5.17</td>
</tr>
<tr>
<td>d</td>
<td>a</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>6.33</td>
</tr>
<tr>
<td>e</td>
<td>b, c</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>5.17</td>
</tr>
<tr>
<td>f</td>
<td>d</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>4.50</td>
</tr>
<tr>
<td>g</td>
<td>e</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>5.17</td>
</tr>
</tbody>
</table>

5. Determine the critical path. Add the times for the activities in each sequence and identify the longest path in the project. The critical path has no slack – if activities outside the critical path sped up or slow down the total project time does not change.

3.4.3 CPM and PERT advantages and limitations

Network based scheduling techniques can provide a valuable aid to the monitoring and control of complex projects. The benefits or advantages of using such techniques include:

- They offer a consistent framework for planning, scheduling and monitoring the project
- They provide a clear illustration of the interdependence of all tasks
- They denote the times when certain people must be available for a specific task
- Network techniques aid in communication between departments
- They determine an expected project completion date
- They determine the dates on which tasks may be started
- They illustrate which tasks must be co-ordinated to avoid resource or timing conflicts
- Finally network techniques are popular and easy to use and a large number of software packages support them

PERT and CPM models are not without their disadvantages and problems. Even the largest organisations with much experience in using these techniques have the same ongoing problems. Listed are the most common issues:

- Project activities have to be clearly defined, independent, and stable in their relationships
- Precedence relationships must be specified and networked together
- Time estimates tend to be subjective and are subject to fudging by managers
- Top-level management may feel that the adoption of these techniques removes some of their power to make decisions
- There may be conflict between planners and doers
- Unless the project is repetitive there can be a lack of historical information on which to base the cost and time estimates
- Network techniques are based on the assumption that all activities start as soon as possible
3.5 Summary

Project scheduling is about identifying the main tasks to be accomplished in a project, the time allowed for each of these tasks and the people and skills required to implement the tasks. This chapter focused on project scheduling techniques. These include (a) Work breakdown structure (WBS); (b) Gantt charts and (c) network techniques such as the critical path method and programme review and evaluation technique. Each of these was discussed in this chapter. The next chapter focuses on estimating project costs and budgets.
Unit 3 Progress Check

Q1. What is a Gantt chart and what is it used for?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Q2. Given the following diagram, find the critical path and how long it will take to complete the project.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Q3. Identify six critical steps in developing an aggregate project plan.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Q4. What is meant by the scope of a project?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What is a WBS and how is it used?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Unit 3 Answers to Progress Check

Answer to Q1 - Guideline answer
A ‘Gantt chart’ is a graphical tool outlining the interrelation between the different activities and their duration. The tool allows for resource loading, milestone setting and determination of the sequence of events. The most common software package is MS Project.

The Gantt chart is the main tool for graphically outlining the plan for achieving the project during the implementation. The Gantt chart is used to track project progress, control slippage and generate corrective action.

Answer to Q2
ACF = 18
ADG = 22
BEG = 23 = Critical Path
23 Days

Answer to Q3
Steps in project scheduling:
Set up the project scheduling chart
Identify tasks, deliverables, milestones and durations
Schedule tasks. Decide on timing and sequence of tasks
Assign resources: people, equipment
Establish costs/enter costs
View schedule and adjust if necessary

Answer to Q4
The scope of a project means the range of activities and tasks required to complete the project. The first task in project planning is to scope out the project by making a list of all of the activities and tasks involved.

A Work Breakdown Structure is a detailed graphical display of all the activities and tasks involved in a project. It breaks the project into separate levels — separate modules, and their sub-components, and then down to detailed activities and tasks for each activity. The resources and costs of each task can then be worked out in detail more easily. It is a useful planning tool for scoping out a project in the early planning phase.
4.1 Introduction

When it comes to implementing projects one of the key tasks to be carried out is the preparation of a budget. Budgeting helps to determine the costs associated with the defined activities in a project. The budget represents a plan for obtaining the necessary resources for executing a project. Budgets are created not only at project planning stage but are also used for extensions, enhancements or improvements to existing projects. They also constitute an important mechanism for controlling and reviewing the progress of the project. Finally, the approval of project budgets reflects the policy and priorities of the organisation since the allocated budget will decide the overall investment in terms of resources and commitment. Any budgeting method must take into account all functions that a project budget must serve.

This chapter introduces the role of budgeting in the context of project management. It determines the importance of effective budget management in projects. Specific attention is paid to the process of estimating project budgets. Some of the more common methods of budgeting are then discussed in more detail. By the end of this chapter you should understand what the various functions of a project budget are, be capable of developing a budget estimate and be familiar with the three main methods for developing a project budget.

4.2 Estimating Project Costs

Project budgeting involves identifying the costs of all the resources needed to complete every task in the project. Resources include people, time, equipment and material. Budget estimates are obtained from those responsible for managing the work. Project leaders must identify the skills and competencies needed to perform the work as well as the amount of time needed to undertake the task. This is not an easy task as estimating is in fact guessing. It is important to remember that all project activities are probabilistic not deterministic. In other words, there is a probability that a task can be completed in a certain time period and consume a defined or fixed amount of resources, however in reality this is not always the case. Often if you want to guarantee that a task is completed by a particular date you must be in a position to vary the amount or quality of people assigned to it, or you must be prepared to reduce the scope (or quality) of the task.

Budgets are highly dependant on the estimated length of the tasks. Determining how long a task will take can be the most difficult part of developing a cost estimate. Elements such as breaks, sick leave, bank holidays and meetings are often omitted in estimates. Such omissions may have major repercussions at a later date. Harold Kerzner (2006) identified some of the more common pitfalls in estimating budgets. These include:

To estimate a budget we must identify the following for each task:

- what resources will be needed
- how much of it will be needed
- for how long it will be needed
• Misinterpretation of the project's goals.
• Omissions or poorly defined scope.
• Poorly defined or overoptimistic schedule.
• Inaccurate work breakdown structure.
• Applying improper skill levels to tasks.
• Failure to account for risks.
• Failure to understand or account for inflation.
• Failure to use correct estimating technique.

Past experience, historical data and commercial databases can be used to help estimate the cost of a project. For example, individual members of the project team may remember previous costs and previous project files or records may contain some useful figures. Commercial cost estimating databases are also available to help gather figures. The project leader or sponsor should also consider variation and the causes of variation in the final estimates. Assumptions made in the budget should also be presented. Project managers often include two scenarios i.e. the worst case and the most likely case to help with uncertainty. Three point estimating is another technique that helps project managers produce better estimates. Simply put, it is the weighted average of three estimates. To do this, the project manager should identify the best, most likely and worst estimates. They should then add the best estimate to four times the most likely, then the worst and divide by six. This gives an estimate, which is a slightly more balanced view of how long the task or activity is likely to take.

\[
\text{Best Estimate} + 4 \times \text{(Most Likely Estimate)} + \text{Worst Estimate}
\]

Listening to dictums:
• Assume nothing
• Trust, but document
• What you don’t know will hurt you
• The same work under the same conditions will be estimated differently by ten different estimators at ten different times
• What isn’t written isn’t

A few basic rules will also help ensure that an accurate and realistic estimate is produced:

• People are generally optimistic and often underestimate how long tasks will take.
• Assume that people will only be productive for 80 percent of their time
• Resources working on more than one project take longer to complete project tasks because of time lost switching between them
• The more input you receive from key stakeholders the better.
• Include management time in any estimate
• Always build in extra time and money for meetings, idea generation and unexpected events
• Communicate any assumptions, exclusions or constraints you have to all key stakeholders

To maximise your chances of meeting your project budget, meet your project schedule. The most common cause of overrun budgets is slipped schedules. Meeting the project schedule won’t guarantee you will meet the project budget, but it significantly increases your chances. And above all, manage the project scope. Don’t allow the project scope to “creep” upward without getting budget and/or schedule adjustments to match.
4.3 Developing a Budget Estimate

The following details a simple methodology to help generate project budgets. The steps in the process are; (a) identify internal and external costs; (b) identify total costs; (c) assign accuracy rating; (d) compare costs to spending limit; (e) develop a spending forecast (see figure 4.1). Each of these stages is discussed in more detail.

**FIGURE 4.1 Developing a Budget**

4.3.1 Identify internal and external costs

Internal costs include staff costs as well as the cost of materials, equipment, tools, overheads and other items that come from within the organisation. Staff costs are calculated by estimating the amount of staff time needed (man days or man months) from each team member multiplied by the appropriate billing rates (e.g. hourly, weekly or monthly rate). The staff should include technical, administrative as well as managers and the billing rate should include allowances for social welfare and pensions. Overheads are costs that are incurred but are not directly associated with any particular project or element of the project. They might include items such as heat, light and insurance. They are normally charged as a percentage of labour or as a percentage of the total project costs. To calculate the total internal costs add the staff costs and the costs of the materials, equipment and other costs.

External costs refer to purchases made from outside the organisation. These include contracted labour (e.g. consultants, software programmers etc) purchased material, travel, and equipment rental or purchase. External costs are normally made with a purchase order or expense account.
4.3.2 Identify total costs

Add together the estimate for internal costs and the estimate for external costs to get an estimated total cost for the project.

4.3.3 Assign an accuracy rating to each estimate

The accuracy rating indicates how comfortable the team feels that the estimates are an accurate prediction of what will be spent. The letters H, M and L (high, medium and low) to indicate the teams' confidence in the estimates. Where;

- H = actual costs could vary by +/-10% from the estimates
- M = actual costs could vary by +/-25% from the estimates
- L = actual costs could vary by +/-50% from the estimates

A low accuracy rating means that the team is really guessing. It is a good idea to capture the teams' reasons for each accuracy rating.

4.3.4 Compare cost estimates to senior managements limit on spending

Compare only those estimates that senior management has set a limit on. For example, if senior management set a limit on the total project cost, then the team should only compare the total cost estimate to the spending limit on the total project cost. If there is no spending limit the team should double check the assumptions that were made in creating the estimate to make sure that they were right and to be confident that it is the best estimate that the team can make based on their information.

To compare the estimate to the limit, calculate a range (+/-) for the estimate based on the accuracy rating assigned to it. For example, if the team has an estimated cost of €100, with a medium accuracy rating (equivalent to a range of +/- 25%), the estimate could range from €75 to €125.

If the high end of the range is over the limit, list the assumptions the team used to create the estimate. The project manager should then negotiate directly with senior management on behalf of the team to determine the final figure.

4.3.5 Develop a spending forecast

In order to determine when the money for the project will be spent a spending forecast should be developed. This involves assigning cost to time buckets or periods in which the cost will be spent. These periods may be days, weeks or months. This gives credibility to the teams cost estimate and it helps the team to monitor the spending levels of the project (see table 4.1). Another easy way to distribute the costs is to match each cost to an activity or set of activities in the work breakdown structure. Then simply write the costs under the appropriate time period along the bottom of the chart. This will allow the team to see the schedule and costs by time period in one chart (see table 4.2).
### TABLE 4.1 Spending Forecast

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>……</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers</td>
<td>4,000</td>
<td>4,000</td>
<td>4,000</td>
<td>4,000</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Technical</td>
<td>6,000</td>
<td>6,000</td>
<td>6,000</td>
<td>6,000</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>20,000</td>
<td>3,000</td>
<td>25,000</td>
<td>30,000</td>
<td>60,000</td>
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<tr>
<td>Tools</td>
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<td>15,000</td>
<td>20,000</td>
<td>30,000</td>
<td></td>
</tr>
<tr>
<td><strong>Overheads</strong></td>
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</tr>
<tr>
<td>Space</td>
<td>2,000</td>
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<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td></td>
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<tr>
<td>Light &amp; Heat</td>
<td>1,200</td>
<td>1,200</td>
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<td>1,200</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
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<tr>
<td>……</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td><strong>External costs</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Managers</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,000</td>
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</tr>
<tr>
<td>Administration</td>
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<tr>
<td><strong>Equipment</strong></td>
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<tr>
<td>Material</td>
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<td>10,000</td>
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<tr>
<td>Tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td><strong>Travel</strong></td>
<td>1,000</td>
<td>1,000</td>
<td>2,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Monthly total</strong></td>
<td>49,700</td>
<td>32,700</td>
<td>65,700</td>
<td>73,700</td>
<td>125,700</td>
<td></td>
</tr>
<tr>
<td><strong>Cumulative total</strong></td>
<td>49,700</td>
<td>82,400</td>
<td>148,100</td>
<td>221,800</td>
<td>347,500</td>
<td></td>
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<tr>
<td>Project Task</td>
<td>Internal costs</td>
<td>External costs</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>-----------------------------</td>
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</tr>
<tr>
<td></td>
<td>Staff</td>
<td>Equipment</td>
<td>Overhead</td>
<td>Other</td>
<td>Staff</td>
<td>Equipment</td>
</tr>
<tr>
<td>1. Define problem</td>
<td></td>
<td></td>
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<tr>
<td>2. Gather information</td>
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<tr>
<td>3. Search for solution</td>
<td></td>
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<tr>
<td>4. Design prototype</td>
<td></td>
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<tr>
<td>5. Test prototype</td>
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<tr>
<td>6. Develop new system</td>
<td></td>
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<tr>
<td>7. Test new system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8. Document new system</td>
<td></td>
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<tr>
<td>9. Implement new system</td>
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<tr>
<td>10. Manage Project</td>
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</tr>
</tbody>
</table>
4.4 Budgeting Methods

There are three common budgeting methods: Top-down Budgeting; Bottom-up Budgeting and; Iterative Budgeting (see Meredith and Mantel, 2006). Each of these methods are discussed in more detail.

