AGRIBUSINESS PROJECT PLANNING AND MANAGEMENT
PPT4202

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43400 UPM Serdang
Selangor Darul Ehsan
## COURSE INTRODUCTION

### a. Course information

<table>
<thead>
<tr>
<th>Department</th>
<th>Agribusiness and Information Systems</th>
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</thead>
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<tr>
<td>Course name</td>
<td>Agribusiness Project Planning and Management</td>
</tr>
<tr>
<td>Code courses</td>
<td>PPT4202</td>
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<tr>
<td>Credit hour</td>
<td>3 (3+0)</td>
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</table>

This course consists of 3 hours of lectures per week. To meet the course requirements of continuous assessment component, students are required to complete a number of individual and group assignments that will take more than 42 hours during the semester. These assignments (if applicable) apply a 'self-learning' as the method of distance learning as the students do not have frequent meetings with a lecturer.

### b. Author’s Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Nitty Hirawaty Kamarulzaman, PhD</th>
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<tbody>
<tr>
<td>Address</td>
<td>Department of Agribusiness and Information Systems</td>
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<td></td>
<td>Faculty of Agriculture, Universiti Putra Malaysia</td>
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<td>+03-8940 8213</td>
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<td><a href="mailto:nitty@upm.edu.my">nitty@upm.edu.my</a></td>
</tr>
</tbody>
</table>
c. Course objective/learning outcome

Students are able to:

1. evaluate the viability of the agribusiness project (C6)
2. adapt the principles of agribusiness project management efficiently and effectively (P6)
3. display the ability to make decisions individually or collectively (A5, LS)
4. continuously apply knowledge and understanding in assessing the project viability (CTPS, KK)

d. Course synopsis

This course encompasses the theory and techniques of project evaluation including the net present value (NPV), internal rate of return (IRR) and benefit cost ratio (BCR). It also encompasses the essential steps in planning an agribusiness project. The process and techniques of project management such as PERT/CPM and project organization will also be discussed.

e. Course contents

- Refer to Table 1 below.
Table 1: Course Content

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<thead>
<tr>
<th>Unit</th>
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<th>Contact Hours</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
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<td>2</td>
<td>Evaluation of Marketing Factors</td>
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<td>Evaluation of Processing Factors</td>
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<td>Financial Estimation and Forecasting</td>
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<td>Financial and Economic Evaluation</td>
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<td>Government Incentives for Agribusiness Projects</td>
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<td>10</td>
<td>Types of Project Organization</td>
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</tr>
</tbody>
</table>

**Online learning: 1 hour lecture equal to 3 hours self-learning**
f. Assignment guideline

An individual report assignment should not exceed 10 pages (excluding cover page) and a group report assignment should be between 10-20 pages (not including cover page and appendices (if any)). All reports must be typed in an interval of two lines (double spacing) on A4 paper, using Arial font size 12. Reports are to be bound with all details (name, matric no, program and contact no) on the first page (cover page). Further information on the assignments will be informed during face-to-face meetings.

g. Courses assessment

The assessment of this course consists of:

(i) Coursework 40%
   • Individual assignment 20%
   • Group assignment 20%

(ii) Midterm Examination 20%

(iii) Final examination 40%

Total 100%

** The evaluation of the course will change from time to time depending on lecturer/instructor during the course.

h. Proposed Schedule and Learning Activities

1. Face-to-face meeting 4 hours
2. Self-learning 45 hours
3. Tutorial sessions (4-6 sessions) 12 hours
4. Group-Learning 6 hours
5. Online/Email/Phone/LMS/Virtual Classes with lecturer/instructor 6 hours
6. Exercises/Quizzes 2 hours
7. Assignments 45 hours

Total 120 hours
i. **Midterm examination**

Midterm examination should be taken by all students. Examination questions will be prepared based on the established module. The questions are prepared in two types; objective and subjective/essay questions. The midterm examination questions will cover topics from Unit 1 to Unit 5. However, latest information about the examination will be notified during a face-to-face meeting.

j. **Final examination**

Final examination will cover all topics in the module, however the emphasis is on the topics that have not been evaluated or assessed. Lecturer/instructor will inform about these topics and students can communicate directly with the lecturer/instructor of the course for the latest information. Final examination questions are prepared in two types; objective and subjective/essay.

(Attention!: Examination questions can be changed. To get updated information about the examination, students need to communicate directly with the lecturer/instructor during face-to-face meetings).

k. **Main resources**


## I. Icons explanation in the module

There are several icons in this module use to help students understand regarding module structure. Below are the icons and explanation:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Explanation</th>
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<td>Observation/outlook</td>
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<td>e)</td>
<td>Conclusion</td>
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<td>Question in text</td>
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<td>g)</td>
<td>Self-Assessment Questions</td>
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<td>h)</td>
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<td>i)</td>
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<td>j)</td>
<td>Attention</td>
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<td>- Selecting and identifying a project</td>
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<td>- Procurement organization</td>
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<td>- Assessment of tax burden</td>
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<td>- Financial costs and benefits</td>
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<td>- Techniques and evaluation criteria</td>
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<td>- Risk analysis</td>
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<td>- Sensitivity analysis</td>
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<td>Government Incentives for Agribusiness Projects</td>
<td>88 - 103</td>
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<td>- Monetary incentive</td>
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<td>- Project management process</td>
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<td>- Network management techniques</td>
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<td>- Network analysis</td>
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<td>10</td>
<td>Project Organization</td>
<td>137 - 144</td>
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<td></td>
<td>- Types of project organization</td>
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<td>- Matrix organization</td>
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<td></td>
<td>- Position of a project in an organization</td>
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UNIT 1
INTRODUCTION

Introduction

This chapter provides a general overview of the project, the role of the projects and the projects involved in agribusiness sector. An effective strategy can be developed if we understand the framework of the project. In defining and managing a successful project, some elements such as purpose, scope, people, financials, timescales, risks, and implementation are important (Figure 1.1).

Figure 1.1: A Project

Objective

Upon completion of this chapter, you will be able to:

1. Understand a project and project cycle.
2. Identify basic elements of a project.
3. Explain factors affecting viability of a project.
TOPIC 1: INTRODUCTION

1. Project and project cycle
2. Selecting and identifying projects
3. Factors affecting viability of a project

Main points

Project
A project can be defined as “a set of complex activities that use different resources to meet the pre-defined objectives and to gain benefits to the society”. It constitutes a stream of investment and production cost producing a flow of benefits. A project can also be defined as “a temporary group activity designed to produce a unique product, service or result”.

Project Attributes
The project attributes include the following elements:

1. A project needs a well-defined objective.
   This means the objective of a project is usually defined in terms of scope, schedule, and cost. An organization embarks on a project needs to set up a good objective. This objective helps the organizations to identify their needs and aims before beginning their project.
2. A project is carried out through a series of interdependent tasks. 
   A project always relates to various tasks. For that reason, a project needs to be accomplished in a certain sequence in order to achieve the project’s objective.

3. A project utilizes various resources. 
   Every project needs various resources such as people, organizations, equipment, materials, and facilities.

4. A project has a specific time frame. 
   Every project has a start and end point. For that reason, an organization needs to consider the effectiveness and efficiency of their time during the implementation of the project.

5. A project may be a unique or a one-time endeavour. 
   Each of the projects has different types of project shape. Some projects like designing and building a space station, which are unique because they have never attempted this type of project before. This uniqueness can be a challenge to the organization who executes the project.

6. A project has a customer. 
   The customer is the entity that provides necessary funds to accomplish the project. Thus, an organization who involved with the project must make sure that their customers satisfy and happy.

7. A project involves a degree of uncertainty. 
   An organization who involved in the project needs to calculate the risk of the project. This is for preventing from loss and also makes sure the project can be run smoothly and successfully. Figure 1.2 shows several project resources that are vital to running a project.
Basic Elements of a Project
All projects have three basic elements: **Resources** (people, equipment, and materials), **Money** (costs, contingencies, profit), and **Scope** (project size, goals, requirements). These elements are interrelated and any changes in one have an effect on the other two. Before planning a project, a project leader/manager must have clearly identified the project scope and this will help the team members to work efficiently to accomplish their tasks. Table 1.1 lists out some examples of projects.

Table 1.1: Examples of Projects

<table>
<thead>
<tr>
<th>No.</th>
<th>General Projects</th>
<th>Agribusiness Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hosting an international/local conference</td>
<td>Modernizing food-based factory</td>
</tr>
<tr>
<td>2</td>
<td>Planning a wedding</td>
<td>Expanding cattle farm</td>
</tr>
<tr>
<td>3</td>
<td>Designing and producing a brochure</td>
<td>Fruit/vegetable/crop packing and processing</td>
</tr>
<tr>
<td>4</td>
<td>Performing a series of surgeries</td>
<td>Meat packing and processing facilities</td>
</tr>
<tr>
<td>5</td>
<td>Conducting telephone or mail surveys</td>
<td>Plantation trucking operations</td>
</tr>
<tr>
<td>6</td>
<td>Arranging a final year dinner at 5 star hotel</td>
<td>Upgrading bio-pesticide formulation mixer</td>
</tr>
</tbody>
</table>
Aspects of Project Preparation Analysis
To design and analyze effective projects, managers must consider many aspects and determine how remunerative a proposed investment will be. There are several aspects of project preparation analysis before a project manager can run a project. The aspects are as follows:

1. Technical aspects
   The technical analysis concerns the project’s inputs (supplies) and outputs (production) of real goods and services. It is extremely important, and the project framework must be defined clearly to permit the technical analysis to be comprehensive and precise.

2. Social aspects
   Project analysts are also expected to examine carefully the broader social implications of proposed investments. For example, what are the expectations from government rules and regulations concerning the quality of life in any community or does the project bring bad/negative implications for environmental impact.

3. Commercial aspects
   The commercial aspects of a project include the arrangements for marketing the outputs produced by the project and the arrangements for the supply of inputs needed to build and operate the project.
4. Financial aspects
The financial aspects of project preparation and analysis encompass the financial effects of a proposed project on each of its various participants. In agricultural projects, the participants include farmers, private sector firms, public corporations, project agencies, and perhaps the national treasury.

5. Economic aspects
The economic aspects of project preparation and analysis require a determination of the likelihood that a proposed project will contribute significantly to the development of the total economy and that its contribution will be great enough to justify using the scarce resources it will be needed. The point of view taken in the economic analysis is that of the society as a whole.

6. Institutional-organizational-managerial aspects
A whole range of issues in project preparation revolves around the overlapping of institutional, organizational, and managerial aspects of projects, which clearly have an important effect on project implementation.
**A Successful Project**

The successful accomplishments of the project are usually constrained by scope, cost, and schedule. If the project has been completed within the agreed upon scope, time, and cost, it will deliver the required quality.

**Project Management Triangle (Constraints)**

Figure 1.3 shows the project management triangle and it is also known as project constraints.

![Figure 1.3: Project Constraints](image)

- **a. Project scope**
  - Work that must be done in order to satisfy the customer and the task must be done to produce the project’s end result.

- **b. Schedule/time**
  - The timetable shows a project where the activity should be started and to be finished. The schedule can be defined as “the amount of time available to complete the project”.

- **c. Cost**
  - The budgeted amount available for the project can be a constraint if the project manager failed to use it wisely.

There are several reasons that contribute to the failure of a project. The following are some of the reasons:

1. Insufficient scope definition (unrealistic scope).
2. Improper focus of the project management system.
3. Wrong level of details.
4. Lack of understanding about project management tools.
5. Too much reliance on project management software.
6. Too many people.
7. Poor communication (communication breakdown).
8. Rewarding the wrong actions.
9. Poor cost and schedule estimation.
10. Failure to plan.
11. Stakeholders’ conflicts.
12. Vague requirements (poor requirements).

Table 1.2 lists out some reasons why some projects are failed.

**Table 1.2: Reasons for Failed Projects**

<table>
<thead>
<tr>
<th></th>
<th>Reasons</th>
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<tbody>
<tr>
<td>1</td>
<td>Time and cost allocated for the project are too optimistic.</td>
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<td>2</td>
<td>Unexpected budget cut.</td>
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<tr>
<td>3</td>
<td>Unclear role and responsibilities of people involved in the project.</td>
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<td>4</td>
<td>Lack of resource commitment.</td>
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<td>5</td>
<td>Problems of project design and implementation such as inappropriate</td>
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<td>technology, administrative problems and policy environment.</td>
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<tr>
<td>6</td>
<td>Problems of poor project analysis, such as underestimates cost (omitted</td>
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<td>necessary components of the project), and overestimate return of the</td>
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<td>project.</td>
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</table>

**Project Cycle**

It tends to be a natural sequence in the way projects are planned and carried out, and this sequence is often called as “project cycle”. The project cycle (Figure 1.3) consists of many stages such as identification, preparation, appraisal, presentation, implementation, monitoring, and evaluation.
1. Identification

The first stage in the project cycle is to find the potential projects. There are many sources from which the suggestions can contribute. The most common sources are from the technical specialists and local leaders. While performing their professional duties, technical specialists will identify many areas where they feel the new investment might be profitable. Local leaders will generally have a number of suggestions about where investment might be carried out. Ideas for new projects also come from proposals to extend existing programs. For example, a program to develop water resources will probably lead to suggestions of additional areas for irrigation. An existing land settlement program will probably generate suggestions of new areas for settlement.

Suggestions for new projects usually arise because some agricultural products are in short supply or will be in a few years if production is not expanded or imports increased. The analysis may be based on general knowledge or upon a more systematic examination of market trends and import statistics. In addition, many countries have set up development banks intended to encourage growth of domestic industry. Often local firms will come
to these banks with food processing proposals for which they are seeking financing.

2. Preparation

Once the project has been identified, it begins a process for more detailed preparation and analysis of project plans. This process includes all the work necessary to bring the project to the point at which a careful review or appraisal can be undertaken and, if it is determined to be a good project, implementation can begin. In the preparation and analysis of projects, consideration will be given to each of the aspects discussed earlier.

The first step in project preparation and analysis is to undertake a feasibility study that will provide enough information for deciding whether to begin more advanced planning. The detail of the feasibility study will depend on the complexity of the project and on how much is already known about the proposal. Quite often a succession of increasingly detailed feasibility studies will be needed. The feasibility study should define the objectives of the project clearly. It should explicitly address the question of whether alternative ways to achieve the same objectives may be preferable, and it will enable project planners to exclude poor alternatives. The feasibility study will provide the opportunity to shape the project to fit its physical and social environment and to ensure that it will be producing good results or outcomes.

3. Appraisal

After a project has been prepared, it is generally appropriate for a critical review or an independent appraisal to be conducted. This provides an opportunity to re-examine every aspect of the project plan to assess whether the proposal is appropriate and sound before large sums of money are committed. The appraisal process is built on the project plan, but it may involve new information if the specialists on the appraisal team feel that some of the data are questionable or some of the assumptions faulty. If the appraisal team concludes that the project plan is sound, the investment may proceed. But if the appraisal team finds serious flaws, it may be necessary for the analyst to alter the project plan or to develop a new plan altogether.
4. Presentation

A detailed plan is submitted for approval and financing to the appropriate entities. The purpose of the presentation is to share ideas and receive feedback from all entities. All information and activities of the project must be presented carefully so if there are problems or limitations, a decision and solution can be made.

5. Implementation

Clearly, the objective of any effort in project planning and analysis is to have a project that can be implemented and benefits the society. Thus, implementation is perhaps the most important part of the project cycle. It is also clear, however, that considerations of implementation and project management are far too extensive for discussion here. Yet there are some aspects of implementation that are of particular relevance to project planning and analysis. The better and more realistic a project plan is, the more likely the plan can be carried out and is expected to get benefits. This emphasizes once again the need for careful attention to each aspect of project planning and analysis.

6. Monitoring

At every stage, the progress of the project is assessed against the plan. Monitoring helps to keep a check on all the various activities, including finances. This will help project staff to know how things are going, as well as giving early warning of possible problems and difficulties. For example, monitoring methods can be such as reports, diaries, meetings, and financial reports.

7. Evaluation

The final stage in the project cycle is to evaluate the progress of the project. The analyst looks systematically at all the elements of success and failure in the project, which experience to learn how best to plan for the future. Evaluation is not limited only to complete projects. It is a most important management tool in ongoing projects, and rather a formalized evaluation may take place at several times in the life of a project. Evaluation may be
undertaken when the project is in trouble, as the first step in a pre-planning effort. It may be appropriate when a major capital investment such as a dam is in place and operating, even though the full implementation of the plan to utilize the water and power is still under way. Careful evaluation should precede any effort to plan follow-up projects. Besides, evaluation should be undertaken when a project is terminated or is well into routine operations.

Evaluation may be done by many different people. Project management will be continually evaluating its experience as implementation proceeds. The sponsoring agency, perhaps the operating ministry, the planning agency, or an external assistance agency, may undertake an evaluation. In large and innovative projects, the project's administrative structure may provide a separate evaluation unit responsible for monitoring the project's implementation and for bringing problems to the attention of the project management. Often the evaluation unit will include persons with planning skills who enable the unit to take part in any necessary pre-planning. The evaluation unit may also be responsible for planning follow-up projects.

**Agribusiness System**

![Figure 1.4: The Agribusiness System](image)

Based on Figure 1.4, each of the elements in agribusiness system are interrelated to each other. Agribusiness system consists of three sectors as follows: -
1. The Input Sector
   a. Agricultural chemicals – fertilizer manufacturers, pesticide manufacturers
   b. Agricultural credit – farm credit system, commercial banks, agro banks
   c. Energy – oil companies, electric utilities
   d. Feed – feed manufacturers
   e. Farm machinery – farm equipment manufacturers
   f. Labour – contract labour, migrant workers
   g. Livestock and poultry – farmers, ranchers
   h. Management information – cooperative extension service, farm consultants
   i. Real estate – individuals, realtors
   j. Seed – seed manufacturers
   k. Water – water districts, private wells

2. The Production Sector
   a. Farmers – row crops, fruit and vegetables, poultry
   b. Ranchers – cattle, sheep
   c. Nurseries – flowers, ornamentals
   d. Fisheries – ocean fish, fish farms
3. The Processing/Manufacturing and Distribution Sector
   a. First handlers – grain elevators
   b. Food processors – grain millers, food manufacturers
   c. Food service distributors – broad line food service distributors, specialty food service distributors
   d. Food retailers – supermarkets, convenience stores
   e. Food service establishments – restaurants, institutions

**Conclusion**

To sum up, the performance of the project, it is measured by three criteria such as resources, money, and scope of the project. A success or failure project depends on a well preparation for running the project. Thus, by having a clear project’s vision and well understanding of the project framework will lead to achieving an excellence and viable project.

**Exercise/Activity**

1. What are the factors that affect the viability of agriculture projects?
2. “Failed to carry out a proper planning for agriculture projects will increase the percentage of project failure”. Assume you are a project manager who involved in an agriculture project, how would you react to the statement?
3. Marketing, procurement, and processing are among factors that need to be assessed by a project manager or planning a project. If you are about to embark on an organic vegetable project, what would you assess?
Answer

Question 1

1. Investment cost
2. Market
3. Operational cost
4. Production cost

Question 2

1. Project planning
2. Effective project management
3. Retain flexibility

Question 3

1. Comply with SOM (Malaysian Organic Scheme)
2. Political factors - government policy for organic agriculture/produce
3. Environmental factors
4. Market trend, including customer needs and wants
5. Procurement
6. Production system
7. Distribution
UNIT 2
EVALUATION OF MARKETING FACTORS

Introduction

A project manager or business organization must have a sharp vision and smart way to achieve a realistic mission in today's turbulent business environment. Evaluation of marketing factors is important and crucial because it will determine the success of the project. The project managers need to know who are their customers and what are the customer's needs. Therefore, this chapter will emphasize on several aspects including analysis of the competitive environment for both customers and competitors and how to develop a reliable marketing plan that suits today's business environment.

Objective

Upon completion of this chapter, you will be able to:

1. Understand elements in customer analysis.
2. Understand the importance of competitive environment analysis.
3. Formulate an effective marketing plan.
TOPIC 2: Evaluation of Marketing Factors

1. Customer analysis
2. Analysis of competitive environment
3. Marketing plan
4. Demand forecasting

**Main Points**

**Customer Analysis**
Customer analysis or consumer analysis is an important part and the first step of marketing research. This analysis will help a business organization to understand customer behaviour and allow a manager to identify prospects and market segmentation to meet customer’s needs.

**Market Segment**
Market segment can be explained as a subgroup of people or organizations sharing for one or more characteristics that cause them to have similar product needs. Producers/marketers can focus on the subset of prospects that are more likely to purchase the products. Examples of market segment are as follows: -

- Gender – cosmetics for ladies, car accessories for men
- Age – toys for toddlers
- Geographic location – whitening products for Asian people
Market Segmentation

Market segmentation is the process of classifying a market into distinct subsets (segments) that behave in similar ways or have similar needs. Customer does not have any communication about how companies segment their market(s). When choosing between the competing products and services, customers select the proposition that meets their needs better than any other. To win market share, a company must ensure that their offers meet these needs better than any other at a price they perceive as it provides superior value for money (which does not necessarily mean it has to be the cheapest). This is how the customers will operate in a market rather than in segmenting the project that will have its segmentation criteria.