4.4.1 Top-down budgeting

Top-Down Budgeting is the term given to a budgeting process based on estimating the cost of higher level tasks first and using these estimates to constrain the estimates for lower level tasks. As such, the budgeting process begins when the project manager or the project co-ordinator makes an estimate on the amount of funding required for the whole project. This estimate will be made on the basis of the experience and judgment of the manager or co-ordinator concerned, together with any past data regarding similar type projects. This primary budget is then divided amongst the first level of tasks that go to making up the project, becoming in effect the individual budgets for each of these tasks. The first level task budgets are then divided amongst the second level tasks and the breakdown of budget is continued in this manner until funding has been allocated to all the tasks needed to implement the project. This process is illustrated below in figure 4.2.

![FIGURE 4.2 Top-Down budgeting](image)

A crucial factor for successfully implementing this method for estimating budgets is the experience and judgment of those involved in producing the overall budget estimate. They must be able to take into account such aspects as likely time delays, minor but high cost tasks and other resource considerations that are important to the lower level tasks. Otherwise situations arise where inexperienced budget developers may find themselves faced with trying to accomplish important yet low-level tasks with insufficient means available to them. Problems of this nature can seriously endanger the overall success of a project.

One way that problems of under funding of lower level tasks can be avoided is if the managers of these tasks request a greater allocation than they feel necessary. This is often assumed when top-down budgeting is implemented, however many people have found that this assumption is not safe to make. Often, due to poor communications or external pressures, lower level task managers feel forced to accept the budgets allocated to them. This can lead to the budgeting process becoming a destructive game between the various actors in the process where one’s gain is the other’s loss.

In practice top-down budgeting is widely used. When carried out in the appropriate manner it also has some important advantages such as a high level of overall accuracy and
the fact that all aspects are included it also provides a high level of stability in terms of the fraction of the total budget allocated to each task.

In many instances estimates are based on the availability of funds and this does not always coincide with the actual funds needed to perform the tasks on the project.

4.4.2 Bottom-up budgeting

Bottom-up budgeting begins with identifying all the constituent tasks that are involved in executing the project and working out the resources and funding required by each. The budgets for the tasks one level up from these are then arrived at by simply adding together the budgets of all the tasks that form it. This process of adding or aggregating the budgets of lower level tasks to arrive at the budget for higher level tasks is continued until a budget for the entire project is finally arrived at. At the initial stages of carrying out a bottom-up budgeting process the estimates are often arrived at using the basic tools for cost estimation, sometimes estimates can be in terms of man hours or materials. When all the estimates are converted to cash, costs negotiations are often necessary between those responsible for each task and the overall project manager or project co-ordinator who is responsible for the overall budget. Bottom up budgeting is illustrated in figure 4.3.

One of the main disadvantages of this method for developing a project’s budget is that it leads to a situation where individual project managers deliberately seek higher funding than necessary. This happens since managers wish to ensure that they will be able to accomplish the task to which they have been assigned and also due to the fact, that all requests for funding are often only partly met. This situation can lead to mistrust between the overall project manager and the other managers involved in the project. Furthermore it can be easy to overlook a task when working from the bottom up and such an oversight can be the cause of serious errors in the overall project budget.

The advantages of bottom-up budgeting lie in the accuracy of the budgets for individual tasks. This is useful from the point of view of controlling the project as long as all the tasks have been included. Other advantages stem from the level of involvement of personnel with responsibility for the various aspects of the project. In general, the estimates of the necessary funds and resources to complete each task will be more accurate if they come from those closely involved in performing the task.
4.4.3 Iterative budgeting

In the iterative budgeting process the approach is to obtain budget estimates for each task at each level from the individual responsible for the implementation of that task. In other words the principal project manager devises an estimate for the overall project budget, the managers of the level one tasks develop the budgets for those tasks and the managers of subsidiary tasks are responsible for the budgeting of these tasks. In an ideal situation there would be a perfect match between these estimates and the aggregate of all the budgets at any particular level would equal that of any other level. In practice however, it is found that the sum of the budgets at one level will be greater than the amount estimated at a higher level and less than the amount estimated at a lower level. This happens for two main reasons. Firstly, the manager of the lower level task is more likely to include all the details involved in the task, whereas the more senior manager who is somewhat removed from the actual implementation will tend to oversimplify the issue. Secondly, the manager of the task will seek to have a certain level of redundancy or protection from unforeseen problems factored into the budget.

The next step in the process is for each manager to negotiate with the managers of tasks one level above and below his own, to try and bring their budget estimates closer into line. When negotiating revisions in the budget estimate for each task an important factor that must be taken into account is the life cycle of the task. The life cycle for most projects and for many tasks within a project adopts an “S-shaped” form. In other words, progress is slow at the beginning, speeds up as the project or task gathers momentum and slows down again during the completion stage. However certain tasks and projects have a life cycle where most of the completion takes place near the end of the project life. This type of life cycle usually represents a project where the outcome is heavily dependent on the completion stage. Within the context of the iterative budgeting process it is important to be able to identify which type of life cycle is associated with a particular task. This will have a large bearing on whether the budget estimate for a given task will be accepted without revision or revised in line with the budget estimate of a higher level task or the project as a whole.

The disadvantages of this process of budgeting lie in the relative lengthy and inefficient nature of the negotiations over the budgets. This arises due to the fact that the manager of each task has to simultaneously work out the differences between his own estimates and those of the managers of both the higher and lower level tasks associated with his task. The advantages of the process are that it promotes employee involvement and stimulates a high degree of information flow between those involved in the project at different levels. The level of employee involvement is increased since the initial budget estimate for each task must be generated by the individuals responsible for it. The involved negotiations and budget revisions for each task ensure that information and ideas percolate.

4.5 Summary

This chapter introduced focused on estimating costs for project budgets. The concept of budgeting in the context of project management was discussed from the outset. Specific attention was paid to the process of estimating project budgets. Some of the more common methods of budgeting were presented and discussed in more detail. The next chapter deals with performance measurement and control for preojects.
5.1 Introduction

Project control is about measuring and managing the performance of a project or project portfolio. It enables project managers to understand, manage and improve the work in progress. Project control functions include the following activities:

- Educating the project team on proper project management processes
- Managing the critical path to ensure schedules are being met
- Tracking and analysing project costs
- Managing the process of issue, risk and change control
- Documenting and delivering project status information

In other words, it helps them to ascertain how well the project team are doing, if they are meeting their goals, whether the stakeholders and customers are satisfied and if, and where, improvements are necessary. However, research indicates that many organisations do not perform project control functions well. Managing issues such as risk and process improvements are proving to be particularly troublesome. Consequently, concerns are being raised in the business environment over how best to measure a project’s performance. This chapter introduces performance measurement and control for project management. It identifies the benefits and limitations of using performance measures and proposes a code of conduct to help guide best practice. The critical processes of (a) developing performance measures and (b) a performance measurement system are also described in detail.

Unit Learning Objectives

When you have successfully completed this unit, you will be able to:

- Give reasons why project measurement and control are needed
- State the benefits and limitations of project measurement
- Outline a code of best practice for project measurement
- Explain how to generate suitable performance measures for projects
- Describe a project measurement system in detail

5.2 Understanding Performance Measurement and Control

Performance measurement is the process of measuring the efficiency and effectiveness of an activity or action. A performance measure refers to a metric used to measure the efficiency and/or effectiveness of an activity or action. A performance measurement system is not simply concerned with collecting data associated with a predefined performance goal or standard. It is an overall management system involving prevention and detection aimed at achieving conformance of the work to customer or end user requirements. Effective performance is not merely measured by the delivery of results in one area, but by delivering satisfactory performance across a range of many measures and activities. Furthermore, performance measures are intended to reflect performance as well as stimulate improvement, without being unduly oppressive. The process is a continuous cycle in order to expand and improve the work process as better techniques are discovered and implemented. Simply put, performance measurement informs organisations about their products, services and the processes that affect them. The measurement process lets organisations know;

- how well it is doing
- if it is meeting its goals
In short, the use of performance measures provides organisations with the necessary information to make intelligent decisions. They are recognised as an important element of all continuous improvement programmes. Performance measures do not simply describe what has happened; they influence what will happen, as they provide information for decision makers. A well designed performance measure is a strong tool for controlling business objectives. The aims and objectives of performance measurement can be summarised as follows:

- To know the current status;
- To be aware of trends and to help predict future status;
- To facilitate comparison and benchmarking;
- To set new goals;
- To gain control, i.e. stay within desirable limits;
- To understand and model the impact of driving factors behind performance;
- To find and prioritise improvement actions;
- To verify effects of actions and relate these effects to goals;
- To signal interest and focus, stimulate interest and inquisitiveness and provide a common basis for discussions.

Substantial benefits are realised by organisations implementing performance measurement programmes. The following outlines some of the benefits of performance measures:

- They help organisations understand their processes.
- They identify whether an organisation is meeting customer requirements.
- They ensure decisions are based on fact, as opposed to emotion.
- They identify where improvements need to be made.
- They make the linkages and conflicts visible.
- They verify the effectiveness of corrective actions.
- They receive early warning of problems or conditions that could lead to serious error.
- They demonstrate accountability to all stakeholders.
- They facilitate organisations in benchmark their performance with other organisations.
Measurement can be used to achieve objectives through targeting the processes that support company objectives. However, measuring the wrong things in the wrong area or at the wrong level in an organisation can prompt an inappropriate response and affect the ability to achieve company objectives. In other words, by measuring the wrong things an organisation is encouraging employees to do the wrong things. This is particularly evident if the measurement influences their pay. Such an activity will pull the organisation further from their corporate objectives. Some of the limitations or criticisms of performance measurement include the following:

- **Lack of relevance**: The measures being reported may not be relevant for strategic or operational management depending on the particular area being measured e.g. financial reporting will not provide relevant feedback from strategic goals such as customer satisfaction, quality, speed, innovation, and flexibility and vice versa.

- **Lack of flexibility in dynamic environment**: Goals and needs can vary considerably between business units, departments and teams. Whilst a common set of metrics is often required, management must be able to design and modify measures to meet the specific needs of multiple users. In some instances measures are not updated and modified as operations evolve over time. Very often performance measurement is carried out too late and issued on an infrequent basis which is not acceptable and effective in a dynamic environment.

- **Impediment to progress**: Focusing on inappropriate performance measures and presenting misleading information impedes product and process improvement.

### 5.3 Developing Performance Measures

A performance measure is composed of a number and a unit of measure. Numbers relate to a size (how much) and the unit gives this number a meaning (what). Performance measures are always tied to a goal or an objective (the target). They can be represented by single dimensional units like hours, meters, seconds, pounds, number of reports, number of errors etc. Performance measures can be divided into a number of macro measures of performance such as (a) time; (b) cost; (c) quality; (d) scope and (e) risk.

- **Time**: Time refers to the amount of time required to complete the project. It is typically broken down for analytical purposes into the time required to complete the components of the project, which is then further broken down into the time required to complete each task contributing to the completion of each component.

- **Cost**: Cost refers to the amount of money spent on the project within a particular period. It can be calculated from the time variable. For example, cost to develop an internal project is time multiplied by the cost of the team members involved. When hiring an independent consultant for a project, cost will typically be determined by the consultant or firm’s hourly rate multiplied by an estimated time to complete.

- **Quality**: Quality refers to the standard or degree of excellence of the task or work done on the project. The amount of time put into individual tasks often determines the overall quality of the project. Some tasks may require a given amount of time to be completed adequately, but given more time they could be completed exceptionally. Over the course of a large project, quality can have a significant impact on time and cost (or vice versa).

- **Scope**: Scope refers to the range and extent of the requirements specified
in order to achieve the end result. It will cover the overall definition of what
the project is supposed to accomplish, and a specific description of what the
end result should be.

- **Risk**: Risk refers to the potential points of failure. Most risks or potential
failures can be overcome or resolved, given enough time and resources.

Other performance measures that may be applied to project management are illustrated in Table 5.1

More often multidimensional units of measure are used such as, miles per gallon,
number of accidents per million hours worked, number of on-time deliveries per total
number of deliveries. These measurements are more meaningful to those who may
make decisions. An ideal unit of measure does the following:

- reflects the customers needs as well as the organisations;
- provides an agreed upon basis for decision making;
- is understandable;
- may be interpreted uniformly;
- is compatible with existing measures;
- is precise in interpreting the results;
- is easy and economical to apply.