Elements in Customer Analysis

There are three elements in customer analysis, which are:

1. Customer benefit
   a. The value of products or services that a business delivers to customers.
   b. The products or services must bring benefit to customers.
   c. Two types of benefit
      - Functional benefits – time, money, years
      - Psychological benefits - self-esteem, feeling of power

2. Customer profile
   The customer’s profiles describe the characteristics of the customer who could really be benefitting from the products or services of a business.
   It covers:
   - Customer characteristics
     - B2C - age, sex, level of study, geographic area, income level
     - B2B - company size, level of technology, location
- A customer buying process
  - Who is the decision making person?
  - At what time or period, does he buy?
  - How does he buy?
  - How does he pay?

3. Market customer
   Who is market customer? A group of customers (or prospects) sharing the characteristics which cope with the benefits offered by products or services of a business. For example, a car market, beverage market, pesticides used market or machinery market.

Analysis of Competitive Environment

Analysis of competitive environment includes all the key influencing factors that affect the way in which a business can compete. The competitive environment is very important for the company. This will help the manager or decision maker to make the best choice in positioning the products or services by meeting the customer’s need. It will help to know what customers want and what resources should have to meet the customers’ demands that would be very helpful to manage the resource constraints such as manpower, financial, and materials.
It is important for a manager to know the major competitors that will identify the important aspects about the company for being competitive. For example, market intelligence provides a company with a view of a market using existing sources of information (external and internal data) to understand what is happening in the marketplace, what the issues are and what the market potential likely to have.

**Marketing Plan**

A marketing plan is a written document that details the necessary actions to achieve one or more marketing objectives. It can be for a product or service, a brand, or a product line. The purpose of a marketing plan is to analyse the different possibilities or chances for the success to promote the goods or services for the customer. This marketing plan is suitable for any certain stage of product life cycle. For example, to launch a new product, to promote the existing product that has been added values or selling a product that has been re-packaging. Therefore, a marketing plan is a tool that helps the manager to understand more than what customer need and at the same time can improve the effectiveness of marketing strategies. Below is an example outline of the marketing plan.
Example of Marketing Plan

1.0 Executive Summary

2.0 Situation Analysis
- Market Summary
  - Target Markets
  - Market Analysis
  - Market Demographics
  - Market Needs
  - Market Trends
  - Market Growth
- SWOT Analysis
  - Strengths
  - Weaknesses
  - Opportunities
  - Threats
- Competition
  - Growth and Share Analysis
  - Product Offering
  - Keys to Success
  - Critical Issues

3.0 Marketing Strategy
- Mission
- Marketing Objectives
- Financial Objectives
- Target Markets
- Positioning
- Strategies
- Marketing Mix
- Marketing Research

4.0 Financials
- Break-even Analysis
- Sales Forecast
- Sale's Monthly
- Sale's Forecast
- Expense Forecast
- Monthly Expense Budget
- Marketing Expense Budget

5.0 Controls
- Implementation
- Milestones
- Marketing Organization
- Contingency Planning
Demand Forecasting

Demand forecasting can be defined as “the process in which companies are able to forecast into the future to determine its demands”. Almost every decision a manager takes needs a forecast. If the manager has an idea of what will happen in the future, he can make appropriate management decisions.

The manager also needs to assess the effect of his present decisions on the future, so that the right decisions are made today to create a desired condition for tomorrow. If the manager knows what types of product lines are likely to be demanded, where and when, he can improve the quality of decisions concerning production, procurement, placement, and promotion (4P’s).

Another benefit that can gain from demand forecasting is that the manager will be adequately prepared in advance. This helps the manager to plan for outsourcing the suppliers or materials as a backup plan, if the emergency happens. For example, a manager needs find out the supplier that can give a credit terms to the company when the company faces a financial problems. The manager can also reduce inventory, reduce costs of production, increase sales, and increase profits when making a demand forecasting.

Observation/Opinion

Market-oriented organizations are customer focused. There are in tune with customers’ needs. A market-oriented organization takes all the information it has about the market to create their product. Compare to a non-market-oriented organization which starts with the products that have focused on selling them to the market. Customers are the key to market orientation and the core element in developing customer relationship.

‘Today’s companies face their toughest competition ever. Understanding customers is an important first step in developing strong customer relationships, but it is not enough. To gain competitive advantage, companies must use this understanding to design market
offers that deliver more value than the offers the competitors are seeking to win over the same customers" - Philip Kotler.

**Conclusion**

This chapter covers the customer analysis and competitive environment analysis to develop competitive strategies that are grounded on sustainable competitive for short and long term in running a project. This feasibility study on marketing plan and demand forecasting helps the business organization to understand how to approach customers in a right way and at the same time the organization can achieve its objective successfully.

**Exercise/Activity**

1. What are elements need to be considered when a marketer conducts customer analysis?

2. Prospect consumers for Producer A are golfers, Producer B are ladies, Producer C are industrial users and Producer D are smokers. Which marketing analysis is used for identifying the prospect consumers?

**Answer**

Question 1

i. Customer benefit  
ii. Customer profile  
iii. Market customer

Question 2

Market segment
UNIT 3
EVALUATION OF PROCUREMENT FACTORS

Introduction

This chapter describes the evaluation of procurement factors that a project manager and team use as a tool for purchasing materials or goods to implement a project and complete its deliverable. There are several factors in purchasing activities that will be discussed in this chapter where the requirements for the project are identified. These requirements are developed in the project plan in order to have an adequate detail to ensure the success of the project.

Objective

Upon completion of this chapter, you will be able to:

1. Identify the different between procurement and purchasing.
2. Understand the factors that influence purchasing activities.
3. Understand different types of purchasing and determine its advantages and disadvantages.
TOPIC 3: Evaluation of Procurement Factors

1. Sufficient quantity
2. Right quality
3. Right time
4. Right cost
5. Procurement organization

Main points

Introduction

Figure 1 shows the purchasing process model. It shows the differences between purchasing and procurement process. From the model, procurement shows a broader term compared to purchasing functions. The following paragraphs provide further discussion regarding procurement and purchasing functions.

Figure 3.1: Purchasing Process Model
Purchasing

Purchasing can be defined as “the activity of acquiring goods or services to accomplish the goals of an organization”. The major objectives of purchasing are to (1) maintain the quality and value of a company’s products, (2) minimize cash tied-up in inventory, (3) maintain the flow of inputs to maintain the flow of outputs, and (4) strengthen the organization’s competitive position. Purchasing may also involve (a) development and review of the product specifications, (b) receipt and processing of requisitions, (c) advertising for bids, (d) bid evaluation, (e) award of supply contracts, (f) inspection of good received, and (g) their appropriate storage and release.

Purchasing functions is determined by the specification. For example quantity and quality of the goods and services that needs to be bought. Other function is to select the most suitable supplier and develop procedures and routines to select the best supplier. Preparing and conducting negotiations with suppliers in order to establish an agreement and to write up the contract is one of the purchasing functions. Finally, it is done by placing an order with selected supplier and/or to develop efficient purchase order and handling systems. For examples using the USB system to monitor the order that needs to come in and the product goes out to customers.

Another role of purchasing is to monitor and control of the order to secure supply (expediting) and follow up and evaluation (e.g.: supplier files up-to-date). Monitoring of the materials is very important to ensure no shortage of goods takes place before deliver to customers.

Procurement

Procurement is the process of acquisition of goods and/or services at the best possible way to have total cost of ownership, in the right quantity and quality, at the right time, in the right place for the direct benefit for the use of businesses/corporations, or individuals generally through contract. A business contract is a legally binding agreement between two parties (buyers and sellers) for an exchange of goods or services that are of value. In procurement activities, a business contract is used for purchasing/buying or providing goods or services between buyers and sellers.
Therefore, procurement is slightly different from purchasing. Procurement is somewhat a broader term. It includes all activities required in order to get the product from the supplier to its final destination. It encompasses the purchasing function, stores, traffic and transportation, incoming inspection, and quality control and assurance.

Factors Influencing Purchasing Activities

The following paragraphs will discuss the factors that influence the purchasing activities.

1. Right quality
   Suppliers have to ensure that goods or services they supplied must be in the right quality. Suppliers must meet the required specification of products/services and provide a right-first-time level of quantity (quality levels have been met) for the customer. Increase trust, confidence and maintain a good relationship with buyers (buying organizations also a part of being a right quality). This will ensure a long and strong relationship between vendor and customers. For example, some organizations have invested time, money, and effort into helping their suppliers to improve quality. Besides that, by having a supplier quality assurance (SQA) helps an organization to monitor and improve the level of supplier quality in terms of equipment, systems, procedures, and training.

2. Right quantity
   Suppliers must ensure that the right quantity of supplies is supplied to an organization. When one vendor fail to deliver good/raw materials, the company still has another back up supplier to ensure the project can be run. The right quantity will lead to a smooth operation that can be carried out. With the right
quantity and quality of supplies in place, the business organization can reduce costs of production, inventory, costs of logistics, and increase profit margin.

3. Right time
Late or incomplete deliveries can cause a shortage and disruption. An operation needs to keep inventories to cope with supply uncertainty. For example, the production team needs to prepare a back up plan if the suppliers are late to deliver the goods due to internal or external problems. This can help to reduce a long waiting time.

A system such as Just-in-Time (JIT) is used by businesses to ensure supplies are arriving on time. JIT is an inventory strategy implemented to improve the return on investment of a business by reducing in-process inventory and its associated carrying costs. Work-in-Process (WIP) is an inventory in which the number of units within a process waiting to be processed further (also called as work-in-progress). WIP is part of a manufacturer's inventory that is in the production process and has not yet been completed and transferred to the finished goods inventory.
4. Right price/cost
Purchasing at the right price/cost can provide an operation with a cost advantage. The right cost means profits for the company. For example, in agriculture sector, raw materials for pesticide or fertilizer are the most volatile price. The cost of raw materials such as glyphosate (pesticide use) can be spiked up due to international price playing or insufficiency of raw materials at global usage. Therefore, forecasting the demands is very crucial to ensure the company can control the inventories and reduce cost of purchasing. Savings on purchasing activities (low price goods or materials) will impact on the increase in total profitability. Thus, making a wise decision in purchasing and choosing a right time and right price will lead to the company’s success.

5. Right place
Suppliers must supply and deliver their supplies to the right place which has been specified by buyers. Uncertainty about distribution activities leads to time and cost constraints. In other words, goods or materials that are to be used for operations must be kept at the right place or warehouse. For examples, goods placed in better condition and in proper place help the transportation services made easy to collect the goods. This helps to cut off the waiting time and at the same time it can fulfill on the right time for customers. Reduction in warehouse and distribution costs will significantly contribute to efficient operation activities.
6. **Fast delivery**

It is important that a business finds suppliers who are able to supply quickly (respond quickly). Delays in one or two days will affect the productivity. Some of the company is very sensitive regarding pending delivery of the products to the customer. This is due to a pending or delay in delivery can affect the company reputation which indirectly reduces customers’ trustworthiness to the company and supplier as well. Fast delivery, will help to cope up with unpredictable demand (demand is higher than expected) and reduce the operations failure cause by internal or external problems. Thus, the manager should be alert that products or services are well delivered to end customers to ensure they are happy by fulfilling their needs.

7. **Retain flexibility**

Supply flexibility means that the supplier needs to change specification, delivery time, and quantity according to what customers need or in the ad hoc situation. The manager should understand well what customer really needs instead of what the manager thinks it is right. The customer is always right, even though that sounds cliché. Retain flexibility also means to cope with fast changing or uncertain markets. The company or the supplier must know and understand the best transportation mode to be used to deliver goods to customers. At the same time, the decision making on retaining flexibility can cut off the cost where the win-win situations can be built for a long time between customers and suppliers. Flexible suppliers should be selected to ensure dependable supply. However, rely too much on the suppliers or the vendors will lead to an ineffective management system. The company should try to reduce dependence on one supplier and start to have several vendors which can bring more benefits in the long term.
Classification of Purchasing Goods

The purchasing process may concern a large variety of goods and services. In general, purchased materials and services can be grouped into the following categories:

a. Raw materials - materials which have undergone no transformation or a minimal transformation and which serve as the basis materials for a production process.
b. Supplementary materials - materials that are not absorbed physically into the end product.
c. Semi-manufactured products - products that have already been processed once or more times and that will be processed further at a later stage.
d. Components - manufactured goods that will not undergo additional physical changes, but which will be incorporated in a system with which there is a functional relationship by joining it with other components.
e. Finished products - all products which are purchased to be sold, after negligible added value, either together with other finished products and/or manufactured goods.
f. Investment goods or capital equipment - products that are not consumed immediately, but which purchasing value depreciated over a period of time.
g. Maintenance, repair and operating materials (MRO items) - materials, which are necessary for keeping the organization running in general and for the support activities in particular.
h. Services - labor intensive, non-material activities that are executed by third parties on a contract basis.
Types of Purchasing

An important decision facing mostly by the purchasing managers is whether to source each individual product or service from one or more than one supplier, known as single-sourcing and multi-sourcing. Table 3.1 lists out comparative advantages and disadvantages between single-sourcing and multi-sourcing in purchasing.

Table 3.1: Advantages and Disadvantages of Single-sourcing and Multi-sourcing

<table>
<thead>
<tr>
<th></th>
<th>Single-sourcing</th>
<th>Multi-sourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages</strong></td>
<td>• Potentially better quality because more SQA possibilities</td>
<td>• The purchaser can drive prices down by competitive tendering</td>
</tr>
<tr>
<td></td>
<td>• Strong relationships which are more durable</td>
<td>• Can switch sources in case of supply failure</td>
</tr>
<tr>
<td></td>
<td>• Greater dependency encourages more commitment and effort</td>
<td>• Wide sources of knowledge and expertise to tap</td>
</tr>
<tr>
<td></td>
<td>• Better communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Easier to cooperate on new product/service development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• More scale economies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Higher confidentiality</td>
<td></td>
</tr>
<tr>
<td><strong>Disadvantages</strong></td>
<td>• More vulnerable to disruption if a failure to supply occurs</td>
<td>• Difficult to encourage commitment by the supplier</td>
</tr>
<tr>
<td></td>
<td>• Individual supplier more affected by volume fluctuations</td>
<td>• Less easy to develop effective SQA</td>
</tr>
<tr>
<td></td>
<td>• A supplier might exert upward pressure on prices if no alternative supplier is available</td>
<td>• More efforts needed to communicate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Suppliers less likely to invest in new processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More difficult to obtain scale economies</td>
</tr>
</tbody>
</table>

Purchasing through the Internet and E-commerce

Nowadays, the rapid development of the Internet has changed in purchasing behavior of a business. Internet technologies are used to carry out effective purchasing activities by lowering costs and reducing processing time. Traditional tools have now been replaced by Internet technologies. This brings benefits to both customers and suppliers in terms of reducing time to meet or dealing for payment.
For example, purchase orders and payments to suppliers are carried out online (e.g. e-ordering, e-payment, e-EDI, and e-procurement).

Global Sourcing
The expansion in proportion of products and services has made business organizations to outsource from other countries. The global sourcing facilitates business organizations (e.g. wholesalers and retailers) to find out the lowest price of materials offered by suppliers globally. There are several reasons why many business organizations nowadays choose a global sourcing in their business. Firstly, the formation of trading blocks in different parts of the world (lower tariff barriers – GATT, NAFTA, and EU). Secondly, the availability of better transportation and infrastructures of cheaper air freight and integrated road-rail systems has brought an opportunity to a company that is willing to use global source. Finally, a tougher world competition that leads the companies to reduce the total operating costs.

Even though there are a lot of benefits of global sourcing, but the manager should bear in mind that global sourcing also have a problem. For example, the risk of delays and holds up. Sometime, the uncertainty of weather or some political issue such as war occurs in other countries contributes to a delay in the shipment. Communication and language problems can affect the process of purchasing or wrong delivery of goods to the company. Therefore, learning other cultures will help the company to understand how to communicate effectively. Further, it is difficult to monitor suppliers’ activities which are one of the problems that are faced by the company. The place of production is far away from the local place is also one of distractions because of the company did not know the exact time if it is the first time the company dealing with other countries.

Procurement Organization
A procurement organization handles all procurement functions in a business organization. For example, acquiring or purchasing materials, receiving materials, warehousing, and delivering activities.
Figure 3.2 shows a common procurement organization chart. There are also several charts to indicate centralized and decentralized procurement organizations (refer to Figure 3.3 and Figure 3.4). Both have different structures that play a role in organizing the procurement process. Each function has its own procurement responsibility so that it could make a direct contribution to add values within all functions. Each function uses all the procurement opportunities available on the market to ensure the security of supplies to internal customers. In addition, each function operates in more effective and efficient manners to procure and to perform marketing activities to optimize competition among suppliers.
Figure 3.4: Decentralized Procurement Organization Structure

Observation/Opinion

Procurement and purchasing activities play an important role for the organization to reach maximum profit. A project leader or manager must utilize all resources efficiently to manage supply chain where both business organizations and customers meet their best value in terms of monetary value and satisfaction. Therefore, to understand a real world situation, what happens nowadays is to keep the organization alert in up and down of the global economy situation. This can help the team leader to take the right decision in making the right purchase of the right quality and quantity, price, fast delivery, and retain flexibility.

Conclusion

This chapter describes the factors that influence purchasing activities. By understanding these factors, a manager will have a clear understanding of different types of purchasing and how to utilize single or multi-sourcing in getting the right quality with lower costs. There are several approaches in evaluating procurement factors which can be used by the manager to assist in decision making and achieve efficiency in business operations to maximise project success in the real-world situation.
Exercise/Activity
What is the main benefit for integrating information technology in the services that a business could achieve? Discuss.

Answer
Increase efficiency in operations
UNIT 4
EVALUATION OF PROCESSING FACTORS

Introduction

This chapter describes the evaluation of processing factors in the production systems. The topics include technology selection, project location selection, inventory management, procurement for processing, programming, and controlling, and waste management will be covered in this chapter. These topics are essential to understand further about processing factors.

Objective

Upon completion of this chapter, you will be able to:
1. Evaluate the importance of processing factors in project planning.
2. Understand the importance of operations management.
3. Understand supply chain management.
4. Understand the involvement of technology in a project.
5. Understand inventory management systems.
TOPIC 4: EVALUATION OF PROCESSING FACTORS

1. Technology Selection
2. Project Location Selection
3. Inventory Management
4. Procurement
5. Programming and Controlling
6. Waste Management

Main points

Operations Management

As a project manager, director or general manager may ask you questions regarding managing a project. This question is vital because a project manager needs to ensure every task or process can be carried out effectively so that a successful project is achieved. The following questions are important for managing processes in a project:

- Do you provide a good product/service?
- How do you know?
- What is the best way to improve your product/service?
- Why many people have made their complaints about your service/product?
- How can you improve your product/service?
- How can you get money and resources you need to improve your product/service?

Thus, operations management (OM) is concerned with managing processes. Operations management is an area of management concerned with overseeing, designing, controlling the process of production, and redesigning business operations in the production of goods and/or services. The business functions
responsible for planning, coordinating, and controlling the resources needed to produce products and/or services for a company.

The Role of Operations Management

The role of operations management (OM) is to transform inputs into outputs. Inputs are resources such as people, material, and money. On the other hand, outputs can be described as goods and services. Figure 4.1 below shows transformation process which transform inputs into outputs.

Therefore, operations management is important in every business organization. The decisions made by a manager are generally related to costs to producing products and services and how well the products and services are produced and delivered to end customers. If these elements were to be carried out effectively, an organisation could be able to increase its profit. Therefore, operations management (OM) has an important impact on both profit and costs; which is aiming at increasing profit and reducing costs. This also applies to not-for-profit organisations. In a local
government service, for example, good operations management can produce services efficiently which will satisfy the community and consumers as well. So the community are getting value for money from their local services.

Technology Selection

Technology is a tool that helps organizations to conduct projects and operations efficiently. The advancement of technology has radically changed operations in many organizations. The need for continuous training in the use of technology is vital in an organization that wants to continuously compete in the market.