<table>
<thead>
<tr>
<th>Trait</th>
<th>Description</th>
<th>Expressed as a ratio of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>Ability to perform a task</td>
<td>Actual input/Planned input</td>
</tr>
<tr>
<td></td>
<td>Is the company doing the right things?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the process output conforming to company requirements?</td>
<td></td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Ability to plan for output from processes</td>
<td>Actual output/ Planned output</td>
</tr>
<tr>
<td></td>
<td>Is the process producing the required output at minimum resource costs?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the company doing things right?</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>Was a unit of work done correctly?</td>
<td>Number of units produced correctly/Total number of units produced</td>
</tr>
<tr>
<td></td>
<td>(The criteria of correctly is defined based on the requirements of the customer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the product/ service meet the requirements and expectations of the customer?</td>
<td></td>
</tr>
</tbody>
</table>
A well designed performance measure is a powerful tool for controlling business objectives. Performance metrics integrates the actual work to be done with the cost of doing the work and the time needed to do it. The performance improvement literature stresses the fact that performance measures are best developed co-operatively by those responsible for the system being measured. All affected parts of the organisation should participate in order to understand the desired outcomes and the level of expectations. This includes joint involvement at all stages in the process i.e. developing measures, monitoring performance on a continued basis, self assessment and evaluation. Continuous interaction prevents surprises. Focus is also shifted to performance as opposed to compliance. When developing a performance measurement strategy it is important to consider the following:

- Measure only what is important. Do not measure too much, measure things that impact the bottom line, such as, customer satisfaction
- The measurement system as a whole must be implemented, not just one or two easy or attractive measurements picked out
- Focus on customer needs. Ask your customers what they think you should measure
- Co-ordinate the performance measurement system with other impacted organisations where appropriate
- Secure employee buy-in by giving them a sense of ownership. This will lead to improvements in the quality of the measurement system
- Make sure that the measurements are stable i.e. not changed to due to internal political pressures or flavour of the month ideas

### 5.3.1 Code of conduct

Performance measurement should not be about bureaucracy or assigning blame to individuals. A code of conduct should be adopted if users are to avoid feeling threatened by the potential deficiencies of the measurement process. An organisations code of conduct may include some or all of the following statements:

- Measures are used to gain knowledge and should be part of an improvement process
The use of measurements should be governed by openness and willingness to learn.
- The object under evaluation should be a process, product or organisational structure, never a person.
- A common framework should be used. Common principles, guidelines and definition facilitate comparability and reduce the risk of measurements being misused.
- Measures should be derived from strategic objectives to ensure that employee behaviour is consistent with corporate goals and a good understanding of target attributes is required.
- A ‘vital-few’ approach should be observed. The measurement process should measure only what is necessary and measurements should be well-defined and easy to understand. This ‘vital-few’ should consist of both financial and non-financial measures.
- Extra work should be avoided. Where possible the measurement process should be automated, but only after the measures have been implemented, proven and validated.
- Measurement results should be available to everyone. Contributors to the measurement process should be recognised for their effort. Statistics and analysis should be open and actions should be taken based on data that is made visible.

The use of these guidelines can ensure correct use of performance measures within the organisation and help to guarantee the potential benefits that can arise as a result.

### 5.4 Developing a Performance Measurement System

A performance measurement system is illustrated in a feedback loop (see Figure 5.1).

![Feedback Loop Diagram](image)

This loop was designed by the United States Department of Energy. It presents a systematic series of steps for maintaining conformance to goals or standards. This is achieved by communicating data back to the responsible worker and/or decision maker who will initiate appropriate action. The key message of the feedback loop is that in order to achieve the goal or standard those responsible for managing the critical activities must always be in a position to know, (a) what is to be done, (b) what is being done, (c) when to take corrective action and (d) when to change the goal or standard. The basic elements of the feedback loop and their interrelations are as follows:
A detector assesses the actual performance
He/she then reports this performance to an employee responsible for the process
This employee receives information on what the goal or standard is
He/she then compares the actual performance to the goal. If the difference warrants action, the employee responsible for the process reports to a responsible decision maker
The responsible decision maker verifies the variance, determines if corrective action is necessary, and if so, makes the changes needed to bring performance back in line with the goals

From this, a performance measurement process can be developed. A good process provides users with a "means to achieve the end-result". A performance measurement process ensures that people are not only aware of the process, but they are also responsible for various activities within the process. When people are responsible for activities, accountability and traceability are then immediately incorporated into the process. These features are vital to ensure the success of such processes. If people are accountable for certain activities, these activities will be carried out and the process will be followed. The Performance measurement process illustrated in figure 5.2 defines a set of steps that can be followed to implement the use of performance measures. These steps should be adapted where necessary to fit the specific needs of each organisation and/or process within an organisation. This material should be amended or new information added whenever it is appropriate for a particular process.

Diagram: Performance Measurement Process

1. **Identify the process flow:** A process must be understood in order to be controlled. A flow diagram is a useful tool to help us understand a process. By flowcharting the entire process the foundation for developing performance measures is laid. All parties who are involved in the process should participate in creating the flowcharts. By doing this, individuals will receive a
new understanding of the processes that affect them. Furthermore, by involving those affected, employee support (which is imperative in making the performance measurement system work) is secured.

2. **Identify the critical activity to be measured**: It is important to focus on key areas and processes as opposed to people. Each activity in the process should be examined and those that are critical should be highlighted. Critical activities are those that significantly impact efficiency, effectiveness, quality, timeliness, productivity or safety. Critical activities also impact management priorities, organisational objectives and customer requirements.

3. **Establish performance goals or standards**: These goals should be the target to which you are aiming to reach. Goals can be either set by management or they can be set in response to customer needs or complaints. They should be specific, measurable, attainable, realistic, consistent, understandable, equitable and customer oriented.

4. **Establish performance measurements**: Performance measures should be stated in the same units as the organisation's goals, where possible. However, if an organisation has not developed goals or targets the performance measures should measure what the organisation wants to know.

5. **Identify individual(s) responsible**: At this stage an individual or team should be assigned to take responsibility for the process. Ideally, this person or team of people will be a senior member of staff as lack of authority may prevent an individual from performing their job. This person should also be accountable for the process.

6. **Collect data**: Data are a set of facts presented in either numeric or descriptive form. Data must be specific enough to provide definite information. Furthermore, it is essential that the data collected is accurate and free from bias.

7. **Analyse/report actual performance**: Raw data must be analysed and assembled into a performance measurement. They should then be summarised in a graph or table.

8. **Compare actual performance to goals**: The individual or team responsible should see whether the actual performance differs to the desired performance. If there is a significant difference, those responsible must ascertain if action is necessary. There are several alternatives available for possible actions, which include; ignoring it, changing the process or changing the goal.

9. **Ascertain whether corrective action is necessary**: If the variance is large there may be a problem with the process and corrections will be needed to bring the performance back in line with the desired goal or standard. A root cause analysis may be undertaken to evaluate the potential problem.

10. Make changes to bring back in line with goal: All identified sources of defects should be removed and a new or improved process should be developed.

11. **Ascertain whether new goals are needed**: The decision to create new performance measures or goals will depend on three major factors; (a) the degree of success in achieving previous objectives; (b) the extent of any change to the scope of the work process; (c) the adequacy of current measures to communicate improvement status relative to critical work processes.

How elaborate a process is depends on the size and scope of the task to be managed, as well as the size and distribution of the team working on it. Large, lengthy and distributed projects are more likely to require elaborate, disciplined systems to ensure that all
the pieces remain coordinated. Smaller projects usually tailor the formal system into an informal systematic approach that may trade off a project manager’s skills against detailed, formal procedures.

**What went right and wrong?**

- **Summarise specific things that worked well**
  - Use specific examples: “daily 15-minute morning status meetings worked well” instead of “team communicated well”.
  - Distribute or list network location of forms, procedures, reports, etc. that were found to be particularly useful.

- **Summarise in quick bullet points specific things that caused problems**
  - Try to isolate specific attitudes, procedures, methods, timing issues, etc. that caused problems

- **How did team respond to problems?**
5.5 Summary

This chapter focused on performance measurement and control for project management. It highlighted how performance measures if used correctly can be extremely beneficial to all users throughout the organisation. It also identified the limitations of using performance measures and proposed a code of conduct to follow which serves to mitigate deficiencies and reduce associated criticisms that may arise with the use of performance measures. The chapter also noted how to develop a performance measure and examples of key macro measures was provided. Finally we learned that a process should be applied to help control the means by which the end result is achieved and ensure that deviations from organisation objectives are minimised. Therefore, a simple 11 stage performance measurement process was presented.
Unit 5 Progress Check

Q1. Explain the importance of using performance measures to evaluate the achievement of project objectives.

_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________

Q2. State some limitations of project measurement.

_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
Q3. What are the characteristics of an excellent project measurement system?
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________

Q4. List the key elements of a code of best practice in project measurement.
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
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____________________________________________________

Q5. "Project planning and control are essentially two sides of the same coin". Discuss this statement, focusing on the vital parameters essential for effective project management.
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
Unit 5 Answers to Progress Check

Answer to Q1 - Guideline answer
Your answer should include some of the following key points:

- Explain that performance measurement measures the efficiency and effectiveness of an activity or action.
- It measures how well the work conforms to the customer requirements and pre-stated goals/standards.
- It measures performance across a range of areas, not just one.
- A good performance measurement aims to give information which will enable improvement.
- It allows an organisation to benchmark its performance against other organisations.
- It provides early warning of problems in time to take corrective action.

It shows:
- How well the organisation is doing overall.
- If it is meeting its goals.
- If the customers are satisfied.
- If the work processes are controlled and measured (statistical basis for measurement).
- Possible improvements.

Answer to Q2
Limitations of project measurement

(i) Measuring the wrong things
- It is important to measure the right things, as measuring the wrong things can lead to staff concentration on the things that are measured.
- Must be relevant.

(ii) Inflexibility
- Organisations often develop a 'one size fits all' approach to performance measurements. These may not suit all departments.
- Also, they need to be updated to take account of changes in processes.

(iii) Must be timely
- Performance measurement is often done too late to be of use.

Answer to Q3
An excellent project measurement system would have the following characteristics:

- It would be based on the customers' needs as well as on the goals of the organisation.
- It would be developed through discussion with stakeholders – an
6.1 Introduction

Effective project teams are imperative to successfully implement project goals. This chapter deals with the concepts of teams in general and cross functional teams in particular. Key success factors are identified and discussed. These include team size, composition as well as concepts such as mutual accountability and empowerment. Some obstacles to successful teamwork and collaboration are highlighted. Guidelines for effective collaboration within teams and between teams are then provided. The importance of team leaders is also discussed. Particular attention is paid to the role of team leaders and styles of management. The chapter concludes with a discussion on how to co-ordinate, recognise and reward project teams in a dynamic environment.

6.2 The Concept of Teams

In contrast to past management practices where the scope of jobs was very narrow and undertaken by specialist workers, teams and teamwork encourages multiple and broad skills and enable decisions to be made at the point of action. In addition, teams provide an organisation with a better way of satisfying human work needs as most human beings prefer jobs that include social interaction. This contact is particularly important when the nature of the work is information or knowledge based. Teamwork is known to enhance creativity, motivation, and employee participation in organisations. This in turn is believed to increase performance and productivity.

There is a wide diversity of meanings associated with the term “team” and many definitions of the word cast the net too broadly, or too narrowly, to catch all. However, most writers and practitioners agree that an integral element to the concept is individuals committed to a common purpose. Successful teams are committed to a shared purpose and specific performance goals. Teamwork is also a collective process; it cannot be achieved by a single person. Therefore, another critical factor to the definition is that its members are highly interdependent. This involves individuals with complimentary skills who voluntary co-ordinate their work in order to achieve group objectives. Finally, the concept of mutual accountability is the cornerstone to team success. In other words, the goals of the team are understood to apply to every member of the team, and accountability for accomplishing these goals is shared. Therefore, combining these elements, a team can be defined as “… a small number of people with complimentary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable.” Katzenbach and Smith (1993)

6.2.1 Cross functional project teams

Cross functional teams are lauded to facilitate the successful planning, development and implementation of complex projects. Cross functional teams are made up of people from different departments, or functions, in an organisation. The central advantage of these teams is that they bring together information, knowledge and skills that might not otherwise be readily available. While some employees bring technical knowledge and expertise such as, design engineering or computer programming, others bring specialised knowledge of functions or operations such as finance and marketing.

Cross functional teams accomplish tasks more quickly, and therefore reduce the lead time for project implementation. This is because they use parallel development as opposed to serial development. In other words, they develop different aspects of a project simultaneously instead of sequentially. Cross functional teams also act as a single source of information
and decision making. This produces better decisions because individuals with greater tacit knowledge are involved in the process. They also have the ability to take rapid action as they are more autonomous and do not have to acquire permission from superiors. Therefore, unnecessarily, costly and non value added tasks can be eliminated at the source.

<table>
<thead>
<tr>
<th>How teams add value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• maximise tacit knowledge</td>
</tr>
<tr>
<td>• decentralise decision making</td>
</tr>
<tr>
<td>• cross fertilise ideas</td>
</tr>
<tr>
<td>• more flexible</td>
</tr>
<tr>
<td>• more responsive</td>
</tr>
<tr>
<td>• more productive</td>
</tr>
</tbody>
</table>

### 6.3 Key Success Factors

There are some key issues that facilitate the successful development of a team. It is necessary to understand and adopt these prerequisites, from the outset, in order to facilitate teamwork. These issues include team size, composition, mutual accountability and empowerment. They are discussed in more detail below:

#### 6.3.1 Team size

In general, the smaller the number of team members, the higher the probability of success. The ideal team has between four and seven members and should never exceed ten members. Some projects require a greater diversity of skills but, all other things being equal, a larger size tends to lead to a lower per capita performance. Once a team grows beyond ten members it becomes difficult to maintain close cohesion and they can more readily break up into factions. Conversely, it can also be argued that it is more difficult to bring together the range of skills and approaches that lead to the problem solving and idea generation when the team has less than four members. Therefore, it seems that the ideal team size should consist of four to seven members where they can:

- convene easily and frequently,
- communicate with all members without formal systems and
- understand everyone else's roles and skills

#### 6.3.2 Team composition

Composition has been shown to be central to team success. Finding good performers will contribute to productivity but, unless collectively teams possess the functional background, skills, and experience necessary to implement the project deliverables, the team is not likely to succeed. A well balanced skill mix is essential for teams. Generally team diversity tends to have a positive effect on creativity. Each team must have adequate:

- functional or technical expertise
- problem solving and decision making skills, and
- interpersonal skills

Meridith Belbin (1981) is a British researcher and academic (he is a Visiting Professor and Honorary Fellow of Henley Management College), best known for his work on management teams. He undertook extensive research on the nature, structure and behaviour of teams and provides a framework for understanding the constituents of the ideal team. His work analy-
ses the qualities and preferences team members bring, in addition to their expert knowledge and skill. Amongst his key conclusions was the suggestion that an effective team has members that cover eight key roles. These roles are illustrated in table 6.1. Based on this model, managers or organisations building project teams should ensure that each of the roles can be performed by a team member. Some roles are compatible and can be more easily fulfilled by the same person while some are less compatible and are likely to be done by people with different personalities. In his more recent work Belbin has extended the list of eight roles to include a ninth called the “specialist” or “expert”. In some contexts, it is valuable to determine whether an expert with a unique skill set is needed to fulfil the projects goals.

<table>
<thead>
<tr>
<th>Type</th>
<th>Typical Features</th>
<th>Positive Qualities</th>
<th>Allowable Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker/</td>
<td>Conservative, dutiful,</td>
<td>Organising ability, practical</td>
<td>Finds it hard to be flexible and unresponsive to</td>
</tr>
<tr>
<td>Implementer</td>
<td>predictable</td>
<td>common sense, hard working, self disciplined</td>
<td>unproven ideas</td>
</tr>
<tr>
<td>Chair</td>
<td>Calm, self-confident,</td>
<td>A capacity for treating and welcoming all potential</td>
<td>Considers self as “Average”</td>
</tr>
<tr>
<td></td>
<td>controlled</td>
<td>contributors on their merits and without prejudice</td>
<td></td>
</tr>
<tr>
<td>Shaper</td>
<td>Outgoing, dynamic</td>
<td>Drive and a readiness to challenge inertia,</td>
<td>Proneness to provocation, irritation and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ineffectiveness, complacency or self deception</td>
<td>impatience</td>
</tr>
<tr>
<td>Eccentric/</td>
<td>Individualistic,</td>
<td>Genius, imagination, intellect, knowledge</td>
<td>Up in the clouds, inclined to disregard practical</td>
</tr>
<tr>
<td>Visionary</td>
<td>serious-minded, unorthodox</td>
<td></td>
<td>details or protocol</td>
</tr>
<tr>
<td>Researcher</td>
<td>Extroverted, enthusiastic</td>
<td>A capacity for contacting people and exploring</td>
<td>Liable to lose interest once the initial</td>
</tr>
<tr>
<td></td>
<td>curious, communicative</td>
<td>anything new. An ability to respond to challenge</td>
<td>fascination has passed</td>
</tr>
<tr>
<td>Monitor/</td>
<td>Pedantic, prudent,</td>
<td>Judgement, discretion, hard-headedness</td>
<td>May find it hard to participate fully</td>
</tr>
<tr>
<td>Evaluator</td>
<td>objective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team worker</td>
<td>Socially-oriented,</td>
<td>An ability to respond to people to situations, and to</td>
<td>Indecisive at moments of crisis</td>
</tr>
<tr>
<td></td>
<td>rather mild, sensitive</td>
<td>promote team spirit</td>
<td></td>
</tr>
<tr>
<td>Completer/</td>
<td>Painstaking, orderly,</td>
<td>A capacity for follow through. Perfectionism</td>
<td>A tendency to worry about small things. A</td>
</tr>
<tr>
<td>Finisher</td>
<td>conscientious, anxious</td>
<td></td>
<td>reluctance to “let go”</td>
</tr>
</tbody>
</table>

TABLE 6.1 Belbin’s Team Roles

6.3.3 Mutual accountability

A group will never become a team until it can hold itself accountable as a team. The concept of mutual accountability requires moving from a parochial view of the world in which the individuals own function, values and goals are paramount. In order for teams to become mutually accountable, members must be clear on the contributions for which they are individually responsible and also, for which the team is jointly responsible. These may include; a team’s purpose, goals, approach, and work products. Commitment and trust are two critical dimensions to mutual accountability. When people work together toward a common objective, trust and commitment follow. Consequently, teams enjoying a strong common purpose and approach inevitably hold themselves, both as individuals and as a team, responsible for the team’s performance.
Attempts to share power and create ownership in teams are common in the effort to encourage employees to participate fully in projects. Employee empowerment involves the delegation of decision making to employees while holding them accountable for outcomes. Empowerment means giving employees much more scope to make decisions and allowing organisations to become less bureaucratic. This ownership is lauded to be imperative for the success of teams. More specifically, it is believed to have a positive impact on the team’s decision-making ability. It also increases employee motivation and productivity. Other benefits include:

- Shorter lead times
- Better performance
- More responsive service
- Complaints dealt with quickly
- Greater customer satisfaction
- Lower staff costs and high profits

“We must become the change we want to see.”
Mahatma Gandhi (1869-1948)*

*Mahatma Gandhi was a major political and spiritual leader of India and the Indian independence movement.

However, it must be noted that not all employees welcome the idea of assuming additional responsibly and accountability. For instance, employees who work in high stress environments may be reluctant to take on additional responsibilities. They may feel that their time, energy and resources are stretched to the limits and they do not want any additional responsibility. Therefore, it seems that if organisations really want to empower employees, they have to do more than just cede authority and control, they have to help their employees manage their autonomy.

Team members must have access to relevant skills and information to perform their jobs well. In other words, employees must be enabled to do the work. Enabling people involves helping them develop the competencies they need to manage additional power and autonomy efficiently. When enablement is not part of the effort, it is likely to fail. Barner (1994) proposes a model for enablement (see figure 6.1). The vertical axis represents empowerment which is defined as the extent to which employees have personal power and organisational autonomy. The horizontal axis is enablement which is the extent to which they have the competencies needed to manage that power and autonomy.
According to this model entrenched bunkers is a situation where people lack both power and competence and subsequently they retreat to their original job tasks. Employees who are empowered, but are not enabled, are referred to as loose cannons. They are eager to exercise authority but they lack the necessary skills and experience high levels of cynicism towards the organisation and the concept of empowerment. Caged eagles are capable and predisposed to play larger roles in their organisations, but, they are often thwarted by restrictive organisational practices or controlling managers. People who are fully empowered have both competence and eagerness and work in an environment which encourages employees to exercise decision and making authority. Subsequently, they make greater contributions to the organisation.

Training people can help prepare employees to meet the challenge posed by empowerment. It also helps employees to evaluate their ability to assume additional responsibilities, to set performance goals and to monitor their own performance. Training also helps team members develop positive norms, resolve conflicts, gain consensus and work with people who have different work styles. While, training in technical skills facilitates employees to undertake specialist tasks, training in interpersonal skills such as group dynamics, communications, problem solving and brainstorming enables team members to work together more effectively.

6.4 Obstacles to Effective Team Working

What holds team members back from working closely with one another? Research has found that the most significant barriers are not technical ones. In fact, human barriers such as understanding the motivation to collaborate, overcoming distrust among parties, learning how to communicate and agreeing on how to share costs and benefits loom much larger. According to Cormican and van Leeuwen (2006) key problems with collaboration in teams include:

- **Motivation**: Many people are unclear of the benefits for information and knowledge sharing and collaboration. In other words, they do not know what are the drivers, advantages, rewards and returns of sharing information with others.
Unless mutual benefits to team working are established and communicated to all parties, people will remain unwilling to participate and reluctant to learn new procedures for information exchange.

- **Trust**: Organisations often lack the confidence to share proprietary information with other team members. They often fear that competitors will gain access to proprietary data if they share information such as sales forecasts, or promotional plans with collaborating partners. Nevertheless, this kind of real-time sharing of vital operational information is essential if employees want to work together towards a common goal. Establishing trust is potentially the greatest barrier to overcome in team working, and it must be established from the outset to allow knowledge sharing.

- **Communication**: There is a lack of a common language between representatives from different functions and disciplines and consequently there can be many different interpretations of the same statement. Therefore, information is often misinterpreted between its creation and incorporation. Furthermore, information is often incorrectly formatted in documents and files and people are unable to communicate effectively. These factors also impede effective information sharing. Therefore, a common and agreed language and format must be finalised from the outset in order to allow the members to understand each other.

- **Access**: There is a lack of a common standard to enable information access and transfer. Companies often do not know what information to share, where critical information can be found and how to transfer it to others. Software is a key enabler for collaboration and information sharing with the Internet playing a leading role. In the case of smaller firms, access to sophisticated information technology is often not necessary, however, an adequate knowledge of the methods and mechanisms available for communication is important.

Attention must be paid to redesigning and restructuring internal processes to support a collaborative business environment. Furthermore, successful initiatives require top management support and backing to overcome the natural resistance of organisations to change. Knowledge sharing and collaboration in teams may demand leadership and support. Therefore, leaders must focus on the specific, tangible business benefits of these efforts. Such foundation building will be critical in overcoming the barriers to collaboration and effective teamwork.

### 6.5 Guidelines for Successful Collaboration

Some of the key elements for effective collaboration in teams and between teams are summarised in the following table:

<table>
<thead>
<tr>
<th>Key Success Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clear Need</strong></td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
</tr>
<tr>
<td><strong>Leadership</strong></td>
</tr>
</tbody>
</table>
Early Success

If a team is able to demonstrate at an early stage that it can positively contribute to the organizations goals, it is likely to increase their commitment to its continual evolution.

Trust

Vital membership characteristics include above all mutual respect and trust. The success of the team is heavily dependant on trust between its members.

Ownership

Team members must take ownership of the project. Team members must have a stake both in the process and outcome. If the team is comprised of free loaders then it is unlikely to survive.

Time

Effective teams take time to develop. Trust and independence is built over time. There must be extra willingness and flexibility during the early stages of the project to establish a structure.

Communication

Open and informal communication structures are also necessary.

<table>
<thead>
<tr>
<th>TABLE 6.2 Effective Collaboration in Teams (Cormican and van Leeuwen, 2006)</th>
</tr>
</thead>
</table>

6.6 Team Leaders

Skilled leaders are vital to teams. Research indicates that leaders can be a team’s greatest asset or its primary obstacle. As Cauldron (1994) explains;

“Without skilled leadership, teams can flounder, get off course, go too far or not far enough, lose sight of their mission and connection with other teams, lose confidence, get stymied by interpersonal conflict, and simply fall short of their enormous potential - especially in the early months and years of their development.”

Leading teams refers to the less mechanical, perhaps more intuitive skills necessary for a team to find direction, synergy and success. A leader’s role involves focusing the efforts of a group of people towards a common goal and enabling them to work together as a team. In addition, leaders of cross functional project teams are a pivot of communication within the organisation. They act as a link between the entire organisation and the individual teams. If such links are not established between teams and senior management, the team’s actions are left unsupported. Creating a strong supporting link is vital to a company’s ability to produce a culture that fosters innovation and productivity.

“Be enthusiastic as a leader.
You can’t light a fire with a wet match.”

Unknown

The best team leaders create a vision for the team which inspires people to high levels of performance. A leader’s role is to create, maintain and retain an environment that encourages innovation and remove the blocks and barriers to innovation. A team leader’s responsibilities could be summarised along the following lines:

- to build trust and inspire teamwork,
- to facilitate and support the decisions made by their teams,
- to expand team capabilities,
- to create team identity,
- to force and influence change.

Most researchers agree that a democratic, collaborative style of leadership is best as this promotes innovation. It is also believed that high levels of discretion can encourage innovation. Chaudhry-Lawton et al, (1992) developed the situational leadership model which is...
based on the work of Hersey and Blanchard (1977). This suggests that there is no optimum style of leadership. On the contrary, according to this view, effective leadership behaviour is that which is appropriate to the specific situation the leader finds him/herself in. The model is formed around two categories of behaviour; relationship behaviour (i.e. providing support, encouragement and recognition) and task behaviour (i.e. providing direction, focus and structure). Using these as the axes of a matrix, four leadership styles can be developed. Each of the four styles can be effective when used at the right time and place. This will often depend upon:

- the willingness and ability of the team members
- the nature of the teams goals and tasks
- the climate of the wider organisation

A structuring leadership style is where the team leader decides how the task can be accomplished and communicates this to the members. Close and regular monitoring is characteristic of this approach. A coaching leadership style focuses on interaction, since the team leader/member relationship revolves around two goals; accomplishing the task and developing task related ability and commitment. Coaching requires energy and commitment that is focused as much on the team’s development, as it is on task accomplishment. The main concern with the encouraging leadership style is to ensure that team members are increasing their confidence and ability to perform a specific task in an understanding and independent way. An open and supportive manner is associated with this style. The dominant component of the empowering leadership style is allowing the team members to proceed on their own, this requires the leader to allow team members to set their goals and be in charge of whatever planning or decision making may be involved. The primary concern of the leader is to ensure that organisational goals and policies are being met and that interference or disruptions beyond the team members control are dealt with.

Leading teams is a relatively new and uncharted concept for many. While companies expect middle managers to metamorphose into star team leaders ready to coach, motivate and empower, it seems that few managers understand the transformational process. Furthermore, managers thrust into this new role also wonder what long term effect it will have on their careers. In order to learn how to be a team leader, the following guidelines should be considered:

- Don’t be afraid to admit ignorance.
- Don’t be afraid to delegate.
Kouzes and Posner (2002) developed a model for effective leadership. They base their model of leadership on decades of research on leadership practices and commitments associated with effective leadership. It identifies five leadership practices, each requiring two commitments.