Assessing and selecting the right technology is vital for an organization. Before proposing relevant technologies in an organization, three evaluations need to be considered by managers such as the following:

a. Operation resource evaluation
   - Is the technology scarce to be used?
   - Difficult to move?
   - Difficult to copy?
   - Difficult to substitute for?

b. Market requirements evaluation
   - How does the new technology affect quality?
   - Speed?
   - Dependability?
   - Flexibility?

c. Financial evaluation
   - Does the technology give an acceptable return on investment for its adoption?
Types of Process Technology

There are three types of process technology; a) materials-processing technologies, b) information processing technologies, and c) customer-processing technologies.

a. Materials-processing technologies
   - Robotics
   - Computer numerical controlled automated guided vehicles (AGVs)
   - Flexible manufacturing systems
   - Computer-integrated manufacturing

b. Information processing technologies
   - Telecommunications and information technology
   - The Internet
   - E-Business, E-Commerce, E-Marketing
c. Customer-processing technologies

- Electronic Points of Sale (EPOS)
- ATM
- Airline check-in
- Bar code scanners

Integrating technology into services will bring some benefits to an organization such as efficiency in operations. By using robotics to process a product helps to cut cost in operations as well as reduce costs of labour. It also increases the effectiveness in serving customers by decreasing time consumption in each work. Usually there are few areas that technology can integrate into services. By using advance technology, a right strategic planning is able to be implemented in an organization. It also helps to improve performance by providing faster service, improving customer knowledge and increasing product customization. The technology also increases efficiency in organizations. The efficiency in management can be achieved by applying economies of scale in consolidating operations and reduce labour costs through replacement of manpower and increased labour productivity.
E-Service

The concept of electronic service (e-service) represents one famous application of utilizing the use of information and communication technologies (ICTs) in diverse fields. The role of technology is to deliver the services with better quality and make the consumer more comfortable. Table 4.1 below shows the categories of e-services.

Table 4.1: E-services Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td>World-wide web presence with open access to all.</td>
</tr>
<tr>
<td>Intranet</td>
<td>Internal network providing limited access by individuals within an organization.</td>
</tr>
<tr>
<td>Extranet</td>
<td>A resource-limited network open only to specified internal and external users</td>
</tr>
<tr>
<td>Electronic Data Interchange (EDI)</td>
<td>A network designed to support the exchange of data between the organization and its vendors and suppliers.</td>
</tr>
<tr>
<td>Value-added network (VAN)</td>
<td>A third party service that is used in conjunction with EDI to provide the link to customers and suppliers.</td>
</tr>
</tbody>
</table>

Technology Affects Operational Performance

Figure 4.2 below shows how technology can influence operational performance. Assume that the current operations performance lies on Curve A at point A1, without technology improvement the operations performance will move to A2, where an organization could increase the speed of delivery but the organization has to pay extra cost (increase in costs). When new or advance technology is implemented,
movement of $A_1$ (Curve A) to $B_1$ (Curve B), the organization enable to improve its performance with acceleration in delivery and operate at a low cost (reduce cost).

![Diagram: Effects of Technology on Operational Performance](image)

**Figure 4.2: Effects of Technology on Operational Performance**

**Project Location Selection**

The reasons for location decisions are basically based on two important things; a) changes in demand for goods and services, and b) changes in supply of inputs to the operations. Changes in demand for goods and services are from customers’ perspective while changes in supply of inputs are from suppliers’ perspective. Changes in demand can be described based on increase or decrease in demand volume. If the demand volume increased, an organization needs to expand its operations to increase the production, or conversely, reduce the production if there is decrease in the demand. Meanwhile, the changes in inputs supply occur when there is increase or decrease in costs of supplies/goods. When the costs of supplies increased, an organization needs to find a new supplier for a replacement.

The location decision basically cover three objectives; a) the potential revenue of the operation, b) better service that new operation is able to provide to its customers, and c) the operation can be carried out with low cost. These three objectives need to be linked with many aspects such as market factors, public policy, and indirect factors. As for market factors, the elements are including labour (quality and quantity...
of labour), availability of land, local infrastructure, access to markets (business climate), input materials and inputs costs for production (suppliers), entrepreneurship, and proximity to customers. Public policy will be a major factor to ensure the success of the project. The elements such as regulations, taxes, financial incentives, host community, free trade zones, political risk, government barriers and trading blocks are considered as public policy. While indirect factors such as industry cluster, quality of life, innovative capacity, climate and weather are very important in making the project success.

**Inventory Management**

Inventory can be defined as “the stock of any item or resources used in an organization”. Examples of inventory are raw materials, finished products/goods, component/spare parts, supplies and Work-in-Process (WIP). Inventory management involves making decisions concerning how much inventory to order and when. The basic criterion in making these decisions is to minimize total inventory costs, such as the cost to carry inventory, the cost to order inventory, and the item cost, subject to meeting demand for the items. In order to ensure the inventories are smoothly managed, inventory control by management is needed where it involves process, procedures, and infrastructure to maintain the inventory at the desired level.

There are three basic reasons for keeping an inventory such as time, uncertainty, and economies of scale. Time is a common reason as the time lags present in the supply chain, from supplier to end user at every stage require that an organization to maintain certain amounts of inventory to use in this lead time. Inventories are
maintained as buffers to meet uncertainties in demand, supply, and movements of
goods. Cost is the main issue in economies of scale. The ideal condition of “one unit
at a time at a place where a user needs it, when he needs it” tends to incur lots of
costs in terms of logistics. This results in bulk buying, movement, and storing.

The five strategic roles of inventories are: a) supporting quality objectives (to
enhance quality), b) supporting cost objective (to minimize cost involved), c)
supporting flexibility objectives (enhance volume or delivery flexibility and allow
flexibility in production scheduling), d) supporting speed objectives (fast response to
demand and meet variation in product demand), and e) supporting dependability
objectives (keep process working and maintain independence of operations). The
inventory management is essential for each operation.

However, there are few disadvantages in holding inventory. Holding inventory can
increase administrative costs and insurance costs. Keeping high volume will
increase the numbers of workers to maintain and arrange the inventory, at the same
time the cost for insurance will also rise up. Inventories can also take up excessive
storage space in a warehouse. Warehousing is another cost of holding excess
inventory in a business organization. The costs of warehousing include the
warehouse space, utilities, and maintenance of the storage area. Some supplies
may require additional maintenance, such as temperature control to preserve the
quality of the materials. Poor maintenance in inventory can turn the inventory
obsolete. In some cases, inventory is so bloated that a high percentage of it will
become obsolete before it is used in production. Besides, too much inventory is a
certain indicator of more serious and costly business process and systems problems
that can be rooted very deeply across the organization. At the same time the inventory can be damaged in terms of quality and value if it is kept for a long time and not use it. In serious case, it could be totally lost as well. Keeping excessive amount of inventories can cause hazardous to store. It can create hazardous situation for workers that handle the inventories and put them in dangers.

Types of Inventory

1. **Buffer inventory** is an inventory that compensates for unexpected fluctuations in supply and demand. It also known as “safety stock” for production. Buffer inventory helps improve accuracy of forecasts for future plan. It helps to reduce purchase and manufacturing lead times and reduce uncertainties in supply chain.

2. **Cycle inventory** is inventory that occurs when one stage in a process cannot supply all the times it produces simultaneously and so has to build up inventory of one item while it processes the others. This inventory used in batch processes, it is the available inventory excluding buffer stock and used streamline methods for placing orders and making setups to reduce stocks.

3. **De-coupling inventory** is the inventory that is used to allow work centres or processes to operate relatively independently. This is a term used sometimes instead of safety stock to establish a buffer between product demand and product supply. It is used in work-in-process inventories. The buffer stock that is held by both the supplier and the user. As factory work orders pass from machine to machine, queues (stocks) of inventory are often planned to enable each work
centre (machine) to absorb variations in workload due to such things as product mix changes.

4. **Anticipation inventory** is an inventory that is accumulated to cope with expected future demand or interruptions in supply. The amount of inventory ordered (or produced) above the normal amount in anticipation of uneven supply or demand. It ways of building up extra stock for periods of increased demand. For example in ice cream business. Usually introduce new products with different demand cycles to stabilize demand in market. The best way to improve the demand is use price promotions at periods of low demand and offer seasonal pricing plans to attract more customers.

5. **Pipeline inventory** is an inventory that exists because materials cannot be transported instantaneously. Mainly for goods that are still in transit or in the process of distribution, which the inventory left the factory but not arrived at the customer yet. Select suppliers based on time responsiveness will help the inputs reach the customer fast. By using fast and reliable carriers the goods can be transformed faster. Standardize Enterprise Resource Planning (ERP) platforms throughout the supply chain to facilitate real-time exchange of information. By reduce order size the time factor can be minimized.

Zero inventories are when an organization reduces the amounts of raw materials and purchased parts and subassemblies by having suppliers deliver them directly. The amounts of work-in process (WIP) can reduce by using just-in-time (JIT) production. In zero inventories the amount of finished goods minimize in storage by shipping to markets as soon as possible.

**Inventory Management Systems**

Inventory management systems (IMS) help simplify the data regarding inventory. The systems have the ability to track sales and available inventory, communicate with suppliers in a real-time environment and receive and incorporate other data, such as seasonal demand. Examples of inventory management systems are bar codes, Radio Frequency Identification (RFID) and software for retailers and wholesalers.
Planning and Controlling Operations

Enterprise Resource Planning (ERP) is an integrated computer-based system used to manage internal and external resources, including tangible assets, financial resources, materials, and human resources. It also can be described as management software that allows an organization to use a system of integrated applications to manage the business and automate back office functions. It integrates all aspects of an operation, including product planning, development, manufacturing processes, sales and marketing to perform better in business.

ERP components are as follows:-

- Sales
- Inventory management
- Payroll
- E-Commerce
- Vendor integration
- Accounting
- Purchasing
- Customer Relationship Management (CRM)

Advantages of ERP

ERP can greatly improve quality and efficiency of a business. It will design the business in order to perform best in the market. The single data source for products and services information such as information related to suppliers, vendors, customer orders and the products themselves drive rapid product development and launch cycles which increases a company’s overall market share. ERP creates a more agile company that better adapts to change. ERP makes a company more flexible and less rigidly structured so organization components operate more cohesively, enhancing the business event internally and externally. It helps tracking the 3-way match between purchase orders (what was ordered), inventory receipts (what arrived), and costing (what the vendor invoiced). ERP is an effective mechanism for
making all parts of the business more efficient. It has better 'sense of control' with continuous improvement in operations in order to fulfil customer satisfaction more efficiently. ERP creates more sophisticated communication with customers, suppliers and other business partners which integrating whole supply chain players.

**Disadvantages of ERP**

ERP has some disadvantages as well. There are frequent compatibility problems with the various legacy systems of the partners. It might interrupt the business operations. The system may be over-engineered relative to the actual needs of the customer. It might be difficult and become burden for customers. ERP systems can be very expensive to install for multinational companies. In other words, it will increase the total cost at initial stage. The systems are might too restrictive and do not allow much flexibility in implementation and usage. It will become more difficult when some amendment need to made in operations. Once a system is established, switching costs are very high for any one of the partners. Since it's require expertise to set up and modified the cost for troubleshooting is high.

**Waste Management**

Waste management is the collection, transport, processing, recycling or disposal of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effects on health, the environment or aesthetics. Waste management encompasses management of all processes and resources for proper handling of waste materials, from maintenance of waste
transport trucks and dumping facilities to comply with health codes and environmental regulations. Waste management is also carried out to recover resources from it.