### Kouzes and Posner’s Five Practices and Ten Commandments

**Model the Way**
- Find Your Voice
- Set the Example

**Inspire a Shared Vision**
- Envision the Future
- Enlist Others

**Challenge the Process**
- Search for Opportunities
- Experiment and Take Risks

**Enable Others to Act**
- Foster Collaboration
- Strengthen Others

**Encourage the Heart**
- Recognise Contributions
- Celebrate the Values and Victories

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### 6.7 Organising and Co-ordinating Teams

Understanding how to co-ordinate project teams effectively is vital for project success. The matrix structure has been lauded as the most effective method to co-ordinate complex projects. The matrix organisation is in reality a compromise between two sets of needs: the customers need a single point of contact for the project, to avoid having to negotiate with a series of separate functional managers, and the company’s need to build up its capability through strong specialist departments. Here both product and functional structures are implemented simultaneously. In this situation a person working on a project would have two managers, the project manager and the functional manager. The project manager has the total responsibility for the success of the project while the functional manager is responsible for maintaining technical excellence in the discipline. Matrix structures are flatter and more responsive than other types of structures because they permit more efficient exchanges of information. Furthermore, matrix structures may result in a more efficient use of resources than other structures. This is because specialised employees and equipment are shared by departments and functions.

Despite the popularity as a creative structural solution, the matrix structure has always had its critics. Matrix structures create differentiation, by separating the function and the project. The structure attempts to achieve diverging objectives by making different people accountable for them. For instance, a product line manager builds project identity while the
functional manager is responsible for building organisational commitment and identity. This separation causes conflict and problems with relationships. Matrix structures can also result in increased suspicion, defensive behaviour and conflict. For example, employees compete with each other for resources in the functional area which causes conflict. This conflict can become dysfunctional when it delays decision making, significantly reduces the amount of energy available for relevant work, blocks important communication channels and subjects individuals to unacceptable stress.

Furthermore, one of the most common problems to be reported by managers of matrix organisations is that of role conflict and role ambiguity. Role conflict is the state of being exposed to conflicting expectations from the various people, while role ambiguity is a condition in which people seem to have no clear expectations about their role. This suggests that a major issue that faces matrix managers is how to integrate employees who have been given these different responsibilities and powers. A traditional answer is to provide a balance of power or influence for the two managers. One approach is to place both responsibilities on the same shoulder which concentrates on one objective at the expense of the other. The other approach is to make different people accountable for the two requirements in the hope that this will make it easier to reconcile the conflicting objectives.

It must also be taken into account that there is no right structure for all organisations, instead. Times of great change require short term inconsistencies. Organisations will always require the individual to serve two masters, as in a classic matrix structure. It is better to teach the individual how to handle complex, inconsistent demands, than it is to hold organisations responsible for eliminating them.

6.8 Rewards and recognition

Motivation theory suggests that individuals respond positively to stimuli that reward achievement and performance. Employee recognition and compensation are key elements in aligning the interest of employees to that of the organisation. If organisations wish to encourage teamwork, they must reward team members for their activities. Consequently, performance rewards for teams is of great importance and thus, organisations must design a performance reward system which incorporates the activities that management wishes to promote. For example, in high risk ventures such as developing new products, innovative companies must accept failure, or at least, not punish it. Management must also actively encourage individual initiative and risk taking by rewarding such activities appropriately.

It is also imperative to consider what form of reward is most effective in rewarding teamwork. In other words, should they be extrinsic (financial) or intrinsic (soft)? Appraising the performance of professional, team members is a major organisational challenge, given the nature and diversity of tasks they accomplish. This problem is especially felt in technology based companies, where a significant timelag exists between the concept definition and profitable results.

In complex projects, team members are highly interdependent; therefore, the reward system should be designed to encourage co-operation, rather than competition. Many believe if a team is not recognised, as a unit, it will be difficult to continue to motivate the group to work as a team. However, giving equal recognition for unequal performance is detrimental to a group's sustained performance. When a team, as a whole, is rewarded, the best performers are demotivated. Conversely, when only the best performers are rewarded, the team, as a whole, is demotivated. Astute managers must strike a fine balance between team and individual rewards.
6.9 Summary

This chapter introduced the concept of project teams. Comprehensive definitions were outlined from the outset in order to provide the reader with a clear understanding of the concept in relation to project management. In addition, important elements of these definitions were explored in further detail. Some essential prerequisites for the successful formation of teams were then outlined and discussed. Barriers to teams and teamwork were highlighted and guidelines for effective collaboration were provided. The importance of team leaders was also discussed. The remainder of the chapter focused on some of the issues that team leaders and senior management must address in project based organisations. This includes organising and rewarding project teams.
In the past, project management focused on the dynamics of managing an individual project well. Now the business world has expressed a need to better manage the portfolio or suite of projects. Companies are now realising that a key element of their success involves employing a platform or family perspective when planning and executing development or improvement projects. In general, an organisation’s project portfolio will contain a mix of many types of projects. Some projects will represent small scale incremental developments or improvements while others will focus on more radical innovations. Organisations must maximise the value of the portfolio and seek the right balance of projects. They must also attempt to align the portfolio of projects to the firm’s competencies and capabilities. Consequently project and programme managers must ensure that the projects in the portfolio and the spending breakdown mirror the business’s strategy. Furthermore, a company should seek to have a combination of low risk, short-term projects and high risk longer term ones. It should also ensure that the project life cycles overlap. This guarantees continuity of income and growth potential. The fundamental principles of portfolio management methods and selection techniques are discussed in more detail in this chapter.

Unit Learning Objectives

When you have successfully completed this unit, you will be able to:

- Explain why organisations often have too many projects underway at any one time.
- Outline the key elements of portfolio management
- Describe numeric and non-numeric project selection methods
- Use risk assessment techniques to rank projects

Fundamentals of Portfolio Management

Portfolio management is a decision process, whereby a business’s list of active projects is constantly updated and revised. In this process, new projects are evaluated, selected, and prioritised; existing projects may be accelerated, killed, or de-prioritised; and resources are allocated and reallocated to the active projects. The portfolio decision process is characterised by uncertain and changing information, dynamic opportunities, multiple goals and strategic considerations, interdependence among projects, and multiple decision-makers and locations. While the portfolio management decision problem is important and valuable it is also intricate and complex. Therefore, portfolio management techniques and methods should be adopted and used. These techniques and methods should include the following performance goals:

- To have the right number of projects in the portfolio for the resources available.
- To avoid pipeline gridlock in the portfolio undertaking projects on time and in a time-efficient manner.
- To have a portfolio of profitable, high return projects with solid commercial prospects.
- To have a balanced portfolio i.e. long term versus short term, high risk versus low risk, and across markets and technologies.
- To have a portfolio of projects that is aligned with the business’s strategy.
- To have a portfolio whose spending breakdown mirrors the business’s strategy and strategic priorities.

Many organisations have too many projects in their portfolio and not enough resources to execute or implement them well. This leads to resources being spread too thin over too many projects and this can lead to poor project management. The reasons why organisations have too many projects include:

- There are too many projects that “must” be done. This can be because
organisations are too eager to respond to customer and sales requests in case they will adversely affect their relationship with them.

- Once projects are generated there is no mechanism to stop them from developing.
- There are no criteria for making prioritisation decisions.
- Management are often not engaged in the decision making process, for reasons of time and not understanding how critical the decision process is.
- There is often pressure on management to deliver many projects as it makes them look good.

As a result of these issues, a structured project selection process is essential. The screening of projects is one of the most critical project management activities, yet it often is performed poorly.

### 7.3 Project Selection Methods

Every company has limited resources and therefore cannot carry out all the projects they may need or want. A process is required to select and rank projects on the basis of beneficial change to the organisation. Project selection involves deciding if a project should be rejected, deferred or accepted for further processing and if so what priority it should be given. The purpose of doing this is to establish the best possible basis for making decisions regarding the processing of ideas and proposals for new and improved products, services or initiatives. The screening process helps to eliminate projects that require extensive resources but are not justified by current business strategies. It also helps to prioritise projects so that efforts can focus on the critical few. Research in project management points out that it is necessary to effectively select projects, which are customer focused and link to the organisation’s strategy and goals.

There are two basic types of project selection models. These are often referred to as (a) numeric and (b) non-numeric. Numeric models use quantitative figures or numbers to help make a decision. Non-numeric models are based on qualitative or subjective criteria and involve judgements based on experience and intuition. Such methods help decision makers to select projects based on explicit assessment criteria. Some project selection methods and techniques are discussed in more detail. This list is by no means exhaustive but it does provide a example of some of the tools available.

#### 7.3.1 Payback period

The payback period is a widely used numeric method. Here a project is assessed based on how many years it takes to generate enough money to cover the initial capital investment in the project. The shorter the time it takes to do this, the more attractive the project is. The payback period is the initial fixed investment in the project divided by the estimated annual cash inflows from the project. The time period is usually expressed in months and years. The advantages of the payback method include; (a) it is simple and easy to use; (b) it reduces the project's exposure to risk by selecting the project that has the shortest payback period; (c) it quantifies the selection criteria in terms the decision-makers are familiar with. The disadvantages of the payback method include; (a) it is not suitable to evaluate long term projects where the effects of inflation and interest rates could change the results; (b) it can reduce the duration of risk but it does not quantify the exposure to risk and (c) figures are based on project cash flow only, all other financial and non-financial data are ignored.

#### 7.3.2 Return on Investment (ROI)
Another numeric or financial technique is return on investment (ROI). The method calculates the average annual profit, which is the project outlay deducted from the total gains, divided by the number of years the investment will run. The profit is then converted into a percentage of the total outlay. The ROI technique has the advantage of being simple to use and it also considers the cash flow over the whole project. The disadvantage is that it averages out the profit over successive years.

7.3.3 Democratic selection models

The democratic selection model is an example of a non-numeric selection model. These models include any model where the final decision or selection is made by voting. This type of model works well in a stable and, broadly speaking united environment, where open discussion and debate can take place and where team members are willing to abide by and support the selection that is made. A major advantage of democratic decisions is that they involve everyone who is concerned with the selection process and can thus be an effective form of employee empowerment. They also encourage contributions and participation from a wider group and help to share both responsibility and credit for the outcome of the decision. Active participation harnesses the creative talents and skills of as many individuals as possible, and lowers resistance to change by engaging everyone in the process.

7.3.4 Dictatorial selection models

Dictatorial selection models are non numeric. Here either a single individual or a small group of senior people make the decision. The selection is often preceded by a series of discussions or presentations from a wider group, often including those involved with developing the projects. This type of selection procedure also supports the implementation of projects that represent the personal ambition of the selector, so called “sacred cow” projects. For dictatorial selection models to be effective the selector must command a high level of respect and trust from the rest of the organisation.

7.3.5 Scoring and ranking techniques

Project selection models based on scoring or ranking attempt to broaden the base on which the selection of projects takes place. This is not to say that they ignore questions of cost and profit, but rather that they seek to include other factors so as to get a wider perspective on the merits of a project. This method involves identifying and examining the predicted benefits of each project and then assessing the value or importance of each of these benefits with respect to goals of the organisation. Scoring models often help to highlight the level of compatibility that a project might have with the firm’s overall strategic aims. This method is particularly popular with voluntary aid organisations, which have a limited amount of resources available to them and a wide range of worthy projects to choose from. Some examples include (a) the Unweighted 0-1 Factor Model; (b) the Unweighted Factor Scoring Model and (c) the Weighted Factor Scoring Model.

• **Unweighted 0-1 Factor Model:** This is the simplest form of scoring model. Projects are scored according to how many criteria they meet from a given list of desirable attributes. The list represents a set of factors chosen by management so as to reflect the goals of the organisation. A project that achieves a high score clearly addresses many of the organisation’s goals and so is generally seen to be more attractive than a project that receives a low score. The major disadvantages of this model are that it assumes all criteria are of equal importance and it allows for no gradation of the degree to which a specific project meets the various criteria.

• **Unweighted Factor Scoring Model:** This model allows for the relative importance of criteria to be considered. This is achieved by getting the selectors to give each project a score (from 0 to 5 is quite common) to represent the level to which the project addresses each of the criteria that is on the list of relevant factors. Again a high score indicates a project that appears
attractive. This can be achieved either by addressing a large number of the relevant factors or by addressing a smaller number of factors to a greater degree.

- **Weighted Factor Scoring Model**: This project selection model uses a similar scoring system to the unweighted factor scoring model but with the added feature that the designers of the model are required to give each factor a weighting. This weighting is chosen to reflect the importance of that particular factor from the point of view of management, or the importance of the factor with respect to achieving the company’s strategic goals.

<table>
<thead>
<tr>
<th>Project Selection Factors</th>
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<tbody>
<tr>
<td><strong>Production considerations</strong></td>
</tr>
<tr>
<td>• Method of implementation</td>
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<tr>
<td>• Time to be running</td>
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<tr>
<td>• Cost of power requirements</td>
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<tr>
<td><strong>Marketing Considerations</strong></td>
</tr>
<tr>
<td>• Number of potential users</td>
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<tr>
<td>• Market share</td>
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<tr>
<td>• Time to market</td>
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<tr>
<td><strong>Financial Considerations</strong></td>
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<tr>
<td>• Cost of new system</td>
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<tr>
<td>• Time to break even</td>
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<tr>
<td>• Payback period</td>
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<tr>
<td><strong>Personnel Considerations</strong></td>
</tr>
<tr>
<td>• Skill requirements and availability</td>
</tr>
<tr>
<td>• Training requirements</td>
</tr>
<tr>
<td>• Level of resistance to change</td>
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<tr>
<td><strong>Administrative Considerations</strong></td>
</tr>
<tr>
<td>• Compliance standards</td>
</tr>
<tr>
<td>• Customer service</td>
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<tr>
<td>• Legal considerations</td>
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</tbody>
</table>

Research has been carried out in the US on companies that have a proven track record on project selection. They have found that financial methods of portfolio management (i.e. using a financial measure or index to rate and rank projects) are the most widely used amongst large firms but yield the poorest performance results. In contrast, strategic approaches (letting the business’s strategy decide resource allocation and choice of projects) are lauded to be more effective. Scoring models produce positive performance and fare the best in terms of yielding a portfolio containing high-return projects with solid economic prospects. It is important to note that no single portfolio method enjoys a monopoly in the field of portfolio management. Organisations use multiple methods or techniques for portfolio management. The most effective project portfolios incorporate high-value projects that are aligned with the business's strategy. These portfolios also have the right balance of projects and the right number of projects. Successful organisations employ a formal, explicit method to managing their portfolio of projects. They rely on clear, well-defined portfolio procedures and they consistently apply their portfolio method to all projects.
When choosing a selection model the points to consider include:

- **Realism**: The model should take into account the limitations on facilities, personnel, money etc. of the organisation. Also without a common selection system it will be difficult to compare projects

- **Capability**: The model should be able to analyse different time periods, simulate different situations that may arise during the project that may affect its outcome

- **Flexibility**: The model should be easily modified or be self-adjusting to response to changes, be it technological advancements or redirection of employee resources

- **Ease of use**: The model should be easy to understand and convenient to the users. It should be easily interpreted, and not require extra personnel or equipment

- **Cost**: Modelling cost should be low relative to the cost of the project and must definitely be less than the potential benefits of the project

- **Easy Computerisation**: It must be easy to gather data, store it and access it when required

### 7.4 Risk Management

Portfolio management and project selection involves predicting future outcomes by considering different possible choices. This involves an element of forecasting which implies a degree of uncertainty or risk when predicting possible outcomes of projects. Risk is the potential harm or negative effect that may arise from some future event. Risk can therefore be defined as a function of these components. Generally speaking risk comprises the probability of a negative event occurring with how harmful that event would be.

\[
Risk = f (\text{event, probability, impact})
\]

Risk assessment refers to the identification, analysis and prioritisation of the level of risk in a project. It involves measuring two elements of risk (a) the magnitude of the potential loss, and (b) the probability that the loss will occur. Risk assessment may be the most important step in the risk management process and therefore should be carried out at the project selection stage. However, it is also the most difficult step in the process and prone to error and there is often a high degree of uncertainty in the assessment of measurement of both these elements. Also, risk management would be simpler if a single metric could embody all of the information in the measurement. However, since two quantities are being measured, this is not possible. A risk with a large potential loss and a low probability of occurring must be treated differently than one with a low potential loss but a high likelihood of occurring. Once risks have been identified and assessed, the steps to properly deal with them are much more systematic and methodical. Table 7.1 is a useful tool to use to help capture these critical data.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Probability of Occurrence</th>
<th>Magnitude of Damage</th>
<th>Planned Action</th>
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<tr>
<td></td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
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**TABLE 7.1 Risk Analysis Chart**
Risk Management is the process of assessing or measuring risk and then developing appropriate strategies or corrective actions to manage the risk. It is a continuous process. It starts as a strategy when the project is being established and continues during the life cycle of a project until it is completed. Risk management includes several processes that, although shown as discrete elements here, are highly interrelated. These are:

- **Identification**: Determine which risks are likely to affect the project and documenting the characteristics of each.

- **Quantification**: Evaluate the probability and consequences of risks and risk interactions on the possible range of outcomes to a project so as to examine and develop alternative options.

- **Mitigation**: Use techniques and methods for the reduction and control of risks or the enhancement of opportunities.

- **Control**: Usually the strategies employed 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.

The final decision may be linked to the tolerance the project manager has for risk. Therefore the manager’s tolerance to risk that must be explored in more detail. The three commonly used classifications for risk are illustrated in the diagram below. They include the risk averter or avoider, the neutral risk taker and the risk seeker.

![FIGURE 7.1 Classifications of Risk (Kerzner, 1998²⁶)](image)

In this diagram the y-axis represents the “utility” or the amount of satisfaction received from a payoff (the project manager’s tolerance for risk) and the X-axis is the amount of money at stake. The shape of the curves is derived from comparing responses to alternative decisions. A risk averter, as shown by the diagram, is someone who avoids risk more and more as the money at stake increases. A neutral risk taker makes a balanced decision on the risk calculated from its probabilities and the possible gains or losses from such a decision. A risk seeker is more likely to take the decision if there is a larger sum at stake.

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**Risk Management**

\[ \text{Risk management} = \text{Risk Assessment} + \text{Risk Control} \]

**Risk assessment** is the **identification, analysis and prioritisation of the level of risk**

**Risk control** refers to the **planning and monitoring of risk and implementing the appropriate corrective action**.
Proper risk management is a proactive rather than a reactive process. In other words, it requires anticipation rather than reaction. However, there are some tools that can help this process. They include experienced judgement, assumption analysis, decision drives, plan decomposition, and brainstorming. Two popular risk assessment tools include (a) The Delphi technique and (b) The analytical hierarchy process.

- **The Delphi Technique**: The purpose of the Delphi technique is to elicit information and judgments from participants to facilitate problem-solving, planning, and decision-making. It is often used to help for forecast future events and identify risk factors in projects. It is mainly used in large (often multinational) organisations. It is a structured process for collecting and distilling knowledge from a group of experts. The Delphi technique aims to build agreement, or consensus about an opinion or view. It does so without physically assembling the contributors. Instead, information is exchanged via mail, FAX, or email. This technique is designed to take advantage of participants’ creativity as well as the facilitating effects of group involvement and interaction. It is structured to capitalize on the merits of group problem-solving and minimize the liabilities of group problem-solving.

- **The Analytical Hierarchy Process (AHP)**: AHP is a multi-criteria decision-making process that allows subjective as well as objective factors to be considered in risk analysis. The AHP methodology allows the participation of decision-makers in reaching agreement and it helps managers make rational decisions. The methodology is particularly useful when making complex decisions involving multiple criteria. The first step in the methodology is for the team to decompose the goal into its constituent parts, moving from the general to the specific. In its simplest form, the structure includes a goal, criteria, and alternative levels. Each set of alternatives would then be further divided into an appropriate level of detail. However, the more criteria that is included, the less important each individual criterion may become. Next, a relative weight is assigned to each one. Finally, after the criteria are weighted and the information is collected, put the information into the model. Scoring is on a relative basis, not an absolute basis, comparing one choice to another. Relative scores for each choice are computed within each leaf of the hierarchy. Scores are then synthesized through the model, yielding a composite score for each choice at every tier, as well as an overall score.

### Results of Effective Risk Management

- Unlike crisis management, good risk management often goes unnoticed
- Well run projects appear almost effortless, but a lot of work goes into running a project well
- Project managers should strive to make their jobs look easy to reflect the results of well-run projects
- Like a duck on water i.e. smooth ton top, but paddling like hell underneath to keep float!

#### 7.5 Balancing Portfolio

Any organisation is likely to have a number of concurrent innovation projects at a given time (Goffin & Mitchell, 2010). Operating in an environment of scarce resources, it is necessary to allocate resources to the projects based on a number of complex factors. The first step in creating a group of complementary projects for an organisation is to review what already exists, and classify each project according to its characteristics and the degree of risk and reward associated with it. Different projects will have unique characteristics, objectives and benefits for the end-customer, so it is useful to look at a broad classification model. O’Sullivan & Dooley (2009) present such a framework which has been adapted below.
7.6 Summary

An organisation's ultimate success depends on exploiting synergy among all its projects. One of the key skills in effective portfolio management is balancing the composition of the project portfolio and matching it to the firm's competencies and capabilities. To do this portfolio management tools and techniques are used. This chapter introduced the concept of project portfolio management. Much of the discussion focused around the project selection process and examples of numeric and non numeric project selection tools are described. The chapter concludes with a brief discussion on risk assessment and management. Two tools to help this process are introduced namely; the Delphi Method and the Analytical Hierarchy Process.
Unit 7 Progress Check

Q1. “Project Managers must select and prioritise projects that align with the organisation's existing product portfolio”. Discuss.

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Unit 7 Answers to Progress Check

Answer to Q1 - Guideline answer
Your answer should highlight the importance of choosing projects that fit with the organization’s portfolio as well as its strategies and goals. A discussion on the various selection models can be incorporated. This may include Non Numeric Models, Profit / Profitability Selection Models as well as scoring and ranking models. A comparative analysis of each could be provided highlighting the benefits and limitations of each approach. The criteria for selection (Realism, Capability, Flexibility, Ease of Use, Cost, and Ease of Computerisation) could also be included.

An effective project plan........
1. helps to formulate sound objectives
2. helps to anticipate problems in advance
3. secures ownership and buy in
4. lays the foundations for co-ordination and control
5. generates documentation
6. improves the process of planning in the future

Limitations
1. Levels and range not uniform
2. Creativity may be stifled
3. Process can be inflexible
4. Plans (time and cost) may be over optimistic
5. Constraints not considered
6. Can be time consuming and delay action
7. Remember each project is unique

Elements of a project plan
1 Goals and objectives
   goals, performance measures
2. General approach
   methodology
3. Contractual aspects
   special requirements, FDA, FAA, ISO etc
4. Schedules
   Key milestones, delivery dates
5. Resources
   people, equipment, money
6. Evaluation methods
   time, cost, quality
7. Potential Problems
   contingency plans
8.1 Unit Introduction

There are many factors that affect the successful implementation of a single project or indeed a portfolio of projects in an organisation. However, we know that an organisation’s characteristics have a significant impact on this success rate. Therefore organisations must purposefully construct strategies and best practice structures in order to optimise their capability to successfully implement projects and thus promote innovation. Building a framework for managing projects in a dynamic environment depends on adopting a socio-technical systems approach to all aspects of the organisation. In other words, people, process as well as technology related issues in an organisation must be considered and integrated. Cormican and O’Sullivan (200427) developed a framework that identifies and groups five key factors that were found to facilitate effective project management. They are; (a) strategy and leadership; (b) culture and climate; (c) planning and selection; (d) structure and performance and (e) communication and collaboration. They are now discussed in more detail.

Unit Learning Objectives

When you have successfully completed this unit, you will be able to:

• List and describe the five critical success factors for effective project management
• Use a self assessment checklist to assess your organisation’s performance across these five critical success factors

8.1.1 Strategy and Leadership

The importance of an organisation’s strategy is well documented in the literature. All the projects in the organisation’s portfolio should be aligned to the organisation’s overall strategy. It should specify market niches as targets to focus on and formalise the necessary structures for implementation. A strategy should also focus and integrate team effort and permit delegation. This is particularly important for virtual project teams.

Whereas every member in the project team has an input into project implementation, leaders appear to have a significant impact on these initiatives. This is because the power to make, and implement decisions, is concentrated in the hands of a few, leading individuals in an organisation. They also have the ability to influence a group towards the achievement of goals. They drive innovative practice at all levels of the organisation. A leader’s role is to create a vision and effectively communicate this by setting clear objectives. In addition, they manage multiple projects and aid in cross-functional and cross-organisational issue resolution. Furthermore, not only must they structure tasks and transcend control, but they must listen to all, help to foster the generation of ideas and motivate team members in order to achieve accepted goals. Leaders must create an environment that encourages employees to take risks and create new growth opportunities. To be effective, it is imperative that project leaders develop co-operation and implement consistent priorities across all functions and all project teams in the organisation. In order to do this, senior managers must adopt a systems approach to projects. In other words, they must look at projects as a system of interrelated activities that combine to fulfil the overall strategy of the organisation.

Strategy and leadership is the first critical success factor identified for project management. To summarise, a strategic plan is used to align projects with the goals of the organisation. This plan should adopt a long-term focus, be clearly defined and communicated to all employees. Furthermore, leaders must visibly drive innovation by actively encouraging the submission of new ideas. They should also adopt a consensus and shared approach to decision making.
8.1.2 Culture and Climate

Possession of positive cultural characteristics provides an organisation with the necessary ingredients to innovate, develop and grow. Innovation and culture are intimately linked. However, culture and climate are elusive concepts. While there is no widespread agreement on what exactly they are, there is some consensus that organisational culture can be described in terms of values, norms and beliefs while climate can be considered in terms of policies, practices and procedures.

Culture and climate are interconnected. Employees’ values and beliefs (which are part of culture) influence their interpretations of organisational policies, practices and procedures (climate). Culture has many characteristics, which can serve to enhance or inhibit the tendency to deliver successful projects. Progressive organisations possess the following characteristics:

- **Progressive organisations are proactive**: This refers to the ability to create opportunities. In other words, it refers to the ability to recognise or anticipate and act on opportunities when they present themselves.
- **Progressive organisations take risks**: World class performers are risk takers. In other words, they are prepared to gamble their resources (e.g. time, energy money and equipment) on an idea that is not guaranteed to succeed.
- **Progressive organisations create commitment**: Such organisations create a vision for the future that embodies the collective values and aspirations of the individuals and provide them with a shared mental picture of things not as they are but as how they should be.
- **Progressive organisations initiate change**: Such organisations are agile, flexible and have the capacity to change, control risks and adapt quickly to emerging circumstances.

Knowledge sharing is a vital element of successful project execution. Organisational culture can be both an enabler and a barrier to sharing or reusing knowledge. It is important to remember that while much valuable knowledge is encultured, so too are bad habits and incompetence. For example, cultural practices within companies often present significant obstructions to the sharing of knowledge. It is possible to create an organisation that has an appropriate culture to enable knowledge creation, transfer and reuse. This is achieved by developing a culture of openness and sharing, by motivating and engaging people and embedding knowledge management activities in the day to day business processes, internal systems and structures. In order to create such a culture, astute organisations will focus their attention on motivating employees. Motivation theory suggests that individuals respond positively to stimuli that reward achievement and performance. Motivation and reward systems are key elements in aligning the interests of employees to that of the organisation. They can be adjusted to encourage the desired behaviour from all staff. Therefore, if organisations wish to encourage knowledge management activities in project management such as knowledge sharing and reuse they must design motivation and reward systems that incorporate these activities.