Observation/Opinion

Operations management is an essential element in every project in order to complete or maintain the project in more efficient ways. There is a need for every management of business or project concerning with overseeing, designing, controlling the process of production, and redesigning business operations in the production of goods and/or services. The business functions responsible for planning, coordinating, and controlling the resources are indeed needed to produce products and services for a company efficiently. Managing all the resources wisely is an ultimate goal in every business organization.
Conclusion

In this chapter, important aspects related to processing factors are described. Its objective is to explain why evaluation of processing factors is vital in project planning and the importance of technologies in operations management.

Exercise/Activity

Describe three reasons for holding inventories.

Answer

1. To protect against uncertainties
2. To take advantage of quantity discounts
3. To support a level aggregate plan
UNIT 5
FINANCIAL ESTIMATION AND FORECASTING

Introduction

This chapter describes financial models that are used to measure the feasibility and viability of a project. Project managers use relevant cash flows to make decisions about proposed capital expenditures. These decisions can be expressed in the form of project acceptance or rejection or project rankings. Several approaches are used such as time value of money, net present value (NPV), internal rate of return (IRR), payback period (PP), profitability index (PI) and benefit cost ratio (BCR). These approaches will help project managers to make most desirable decision on their project based on financial aspects.

Objective

Upon completion of this chapter, you will be able to:

1. Understand several financial models of project analysis.
2. Understand project analysis by making calculation based on several financial models.
3. Analyse, interpret, and evaluate projects based on several financial models.
TOPIC 5: FINANCIAL ESTIMATION AND FORECASTING

1. Time value of money
2. Net present value (NPV)
3. Internal rate of return (IRR)
4. Payback period (PP)
5. Profitability index (PI)
6. Benefit cost ratio (BCR)

Main Points

Measuring worth of a project is very important in order to determine which projects to accept or to reject. It will be the key indicator for a project manager to increase the rate of success and select the best project (viable and feasible project). Projects can be measured based on several approaches/models.

Time Line

Time line is a graphical presentation of cash flows over a given period of time. It is a horizontal line on which time zero is at the leftmost end and future periods are shown as you move from left to right which is used to depict the cash flows associated with a given investment.

\[\begin{array}{cccccc}
-10000^* & 3000 & 5000 & 4000 & 3000 & 2000 \\
\hline
0 & 1 & 2 & 3 & 4 & 5 (year)
\end{array}\]

Note: * Initial deposit (investment)
Time Value of Money

Time value of money is one of the financial techniques that explicitly recognizes that a ringgit received today is worth more than a ringgit received in the future. Ten ringgit (RM10) in our hand today is worth more than ten ringgit (RM10) to be received in the future because the money in our hand today can be invested to earn interest to accumulate more than ten ringgit (RM10) in the future. The time value of money mathematics quantifies the value of ringgit (currency) through time. This, of course, depends upon the rate of return or interest rate which can be earned on the investment. There are two common terms in time value money namely present value (PV) and future value (FV).

Present Value
Present value describes the procedure of formative what a cash flow to be received in the future is worth in today’s ringgit. Therefore, the present value of a future cash flow represents the amount of money today which, if invested at a particular interest rate, will grow to the amount of the future cash flow at that time in the future. The process of finding present value is called discounting and the interest rate used to calculate present value is called discount rate. In other words, present value can be described as the total money that you have in your hand today.
Example: -
Let’s say an investor was given an opportunity to receive RM1,000 one year from now. In other words, end of first year investment the investor will have total amount of RM1,000. If he can earn 10% on his investment in the normal course of event or compound interest (compounding), what is the most he should invest now for this opportunity?

Formula: -

\[
PV = \frac{FV}{(1 + r)^n}
\]

Where,

- \( PV \) = present value
- \( FV \) = future cash flow which occurs \( t \) years from now
- \( r \) = the interest or discount rate
- \( n \) = the number of years
Calculation: -

\[ FV = RM1,000 \]
\[ r = 10\% \]
\[ n = 1 \text{ year} \]

Present value  
\[ = (1,000)/(1 + 0.10)^1 \]
\[ = 1,000/1.1 \]
\[ = RM909.09 \]

Future Value

Future value (FV) is cash investor will receive at a given future date. In other words, the cash flow represents the amount, at some time in the future, that an investment made today will grow to if it is invested to earn a specific interest rate. The value of an investment made today measured at a specific future date using compound interest (compounding). It is the value of a present amount at a future date found by applying compound interest over a specified period of time.

Example: -

An investor saves his RM3,000 in a savings account paying 12% compounded annually, how much will he get in two years?
**Formula:**

\[
FV = PV \times (1+r)^n
\]

Where,
- \(FV\) = future value of an investment
- \(PV\) = initial principal, or present value of an investment
- \(r\) = interest rate per period/dividend paid
- \(n\) = number of periods, typically years

**Calculation:**

- **PV** = RM3,000
- **r** = 12%
- **n** = 2 years

\[
\text{FV at the end of year 1} = \text{RM3,000} \times (1 + .12)^1 = \text{RM3,360}
\]

\[
\text{FV at the end of year 2} = \text{RM3,000} \times (1 + .12)^2 = \text{RM3,763.20}
\]

**Net Present Value (NPV)**

Net present value (NPV) is the sum of the present values of all of a given project's cash flows, both inflows and outflows, discounted at a rate consistent with the project's risk. NPV is used in capital budgeting to analyze the profitability of an investment or project. NPV can be defined as "the present value, discounted at the firm's required rate of return (cost of capital), of the stream of net cash flows from the project minus the project's net investment". A project should be accepted if the net present value (NPV) is greater than or equal to zero and rejected if its net present value (NPV) is less than zero.

**Accept (invest) if NPV > 0**

**Reject (do not invest) if NPV < 0**
This is because a positive NPV translates directly into increases in stock prices and increases in shareholder wealth. Higher NPV values predict that the project capable to produce high level of profits.

**Formula:**

\[
NPV = \sum \frac{CF_n}{(1 + r)^n} - INV
\]

NPV = Present value of future cash inflows – The initial investment (outlay )

Where,

- \( n \) = the expected life of the project
- \( r \) = the firm’s required rate of return (cost of capital)
- \( INV \) = initial investment (outlay)

**Example:**

Two project opportunities were given to a project manager. He has to choose one of the projects to do the investment and give that the rate of return is 10%. The operation cash flows for the both projects are given as below.

<table>
<thead>
<tr>
<th>Initial Investment</th>
<th>Project A</th>
<th>Project B</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 42,000</td>
<td>RM 45,000</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Operation Cash Inflows (RM)</td>
<td>Operation Cash Inflows (RM)</td>
</tr>
<tr>
<td>1</td>
<td>14,000</td>
<td>28,000</td>
</tr>
<tr>
<td>2</td>
<td>14,000</td>
<td>12,000</td>
</tr>
<tr>
<td>3</td>
<td>14,000</td>
<td>10,000</td>
</tr>
<tr>
<td>4</td>
<td>14,000</td>
<td>10,000</td>
</tr>
<tr>
<td>5</td>
<td>14,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

**Question:** Calculate NPV for both projects and decide which project the manager should accept and explain the reasons.
NPV Project A:

Discount factor calculation:

Discount factor = \( \frac{1}{(1 + r)^n} \)

Year 0
\[ \text{Year 0} = \frac{1}{(1+0.10)^0} = \frac{1}{1} = 1 \]

Year 1
\[ \text{Year 1} = \frac{1}{(1+0.10)^1} = \frac{1}{1.1} = 0.9091 \]

Year 2
\[ \text{Year 2} = \frac{1}{(1+0.10)^2} = \frac{1}{1.21} = 0.8264 \]

Year 3
\[ \text{Year 3} = \frac{1}{(1+0.10)^3} = \frac{1}{1.331} = 0.7513 \]

Year 4
\[ \text{Year 4} = \frac{1}{(1+0.10)^4} = \frac{1}{1.4641} = 0.6830 \]

Year 5
\[ \text{Year 5} = \frac{1}{(1+0.10)^5} = \frac{1}{1.61051} = 0.6209 \]

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow (RM)</th>
<th>Discount Factor</th>
<th>Present Value (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(42,000)</td>
<td>1</td>
<td>(42,000)</td>
</tr>
<tr>
<td>1</td>
<td>14,000</td>
<td>0.9091</td>
<td>12,727</td>
</tr>
<tr>
<td>2</td>
<td>14,000</td>
<td>0.8264</td>
<td>11,570</td>
</tr>
<tr>
<td>3</td>
<td>14,000</td>
<td>0.7513</td>
<td>10,518</td>
</tr>
<tr>
<td>4</td>
<td>14,000</td>
<td>0.6830</td>
<td>9,562</td>
</tr>
<tr>
<td>5</td>
<td>14,000</td>
<td>0.6209</td>
<td>8,693</td>
</tr>
</tbody>
</table>

Total present value of future cash inflow (year 1 to 5) = RM12,727 + RM11,570 + RM10,518 + RM9,562 + RM8,693 = RM53,070

NPV for Project A = Present value of future cash inflows – The initial investment
= RM53,070 – RM42,000
= RM11,071
NPV Project B:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow (RM)</th>
<th>Discount Factor</th>
<th>Present Value (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(45,000)</td>
<td>1</td>
<td>(45,000)</td>
</tr>
<tr>
<td>1</td>
<td>28,000</td>
<td>0.9091</td>
<td>25,455</td>
</tr>
<tr>
<td>2</td>
<td>12,000</td>
<td>0.8264</td>
<td>9,917</td>
</tr>
<tr>
<td>3</td>
<td>10,000</td>
<td>0.7513</td>
<td>7,513</td>
</tr>
<tr>
<td>4</td>
<td>10,000</td>
<td>0.683</td>
<td>6,830</td>
</tr>
<tr>
<td>5</td>
<td>10,000</td>
<td>0.6209</td>
<td>6,209</td>
</tr>
</tbody>
</table>

Total present value of future cash inflow (year 1 to 5) = RM25,455 + RM9,917 + RM7,513 + RM6,830 + RM6,209 = RM55,924

NPV for Project B = Present value of future cash inflows – The initial investment
= RM55,924 – RM45,000
= RM10,924

Calculating NPV using Excel

Several software programs available in the market that can be used to calculate NPV values for a project. The common software used is Microsoft Excel. Here are the procedures for calculating NPV for Project A.

1. Key in all the data (cash flows) in Microsoft excel sheet.
2. Go to Formulas; under financial section then choose NPV.