An organisation’s culture and climate has been identified as the second critical success factor for creating a successful project environment. In this view, leaders must endeavour to create an atmosphere conducive to development and growth. In other words, they must actively encourage close customer contact, knowledge sharing, risk taking and experimentation. Furthermore, appropriate support structures such as time, money and equipment should be put in place to promote and encourage the generation of new ideas.

8.1.3 Planning and Selection

A rationally planned development effort is imperative for success. This is particularly important when project teams are not co-located. Pre-development activities are imperative to anticipate problems in advance and bring conflicts to the surface earlier in order to speed up the innovation process and facilitate the integration of new technologies. However, best practices in this area are not widely adopted and research indicates that development output is far from being maximised. In order to address this, it is necessary to effectively plan and select projects, which are customer focused and link to the organisation’s strategy and goals. Selecting projects for their strategic emphasis is good for direction and helps
form an environment for successful projects while comprehensive project planning significantly increases new product success and is strongly correlated with financial performance. Furthermore, organisations cannot remain competitive in dynamic environments unless they are customer driven. Therefore, a clear understanding of user needs is critical to project plans and all operations must be driven by these needs. Team members must work with customers in order to establish the voice of the customer and translate that value into the proposed solution. In order to do this, they must first identify, understand and interpret user expectations, voiced desires and as yet unperceived needs. Requirements engineering enables organisations to be pro-active rather than reactive and assures product quality as defined by the customer and/or user.

Project selection involves deciding if an idea should be rejected, deferred or accepted for further processing and if so what priority it should be given. The purpose of doing this is to establish the best possible basis for making decisions. The screening process helps to eliminate projects that require extensive resources but are not justified by current business strategies. It also helps to prioritise projects so that efforts can focus on the critical few. An organisation’s success depends on exploiting synergy among projects. Therefore, portfolio management techniques and methods should be incorporated into the selection process. Organisations must maximise the value of the portfolio and seek the right balance of projects. They must also ensure that the projects and the spending breakdown mirror the business’s strategy. One of the key skills in effective project portfolio management is balancing the composition of this portfolio and matching it to the firm’s competencies and capabilities.

Project planning and selection has been identified as the third critical success factor for effective project management. In this view, pre-development market and feasibility studies must be rigorously undertaken in order to get things right from the outset. The voice of the customer must be captured and translated into project specifications and finally the project portfolio must match the firm’s competencies and capabilities.

8.1.4 Structure and Performance

An organisation’s structure has been identified as a critical success factor for project management. Two very distinct approaches to organisational structure are mechanistic and organic (see table 8.1). A centralised, mechanistic structure reinforces past behaviours while an organic, decentralised structure promotes learning and knowledge generation. Centralisation creates a more fragmented structure, which does not support people to challenge underlying assumptions and think for themselves. Decentralisation, on the other hand, enables faster and more effective decision making in dynamic information rich environments. The network or information age structure relieves information-processing bottlenecks by moving the authority to make decisions down to the appropriate levels of the organisation where individuals are equipped with the relevant information. Such organisations take advantage of the tacit knowledge possessed by line employees who can adapt the production process to changing conditions of their own. Therefore, the traditional centralised, inflexible models have become increasingly uncompetitive and are being replaced with a flatter, organic and co-operative architecture.
Knowledge sharing and transfer depends on personal networks and the willingness of individuals to share information and knowledge. A great deal of what people learn and therefore what the organisation comes to know results from interaction among employees. Organisations leverage individual talents into collective achievements through networks of people who collaborate. Consequently, organisations are beginning to reorganise reporting lines and organisational structures not around traditional tasks or functional departments, but around communities of practice. Work teams are emerging as the dominant organisational component of the new economy. Teams facilitate a change in focus within a company away from functional and towards project specific goals. Autonomous cross functional teams are more consistent with flatter, more flexible and more responsive organisations capable of managing intensifying competitive pressures. They also are effective in working with customers to uncover or better define problems for which solutions are required. Teams co-ordinate their efforts through free and open communications sustained by trust and shared values, enabled by frequent meetings and supported by information technology. Their accountability and responsibility for project related goals foster a greater sense of ownership and commitment and the improved communications result in a highly effective and dedicated team. However, the synergy and self-direction made possible by autonomous teams come at a price. For example, significant investments in co-ordination, training and management focus are needed to enable a team to develop problem solving and consensus building decision-making.

Activities such as knowledge sharing frequently requires time and effort on the part of the owner of that knowledge to share, codify or represent the practices, processes or information necessary to allow another person to apply the knowledge. However, there are few reports of practical incentive mechanisms linked to measuring and rewarding reuse of knowledge. Most companies still use traditional performance measures, which in many instances are inappropriate indicators of success. Performance indicators should be developed which demonstrate the value of knowledge to the organisation by monitoring its contribution to the bottom line and valuing it as an intellectual asset. However, organisations are only beginning to look for ways to manage and measure the intangible assets that are now recognised as important factors for their market value. Work on intellectual capital indicators is still in its infancy. Much experimentation is being undertaken in large firms and several competing theoretical frameworks have been developed.

An organisation’s structure and performance measurement process has been identified as the fourth critical success factor for project management. Organisations should employ flexible and organic cross-functional teams. Such a structure enables them to maintain close link to customers and suppliers. It also facilitates decentralised decision making. Finally, performance indicators should be used to promote desired behaviour. These indicators should be linked to the organisations goals and strategies.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Mechanistic Approach</th>
<th>Organic Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology:</td>
<td>Certain</td>
<td>Uncertain, chaotic</td>
</tr>
<tr>
<td>Size:</td>
<td>Routine</td>
<td>Innovative</td>
</tr>
<tr>
<td>Goals:</td>
<td>Large</td>
<td>Small</td>
</tr>
<tr>
<td>Culture:</td>
<td>Efficiency</td>
<td>Effectiveness</td>
</tr>
<tr>
<td></td>
<td>Employees taken for granted</td>
<td>Employee-centred teams</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structure</th>
<th>Communication:</th>
<th>Innovation:</th>
<th>Decision Making:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Functional, centralised</td>
<td>Formal systems</td>
<td>Rational analysis</td>
</tr>
<tr>
<td></td>
<td>Teams, decentralised</td>
<td>Face to face</td>
<td>Trial and error</td>
</tr>
</tbody>
</table>

Knowledge sharing and transfer depends on personal networks and the willingness of individuals to share information and knowledge. A great deal of what people learn and therefore what the organisation comes to know results from interaction among employees. Organisations leverage individual talents into collective achievements through networks of people who collaborate. Consequently, organisations are beginning to reorganise reporting lines and organisational structures not around traditional tasks or functional departments, but around communities of practice. Work teams are emerging as the dominant organisational component of the new economy. Teams facilitate a change in focus within a company away from functional and towards project specific goals. Autonomous cross functional teams are more consistent with flatter, more flexible and more responsive organisations capable of managing intensifying competitive pressures. They also are effective in working with customers to uncover or better define problems for which solutions are required. Teams co-ordinate their efforts through free and open communications sustained by trust and shared values, enabled by frequent meetings and supported by information technology. Their accountability and responsibility for project related goals foster a greater sense of ownership and commitment and the improved communications result in a highly effective and dedicated team. However, the synergy and self-direction made possible by autonomous teams come at a price. For example, significant investments in co-ordination, training and management focus are needed to enable a team to develop problem solving and consensus building decision-making.

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Management can influence what the company wants to do and what it can do. By focusing on specific new strategies and measures, the employees can change their motivation and goals, and by generating better resources the company can improve its development potential. Nevertheless, the task of managing a climate conducive to effective project execution is not trivial. Successful initiatives require support and backing from key leaders in order to overcome the natural resistance of organisations to change. Therefore leaders must focus on the specific, tangible business benefits of these efforts, and all participants and stakeholders must also understand and support those benefits.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Strategy and Leadership</strong></td>
<td></td>
</tr>
<tr>
<td>1. The organisation's strategic plan is effective and used</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. The strategy is clearly defined and communicated to all employees</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. The project portfolio has a long term thrust and focus</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. The strategy is used to align priorities with other functions</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Strategies are flexible enough to respond to changes in the environment</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Senior management are accountable for project results</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. Leaders visibly drive innovation</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. Leaders adopt a consensus and shared approach to decision making</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. Leaders adopt a participative decision making style</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. Senior management actively encourages the submission of new ideas</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td><strong>2. Culture and Climate</strong></td>
<td></td>
</tr>
<tr>
<td>1. The organisation permits the emergence of project champions</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. The organisation provides support in terms of autonomy, time and rewards</td>
<td>1 2 3 4 5</td>
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<tr>
<td>3. Money is made available for internal projects</td>
<td>1 2 3 4 5</td>
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<tr>
<td>4. Adequate resources are available and committed to achieve project goals</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. All employees participate in generating ideas</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Senior management is committed to risk taking</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. Failures and mistakes are tolerated and not punished</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. Knowledge sharing is encouraged and rewarded</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. All operations are driven by customer needs</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. There is a formal idea generation process in place</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td><strong>3. Planning and Selection</strong></td>
<td></td>
</tr>
<tr>
<td>1. An effective project management process is consistently implemented</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. A formal process is used to determine and update project priorities</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Concepts are selected using predefined, multiple and explicit criteria</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Pre-development market and feasibility studies are rigorously undertaken</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Projects are terminated if and when necessary</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Project proposals are tested for alignment with organisational goals</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. The spending breakdown mirrors the organisation's goals and measures</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. There is a good balance of projects which maximises the portfolio value</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. The product portfolio is matched to the firm's competencies and capabilities</td>
<td>1 2 3 4 5</td>
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<tr>
<td>10. The voice of the customer is built into all projects</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>STATEMENT</td>
<td>SCORE</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>4. Structure and Performance</strong></td>
<td></td>
</tr>
<tr>
<td>1. Projects are developed using effective cross functional teams</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Project teams are organic, flexible and agile</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. All team operations are driven by customer needs</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Team leaders are involved in setting the product performance objectives</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. All team members are mutually accountable</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Team members are empowered to make decisions</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. Virtual team members are equipped with effective tools</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. Team members rewards are equitable</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. Performance indicators are aligned with the organisations goals</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. Performance indicators encourage desired behaviour</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

**5. Communication and Collaboration**                                                                                                                                                                    |       |
1. Gatekeepers are in place to continuously span the external environment  | 1 2 3 4 5 |
2. Customers and suppliers are involved in the project management process  | 1 2 3 4 5 |
3. Alliances are often formed with other organisations for mutual benefit  | 1 2 3 4 5 |
4. Communications among team members is efficient and effective  | 1 2 3 4 5 |
5. Communications between project teams is efficient and effective  | 1 2 3 4 5 |
6. Information on ideas generated and problems raised is accessible  | 1 2 3 4 5 |
7. User needs analysis are undertaken and communicated to all  | 1 2 3 4 5 |
8. Project strategy and performance measures are clearly communicated to all  | 1 2 3 4 5 |
9. Individual skills are effectively leveraged within and between project teams  | 1 2 3 4 5 |
10. Virtual team members seamlessly communicate with each other  | 1 2 3 4 5 |

TABLE 6.2 Critical Success Factors Scorecard adapted from Cormican and O’Sullivan (2004)
8.1.5 Communication and Collaboration

The final critical success factor identified for creating a successful project environment is communication and collaboration. It has been highlighted from the outset that project management is a knowledge intensive process. Here information is gathered, processed and transferred in a creative way. The right information must be made available to the right place, at the right time, and in the right format. Therefore, communication is a vital and basic necessity for project execution especially when team members are geographically distributed. Improved communication created by adequate use of technology will influence the decision making process and the way in which consensus is reached. Moreover, communication among the project group and with outsiders stimulates the performance of the development teams. Thus, the better project members are connected with each other and with key outsiders, the better the performance of the development team.

The presence of a gatekeeper, or someone that scans the organisation’s boundaries and brings information to the organisation and disperses it to those inside, is also essential for the effective delivery of projects. Organisations must have these receptors that sense changes in the environment and provide quick and accurate feedback to project teams. Strong formal links with stakeholders is also critical to a project’s success. Significant benefits can be achieved if these stakeholders are involved in the early stages of the project management process. Extensive stakeholder involvement can cut the complexity of the project. Such involvement can also alert the team to potential problems earlier when they are easier and faster to rectify.

Internal communication, co-operation and inter-functional harmony are strongly correlated with project success. Concurrency or sequential development has also been proven many times over to have a positive impact on project performance. Concurrent development has the potential to produce more innovations and faster realisation of these ideas than conventional sequential approaches. It is a modern development approach, which improves the interaction between the functional disciplines in the project execution process. In this view, experts from many disciplines form cross-functional development groups. These groups have the ability to solve problems much more effectively and efficiently than individual experts. When the development team is composed of various functional disciplines, team members have access to more diverse information, they can consider all elements of the project life cycle from the outset, anticipate problems in advance, minimise re-work and overlap development phases which accelerates the pace of project delivery.

Communication and collaboration has been identified as the fifth and final critical success factor for project management. In this view, organisations must ensure that all requirements, strategies and measures are communicated to employees. Furthermore, they must employ effective communication structures within and between project teams in order to leverage skills and competencies. They must also ensure that there are sufficient links in place to collaborate with customers and suppliers.

These five critical success factors are a synthesis of best practice in the area and are essential to project management success factors. Over time, the application of these critical success factors may influence the cultural norms and contribute to the development of an environment for effective project management. Taking these theoretical concepts into consideration, a self-assessment audit is developed. This is discussed in more detail in the next section.

8.2 Critical Success Factors Scorecard

The scorecard is a self-assessment audit contains an explicit set of carefully chosen and justified statements, or traits, based on the critical success factors model. The list of statements is presented in table 8.2. In other words, it serves as a checklist for effective project management where bottlenecks and potential problems can to be brought to the fore. The scorecard requires respondents to circle the extent to which they agree or disagree with the statements. This will enable managers and decision makers to get an overview of their company’s strengths and weaknesses with regard to project management and transfer highlighting those areas that require attention.
Unit 8 Progress Check

Q1. What are the critical success factors in project management?

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Q2. Explain the concept of ‘Screening Projects’ relative to the New Product Development process.

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Q3. What is the difference between leading and managing?

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Unit 8
Q4. Identify four strategies for leading knowledge intensive projects.

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Q5. Why is it important to provide information to team members?

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Unit 8 Answers to Progress Check

Answer to Q1
The critical success factors for successful project management are:

- Strategy and leadership
- Culture and climate
- Planning and selection
- Structure and performance
- Communication and collaboration

Answer for Q2 - Guideline answer
Your answer should include key words based on the Critical Success Factors Scorecard Section 3, and taking account of a range of additional factors like those mentioned below.

Ranking criteria, concept evaluation, selecting concepts that best fit the organisation’s direction, prioritising and ranking various concepts, consistency over time, allowing scarce resources be expended on concepts that will be developed into new products rather than those that will be abandoned at a later date.

Answer to Q3
Leaders influence the behaviour of others, motivate them and energise them to progress the project to completion. ‘The leader’s role is to create a vision and effectively communicate this by setting clear objectives.’ Managers focus more on the day-to-day planning of the nitty gritty details, controlling and measuring progress.

Answer to Q4
Four strategies for leading knowledge-intensive projects involve establishing a climate and culture which supports project success:

- Proactive approach – always on the lookout for an opportunity
- Flexible and open to innovation and risk taking
- Good knowledge management – sharing information effectively across the organisation and learning from mistakes
- Culture encourages staff motivation
Answer to Q5
Why is it important to provide information to team members?
Information is vital to successful project management especially if the team is dispersed. The team members need to know in detail what has to be done, by whom and when; they need to know how they are progressing over time as the project unfolds — are they behindhand, or ahead of schedule. Are they meeting customer quality requirements? Is there a cost over-run? This sort of basic knowledge is vital to energising staff to focus their efforts in the most effective way possible, and it enables effective and efficient collaboration.
9.1 Introduction

Writing a good proposal is a very important for many reasons. First and foremost it is essential to secure funding for your project. This is often the first opportunity for the project team to sell their idea or solution by specifying how the proposed deliverable will meet the required objectives. Moreover it acts as contract to establish agreement about the content and limits of the final project deliverable. The development of a project proposal also acts as a tool for organising time and resources to complete a project. This appendix presents the key stages in writing an effective project proposal. It describes the components of a proposal, the ground rules for preparing a proposal for funding as well as some tips on writing style.

The recommended process is not a formula to be rigidly adhered to. It is a suggested approach that can be adapted to fit the needs of any organisation. Securing funds for a project is an art as well as a science. You must bring your own creativity to it and remain flexible. The key stages involved in writing a proposal are:

- Define the project. What is your project about? What do you want to achieve?
- Identify the provider and obtain guidelines and deadlines. Understand the funding agency and the reviewers. What are their criteria for assessment?
- Gather background information. Identify key trends and statistics, determine the changing environment, and clarify the need or opportunity
- Write first draft of full proposal. Many revisions may be necessary. Give yourself time for amendments and additions

9.2 Components of a Proposal

The key elements or components of a project proposal include the following:

- Executive Summary: The executive summary is an umbrella statement of your case and summary of the entire proposal
- Statement of Need: This highlights why this project is necessary or indeed essential
- Project Description: This section describes the nuts and bolts of how the project will be implemented and evaluated
- Budget: The budget is a financial description of the project plus any explanatory notes that are needed
- Profile of your organisation and the network: Details should be provided about the history and governing structure of the organisation or partners in the network, its primary activities, audiences, and services
- Conclusion: The conclusion provides a summary of the proposal’s main points
- Cover Letter: The role of the cover letter is to synthesise the key elements in the project proposal. Particular attention should be paid to the purpose of the project as well as to why you are tendering for funds

Each of these components is discussed in more detail.
9.2.1 The Executive Summary

This first page of the proposal is the most important section of the entire document. Here you will provide the reader with a snapshot of what is to follow. Specifically, it summarises all of the key information and is a sales document designed to convince the reader that this project should be considered for support. Be certain to include:

- **Problem**: a brief statement of the problem or need your organisation or agency has recognised and is prepared to address (one or two paragraphs)
- **Solution**: a short description of the project, including what will take place and how many people will benefit from the programme or deliverable, how and where it will operate, for how long, and who will staff it (one or two paragraphs)
- **Funding requirements**: an explanation of the amount of money required for the project and what your plans are for funding it in the future (one paragraph)
- **Project team or organisation and its expertise**: a brief statement of the name, history, purpose, and activities of your project team, organisation or network, emphasising its capacity to carry out this proposal (one paragraph)

9.2.2 The Statement of Need

The statement of need will enable the reader to learn more about the issues. It presents the facts and evidence that support the need for the project and establishes that your organisation understands the problems and therefore can reasonably address them. The information used to support the case can come from authorities in the field, as well as from your organisation’s own experience. Identify facts or statistics that best support the project. Be sure the data you present are accurate. In addition clearly demonstrate that your programme addresses the need differently or better than other projects that preceded it. The statement of need does not have to be long and involved. Short, concise information captures the reader’s attention.

9.2.3 The Project Description

This section of your proposal should have five subsections: objectives, methods, staffing/administration and evaluation.

- **Objectives**: Objectives are the measurable outcomes of the project. They define your methods. Your objectives must be tangible, specific, concrete, measurable, and achievable in a specified time period. Many people often confuse objectives with goals, which are conceptual and more abstract.
- **Method**: The methods section describes the specific activities that will take place to achieve the objectives. It might be helpful to divide your discussion of methods into the following sections: (a) how, (b) when, and (c) why.
- **Staffing/Administration**: You now need to devote a few sentences to discussing the number of staff, their qualifications, and specific assignments. Describe for the reader your plans for administering the project. This is especially important in a large complex network. It needs to be crystal clear who is responsible for financial management, project outcomes, and reporting.
- **Evaluation**: An evaluation plan should be built into the project proposal. Including an
evaluation plan in your proposal indicates that you take your objectives seriously and want to know how well you have achieved them.

9.2.4 The Budget

The budget for your proposal may be as simple as a one-page statement of projected expenses. Or your proposal may require a more complex presentation, perhaps including a page on projected support and revenue and notes explaining various items of expense or of revenue. As you prepare to assemble the budget, go back through the proposal narrative and make a list of all personnel and other items related to the operation of the project. Be sure that you list not only new costs that will be incurred if the project is funded but also any ongoing expenses for items that will be allocated to the project. Then get the relevant costs from the person in your organisation who is responsible for keeping the books. You may need to estimate the proportions of your company’s ongoing expenses that should be charged to the project and any new costs, such as salaries for project personnel not yet hired. Put the costs you have identified next to each item on your list.

Your list of budget items and the calculations you have done to arrive at a figure for each item should be summarised on worksheets. You should keep these to remind yourself how the numbers were developed. These worksheets can be useful as you continue to develop the proposal and discuss it with funders. They are also a valuable tool for monitoring the project once it is under way and for reporting after completion of the grant.

A narrative portion of the budget is used to explain any unusual line items in the budget and is not always needed. If costs are straightforward and the numbers tell the story clearly, explanations are redundant. If you decide a budget narrative is needed, you can structure it in one of two ways. You can create “Notes to the Budget,” with footnote-style numbers on the line items in the budget keyed to numbered explanations. If an extensive or more general explanation is required, you can structure the budget narrative as straight text. Remember though, the basic narrative about the project and your organisation belongs elsewhere in the proposal, not in the budget narrative.

9.2.5 Profile of the Project Network

It is not necessary to overwhelm the reader with facts about your team or organisation. This information can be conveyed easily by attaching a brochure or other prepared statement. In two pages or less, tell the reader when your network came into existence; state its mission, being certain to demonstrate how the subject of the proposal fits within or extends that mission; and describe the organisation’s structure, programmes, and special expertise. Describe the kinds of activities in which your staff engage. Explain briefly the added value you provide. Describe the markets you serve, any special or unusual needs they face, and why they rely on your organisation or network. Cite the number of people who are reached through your network. Tying all of the information about your network together, cite your expertise, especially as it relates to the subject of your proposal.
9.2.6 Conclusion

Every proposal should have a concluding paragraph or two. This is a good place to call attention to the future, after the budget is spent. If appropriate, you should outline some of the follow-up activities that might be undertaken to begin to prepare your funders for your next request. Alternatively, you should state how the project might carry on without further financial support. This section is also the place to make a final appeal for your project. Briefly reiterate what your organisation or network wants to do and why it is important. Underscore why need funding to accomplish it. Don't be afraid at this stage to use a bit of emotion to solidify your case.

9.3 Cover Letter

Never underestimate the importance of the original cover letter. It gives you an opportunity to capture attention and encourage the reviewers to read your proposal. The best cover letters state clearly and concisely why you are sending a proposal and explain the purpose of the project. Make it as strong as possible, and keep it to the point. A good cover letter will include the following:

- A statement of who you are and what you do, why you are approaching the funder, and what you are requesting. Include specific amounts in euro if you are requesting money and list exactly what you want if you are asking for services or equipment. This information will make up your first paragraph.
- If your proposal does not meet the funding organisation's guidelines, state why you decided to apply to them. In this section you must convince them that the project should be supported by them.
- Briefly describe the project and who it will benefit from the final deliverable.
- If you spoke with someone at the organisation, be sure to mention it. However, do not write that they encouraged you to apply if they gave you a lukewarm response.
- Indicate what you are including in the proposal package. This can also serve as a good checklist before you mail the package.
- Offer to provide them with additional information, if necessary. Make sure that a phone number is in your letterhead or in the body of the letter. For example you can say; if you have ant queries or comments please don't hesitate to contact me at + 353 91 493975.

9.4 Ground Rules for Preparing a Proposal

The following points should be considered to develop an effective proposal.

- Know the funder. It's been estimated that your chances of success improve by as much as 300% when you make contact with the funder before and during the proposal-writing process. Don't ask for hidden agendas, but do find out about general trends or new ideas the funder is currently interested in.
- Always work to a timetable. Make sure you have enough time to complete your application so it meets the funder's deadlines. If you don't have time to do it properly, don't compete for the money at all.
- Keep it readable and concise. Use large, easy-to-read, dark type. Don’t use fancy bindings; use paper clips and staples instead. Open the proposal with a clear, succinct explanation of
your request. Rambling, unclear proposals will fare badly in competition.

- Number the pages. If the proposal is longer than ten pages (most should not be), provide a table of contents.
- Use charts and statistics only where appropriate, since they tend to disrupt the flow of the narrative. Put footnotes on the same page, not at the end of the document.
- Add a limited number of attachments, press releases, news clippings, resumes, etc. Keep appendices to a minimum.

9.5 Writing Style

Consider the following regarding the appropriate writing style to adopt:

- Use the active rather than the passive voice
- Do not use jargon or acronyms unless absolutely necessary, and then provide explanations.
- Use simple sentences; keep paragraphs short; use headings and subheadings
- Write your proposal from the point of view of those who will benefit from it. Talk about their needs and how your deliverable will help
- Write in a positive manner. Try to communicate your energy and enthusiasm for the project, but do not promise benefits that are obviously out of reach
- Tell the reviewers who you are and make a case for why you are the best organisation or network to carry out this project. Do not be modest

If your proposal doesn’t win support, keep calm. Try to get more information, and ask whether it would be worth submitting another application in the future. Go back over your proposal with care, and see if you can find places where it might have been stronger. The key to a strong proposal is proving the likelihood that it will achieve its goals. Result areas should always be clearly determined, and measurement indicators should be outlined. It may not be easy to do, but the value of having clear performance standards can’t be underestimated. Remember that often the key to a strong proposal is simplicity. Don’t waste words. Funders are looking for a proposal that will succeed, so keep things clear, factual, supportable, and professional.

9.6 Summary

Writing effective proposals is the first and perhaps most important step to secure support and funding for your proposed idea or development. Without the support form top management or the money from funding agencies the project cannot begin. This appendix was written to help you structure your project proposal. It details a checklist of the basic components it should contain. This includes; (a) executive summary; (b) statement of need; (c) project description; (d) budget; (e) profile of your organisation; (f) conclusion and (e) cover Letter. This list is, however, not exclusive - rather it is a guide to get you started. It is very important that you always check with the funders what their specific requirements are before packaging and submitting your project proposal. Although each project proposal should be individually tailored to the funder, there are some basic rules that apply to proposal applications. Concerning the overall writing style, let clarity of language, purpose and structure be your guiding principle. In addition, be concise; avoid too much technical jargon and always provide simple definitions of specialised terms; be specific in what you want to achieve and what you request from the funder; structure your proposal logically and present it in a clear and easy-to-read layout.
9.7 Proposal Writing Bibliography


Endnotes

6 www.pmi.org
11 CPM was developed in the 1950’s in a joint venture between DuPont Corporation and Remington Rand Corporation for managing plant maintenance projects.
12 PERT was invented by Booz Allen Hamilton, Inc. under contract to the United States Department of Defense’s US Navy Special Projects Office in 1958 as part of the Polaris mobile submarine-launched ballistic missile project.
15 United States Department of Energy Nevada Operations Office (DOE/NV) Family Quality Forum
NCBES