3. Once you click NPV, you need to key in the rate (in this example rate of return is 10%). Then select the future cash flow values. (In this example the values are arranging from B3 to B7).
4. Once you insert all the data correctly you can click "OK" and the software will calculate total present value.

\[
\text{NPV for project A} = \text{Present value of future cash inflows} - \text{The initial investment} \\
= \text{RM}53,070 - \text{RM}42,000 \\
= \text{RM}11,071
\]

Note: Use the same steps to calculate NPV for Project B. The NPV values for Project B is RM10,924.

Decision: Select Project A.

Reason: Although NPV for both projects showed positive values, NPV for Project A is greater than NPV for Project B \((\text{NPV}_A > \text{NPV}_B)\). Thus, Project A is viable than Project B.

**Internal Rate of Return (IRR)**

The internal rate of return (IRR) is a rate of return used in capital budgeting to compute and compare the profitability of investments. It is the compound annual rate of return on a project, given its up-front costs and subsequent cash inflows. The IRR is the discount rate that equates the present value of the net cash flows from the project with the net investment.
• A project should be accepted if the IRR is greater than the firm’s required rate of return (cost of capital; \( r \) or \( k \)); if not the project should be rejected.

• A ratio above the current cost of capital is considered positive, and a higher expected return is more favourable.

The IRR is a good way of judging an investment. The bigger value of IRR indicates the better project.

**Formula:**

\[
\text{NPV} = 0 = C_{F0} + \sum C_{F_n} / (1 + r)^n
\]

Where,

\( n \) = is the life of the investment
\( r \) = is the project’s IRR
\( C_{F0} \) = is initial investment (cash outflows)
\( \text{NPV} \) = Net present value

**IRR Calculation**

**IRR for Project A:**

\[
0 = \text{RM42,000} + \frac{\text{RM14,000}}{(1+\text{IRR})^1} + \frac{\text{RM14,000}}{(1+\text{IRR})^2} + \frac{\text{RM14,000}}{(1+\text{IRR})^3} + \frac{\text{RM14,000}}{(1+\text{IRR})^4} + \frac{\text{RM14,000}}{(1+\text{IRR})^5}
\]

\[
\text{IRR}_A = 19.9\%
\]

**IRR for Project B:**

\[
0 = \text{RM45,000} + \frac{\text{RM28,000}}{(1+\text{IRR})^1} + \frac{\text{RM12,000}}{(1+\text{IRR})^2} + \frac{\text{RM10,000}}{(1+\text{IRR})^3} + \frac{\text{RM10,000}}{(1+\text{IRR})^4} + \frac{\text{RM10,000}}{(1+\text{IRR})^5}
\]

\[
\text{IRR}_B = 20.7\%
\]

*Note: The IRR calculation is based on best guessing and to get an accurate answer; the calculation can only be performed using Excel Worksheet or financial calculator.*
Calculating IRR using Excel

1. Key in all the data (cash flows) in Microsoft excel sheet.

2. Go to Formulas; under financial section then choose IRR.
3. Once you click IRR section, you need to select the future cash flow values. (In this example the values are ranging from B2 to B7).

![Image: Excel spreadsheet showing IRR calculation]

4. Once you insert all the data correctly you can click "OK" and the Excel will calculate IRR for you.

![Image: Excel spreadsheet showing calculated IRR]

IRR for Project A = 19.9%

Note: Use the same steps to calculate IRR for Project B. The IRR values for Project B is 20.7%
Decision: Select Project B.

Reason: Both projects showed their IRR are greater than cost of capital (in both cases, \( k = 10\% \)), IRR for Project B is greater than IRR for Project A (IRR\(_B\) > IRR\(_A\)). Thus, Project B is viable and better than Project A.

Comparison between NPV and IRR

Usually we will accept all projects with NPV more than 0. However, if we have more than one project to choose, we will rank the projects from the highest to the lowest and accept the project with the highest NPV. Meanwhile a project with IRR greater than \( k \) or \( r \) (cost of capital) will be accepted.

When we evaluate projects using NPV and IRR, both approaches are suitable. On a purely theoretical basis, NPV is the better approach because it is assumed that intermediate cash flows are reinvested at the cost of capital (\( k \) or \( r \)) whereas IRR assumes they are reinvested at the IRR. Certain mathematical properties may cause a project with non-conventional cash flows to have or more than one real IRR. Despite its theoretical superiority, however, financial managers prefer to use the IRR of the preference for rates of return.

Another way to understand the superiority of the NPV rule is that the discounting process inherent in both the IRR and NPV techniques implicitly assumes the reinvestment of the cash flows at whatever discount rate is used, either IRR or the cost of capital. When the IRR is very high relative to the cost of capital it is unrealistic to assume reinvestment at that high rate. This is especially damaging when comparing two investments with very different timing of cash flows.

Benefit Cost Ratio (BCR)

Benefit cost ratio (BCR) is a technique for evaluating a project or investment by comparing the economic benefits with the economic costs of the activity. Benefit cost ratios are often used in corporate finance to detail the relationship between possible benefits and costs, both quantitative and qualitative, of undertaking new projects or replacing old ones. It is an indicator, used in the formal discipline of cost-benefit
analysis that attempts to summarize the overall value for money of a project or proposal. A BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be expressed in discounted present values.

Formula: -

\[ \text{BCR} = \frac{\text{Total benefits}}{\text{Initial cash flows (Costs)}} \]

Example: -
Let’s make a comparison between two agriculture projects, leech project and goat project.

### Leech Project

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow (RM)</th>
<th>Discount factor (@ 20%)</th>
<th>Present value (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-35,000</td>
<td>1</td>
<td>-35,000</td>
</tr>
<tr>
<td>1</td>
<td>20,000</td>
<td>0.833</td>
<td>16,660</td>
</tr>
<tr>
<td>2</td>
<td>15,000</td>
<td>0.694</td>
<td>10,410</td>
</tr>
<tr>
<td>2</td>
<td>10,000</td>
<td>0.579</td>
<td>5,790</td>
</tr>
<tr>
<td>4</td>
<td>10,000</td>
<td>0.482</td>
<td>4,820</td>
</tr>
<tr>
<td></td>
<td>Total benefit (from year 1 to year 4)</td>
<td>37,680</td>
<td></td>
</tr>
</tbody>
</table>

**Benefit Cost Ratio (BCR)** = \( \frac{37,680}{35,000} \)

= 1.077

### Goat Project

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow (RM)</th>
<th>Discount factor (@ 20%)</th>
<th>Present value (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-35,000</td>
<td>1</td>
<td>-35,000</td>
</tr>
<tr>
<td>1</td>
<td>10,000</td>
<td>0.833</td>
<td>8,330</td>
</tr>
<tr>
<td>2</td>
<td>10,000</td>
<td>0.694</td>
<td>6,940</td>
</tr>
<tr>
<td>2</td>
<td>15,000</td>
<td>0.579</td>
<td>8,685</td>
</tr>
<tr>
<td>4</td>
<td>20,000</td>
<td>0.482</td>
<td>9,640</td>
</tr>
<tr>
<td></td>
<td>Total benefit (from year 1 to year 4)</td>
<td>33,595</td>
<td></td>
</tr>
</tbody>
</table>

**Benefit Cost Ratio (BCR)** = \( \frac{33,595}{35,000} \)

= 0.96
Conclusion: -
BCR for Leech Project (BCR = 1.077) is higher than Goat Project (BCR = 0.96), thus Leech Project will be selected. A ratio above 1.0 means that the project expects to make a profit and a higher ratio than 1.0 is better.

Payback Period (PP)
Payback period (PP) in capital budgeting refers to the period of time required to get back the funds expended in an investment, or to reach the break-even point. Break-even point refers to a situation where gains equal to lose or profit is zero. The payback period can be explained as the amount of time it takes for a given project's cumulative net cash inflows to get back the initial investment. It should be noted that the payback period does provide information on how long funds will be tied up in a project. Thus, the shorter the payback period, other things held constant, the greater is the project liquidity. Also, since cash flows expected in the far future are often regarded as being riskier than near term cash flows, the payback is often used as a rough measure of project riskiness. In other words, shorter payback periods are more desirable.

Formula: -

\[
\text{Payback Period (PP)} = \frac{\text{Cost of Project}}{\text{Annual Cash Inflows}}
\]

Payback period calculation: -

Example 1:

Given that,
Project Cost = RM200,000
Expected returns of the project annually = RM40,000
Payback Period (PP) \[= \frac{200,000}{40,000}\]

\[= 5 \text{ years}\]

**Example 2:**

<table>
<thead>
<tr>
<th>Investment Cash Flow</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Inflows</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Cash Outflows</td>
<td>-800</td>
<td>-150</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net Cash Flow</td>
<td>-500</td>
<td>150</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Cumulative Cash Flow</td>
<td>-500</td>
<td>-350</td>
<td>-50</td>
<td>250</td>
<td>550</td>
</tr>
</tbody>
</table>

Payback Period \[= Y + \left(\frac{A}{B}\right)\]

Where,

Y = The number of years before final payback year. In the example, Y = 3.0 years.

A = Total remaining to be paid back at the start of the payback year, to bring cumulative cash flow to 0. In the example, A = RM50.

B = Total (net) paid back in the entire payback year. In the example, B = 300.

Calculation:

Payback Period \[= 3 + \frac{50}{300}\]

\[= 3 + \frac{1}{6}\]

\[= 3.17 \text{ years}\]

\[= 3 \text{ years } 2.04 \text{ months}\]

**Payback Period Drawbacks**

During payback period (PP) calculation usually we will ignore any benefits that occur after the PP, and PP does not measures total incomes. PP ignores the time value of money, where today value of RM100 is not the same after five years. PP makes no adjustments for risk.
**Summary of NPV, IRR, BCR, PP**

<table>
<thead>
<tr>
<th>Calculation</th>
<th>NPV</th>
<th>BCR</th>
<th>IRR</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PV revenue – PV cost</td>
<td>Cash flow/project investment</td>
<td>% return on project investment</td>
<td>Project costs/annual cash flows</td>
</tr>
<tr>
<td>Neutral result</td>
<td>NPV = RM0</td>
<td>Ratio = 1.0</td>
<td>IRR = Cost of capital</td>
<td>Payback period = accepted length</td>
</tr>
<tr>
<td>If used to screen projects or to select projects outright</td>
<td>NPV &gt; acceptable amount</td>
<td>Ratio &gt; Acceptable amount</td>
<td>IRR &gt; acceptable amount</td>
<td>Payback period &lt; acceptable length</td>
</tr>
<tr>
<td>If used to compare projects</td>
<td>Higher NPV better</td>
<td>Higher ration better</td>
<td>Higher IRR better</td>
<td>Shorter payback period better</td>
</tr>
</tbody>
</table>

**Profitability Index (PI)**

The profitability index shows the relative profitability of any project, or the present value of benefits per ringgit of costs. It is defined as “the present value of a project’s cash inflows divided by its initial cash outflows”.

**Formula:**

\[
\text{Profitability Index (PI)} = \frac{\text{Present value of future cash flows}}{\text{Initial investment}}
\]

A project is acceptable if its PI is greater than 1.0, and the higher the PI the higher is the project ranking. If there is any project’s PI value is lower than 1.0 it would indicate that the project’s PV is less than the initial investment. As values on the PI index increase, so does the financial attractiveness of the proposed project. The higher the project’s PI the more profitable the project is per investment.
Profitability Index (PI) calculation:

**Example 1:**

Given that,
Project cost = RM200
Present value of its future cash flows = RM220

Calculation:

\[
PI = \frac{RM220}{RM200} = 1.1
\]

Note: *Per ringgit invested, RM1.10 in value or RM0.10 in NPV results. In other words, every one ringgit invested in this project, there is RM0.10 return.*

1. NPV = RM20
2. + NPV = PV > initial investment
3. + NPV = PI > 1
4. - NPV = PI < 1

**Example 2:**

Given that,

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18,000</td>
</tr>
<tr>
<td>2</td>
<td>12,000</td>
</tr>
<tr>
<td>3</td>
<td>10,000</td>
</tr>
<tr>
<td>4</td>
<td>9,000</td>
</tr>
<tr>
<td>5</td>
<td>6,000</td>
</tr>
</tbody>
</table>

- Investment = 40,000
- Life of the machine = five years
- \( r = 10\% \)
Calculation: 

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash flows</th>
<th>PV@10%</th>
<th>PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18,000</td>
<td>0.909</td>
<td>16,362</td>
</tr>
<tr>
<td>2</td>
<td>12,000</td>
<td>0.827</td>
<td>9,924</td>
</tr>
<tr>
<td>3</td>
<td>10,000</td>
<td>0.752</td>
<td>7,520</td>
</tr>
<tr>
<td>4</td>
<td>9,000</td>
<td>0.683</td>
<td>6,147</td>
</tr>
<tr>
<td>5</td>
<td>6,000</td>
<td>0.621</td>
<td>3,726</td>
</tr>
</tbody>
</table>

Total PV = 43,679

Minus Investment = 40,000

NPV = 3,679

\[
\text{PI} = \frac{\text{Total PV}}{\text{Initial Investment}} \\
= \frac{43,679}{40,000} \\
= 1.091
\]

Note: *Since the PI value is more than 1 we will accept this project.

**Example 3:**

A project manager has to choose one best project from two available projects. The details of the projects are given below: 

<table>
<thead>
<tr>
<th>Project</th>
<th>PV (RM in millions)</th>
<th>Initial investment (RM in millions)</th>
<th>PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanilla</td>
<td>325.3</td>
<td>250</td>
<td>1.3</td>
</tr>
<tr>
<td>Catfish</td>
<td>75.7</td>
<td>50</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Decision:**

Because both projects have a PI greater than 1.0, both are worthwhile. However, notice that if we rank projects based on the PI, the catfish project looks better.
Conclusion

This chapter describes several financial models or approaches for analysing the viability of the projects. It provides guidelines for managers to make best decision for every project, which is to be selected. The entire financial model has its own advantages and disadvantages. The managers must choose the most suitable model to measure their projects’ viability.

Exercises/Activity

Question 1
What is the net present value (NPV) of the following set of cash flows if the required return is 12.3%? Show your calculation
\[ Y_0 = (\text{RM} \, 244,900) \]
\[ Y_1 = \text{RM}16,300 \]
\[ Y_2 = \text{RM}102,900 \]
\[ Y_3 = \text{RM}141,700 \]
\[ Y_4 = \text{RM}137,500 \]

Question 2
Table 1 shows cash flows for Project S and Project L. Find the net present value (NPV) for both projects at 10% cost of capital. Which project will be selected? Explain your answer and show your calculation.

<table>
<thead>
<tr>
<th>Year (t)</th>
<th>Project S</th>
<th>Project L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net cash flows</td>
<td>Cumulative net cash flows</td>
</tr>
<tr>
<td>0</td>
<td>(RM1,000)</td>
<td>(RM1,000)</td>
</tr>
<tr>
<td>1</td>
<td>500</td>
<td>(500)</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
<td>(100)</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>
Answer

1. \( \text{NPV} = \text{RM}37,715.07 \)
2. \( \text{NPV}_s = \text{RM} 78.82, \text{NPV}_L = \text{RM} 54.10; \) Project S will be selected.
UNIT 6
FINANCIAL AND ECONOMIC EVALUATION

Introduction

This unit describes the additional financial analysis that is used for feasibility studies. Business organizations use relevant information to make decisions about future development. Several analyses are used such as cost-benefit analysis, risk analysis, sensitivity analysis, and scenario analysis. These analyses help managers to predict and carry out a project or business in challenging business environment.

Objective

Upon completion of this chapter, you will be able to:

1. Understand cost-benefit analysis, risk analysis, sensitivity analysis, and scenario analysis.
2. Determine the viability of a project based on different financial analyses.
3. Understand the effects of financial outcomes of varying economic situations.
TOPIC 6: FINANCIAL AND ECONOMIC EVALUATION

1. Cost-benefit analysis
2. Risk analysis
3. Sensitivity analysis
4. Scenario analysis

Main points

Measuring project viability is not based on the current situation, but it should take place in the future of the project or business. A manager must keep updating with latest global issues so that he can take early steps. This can minimize the losses during the economy downturn, and maximize their profit during good economy position. By analysing the future part of a project or business, the manager can convert whatever economy situation into more favourable situation to them.

Cost-Benefit Analysis (CBA)

Cost-benefit analysis (CBA) is one of the key aspects in any business case. It is the analysis of the costs of a project that includes some consideration of both the cost and the payback and it is a technique for assessing the monetary, social costs, and benefits of a capital investment project over a given time period. It is basically compared the revenue (benefits) and cost of a project in order to make a decision. Cost-benefit analysis is one of the most important ways that the economists analyse
the major development of proposals and environmental problems. This analysis is similar to the net present value (NPV) technique commonly applied in financial analysis. The major part of this analysis is by identifying all the costs and benefits that would result from a particular resource use, which include non-monetary costs and benefits. Sometime it is difficult to quantify some benefits. So the managers need to quantify it in the most appropriate way to get the real value. In order to reach a conclusion as to the desirability of a project, all aspects of the project, positive and negative, must be expressed in terms of a common unit. The most convenient common unit is money. This means that all benefits and costs of a project should be measured in terms of their equivalent monetary value.

**Example:**

Assume you are working as a production manager in one of the largest dairy farms in Malaysia. As a production manager, you are suggested to purchase a milking machine for your dairy farm to increase output (milk) which is worth about RM2.87 million. Before you can present the proposal to the CEO, you would like to have some facts to support your suggestion, so you decide to carry out a cost-benefit analysis.

Accordingly, you itemize the benefits. With the new machine, you can produce additional 150 litres of milk per hour (save time of milking). The five staffs currently milking manually can be replaced with high new machines. The milk will be in
superior quality because, it will be milked and directly pass through the pipeline to the main tank. The milk will be less or almost never exposes to the surrounding air. The work will carry out in the close environment, which will minimize the contamination. The buyer will be much confident with your product. Your farm will be much more systematic. The new technology will help to keep the record for the milking cow. It will be easy during culling activity.

You are convinced these outweigh the costs. There is a cost to purchase the machine and it will consume some electricity. Any other costs would be insignificant. You calculate the selling price of the 150 litres of milk per hour multiplied by the number of production hours per month. Add to that five percent of the total milk, which aren't rejected because of the contamination, based on the research milking by machine will minimize the contamination. You also add the monthly salaries of the five workers who milk the cows before this. It will cover the most of the benefits.

Let’s calculate the monthly cost of the machine, by dividing the buying price (RM 2.87 million) by 12 months per year and divide that by 15 years, the machine should last. The supplier of the machine will let you know the electricity consumption and the maintenance cost of the new milking machine. Based on that you can calculate your total cost associated with new changes. By conducting the Cost-Benefit Analysis (CBA) based on total benefits and total cost, your positive and high profits will peruse your CEO to agree with this idea.

Risk Analysis
When evaluating a project, it is imperative that we manage our risks along with the returns. Managing risks in capital budgeting is about using certain techniques to determine a project’s risk and decide whether the project’s potential is the risk. Risks can be analysed based on different types of analysis such as breakeven analysis, sensitivity analysis, and scenario analysis.

Breakeven Analysis
Breakeven analysis is used to determine whether a project will be able to cover all its expenses and time of begin to make a profit. It is essential for a manager to recognize his or her initial costs, which will help the manager to determine the sales
revenue needed to pay ongoing project expenses. This analysis will determine the level of sales at which the project gets the breakeven (profit equal to the cost). It can be formulated in many different ways:

- A firm introduces a new product
- A firm wants to evaluate a new product
- A decision to replace old production equipment

Breakeven point (BEP) is the level of sales or production that a firm must achieve in order to avoid losses by fully covering all costs.

Formula:

\[
\text{Break-even level of revenues} = \frac{\text{Fixed costs including depreciation}}{\text{Additional profit from additional ringgit of sales}}
\]

Break-even analysis calculation:

**Example 1:**

Given that,

<table>
<thead>
<tr>
<th></th>
<th>Sales</th>
<th>RM16 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable costs</td>
<td>RM13 million</td>
<td></td>
</tr>
<tr>
<td>Fixed costs</td>
<td>RM2 million</td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>RM0.45 million</td>
<td></td>
</tr>
</tbody>
</table>

Calculation:

1. Variable costs over sales \[= (13 \text{ million} / 16 \text{ million}) \times 100\%
   \[= 81.25\%\]
   \[= \text{Variable costs are 81.25\% of sales}\]
   *Each additional ringgit sales, costs increased by only RM0.8125*
2. Accounting loss before tax = Fixed costs + Depreciation
   = RM2 million + RM0.45 million
   = RM2.45 million

3. The loss reduces by each ringgit of sales = RM1.00 – RM0.8125
   = RM0.1875

4. To cover all cost = Accounting loss before tax / The loss reduces by each ringgit of sales
   = RM2.45 million / 0.1875
   = RM13.067 million

Example 2:

<table>
<thead>
<tr>
<th>Item</th>
<th>RM millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>13,067</td>
</tr>
<tr>
<td>Variable costs</td>
<td>10,617 (81.25%)</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>2000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>450</td>
</tr>
<tr>
<td>Pre-tax profit</td>
<td>0</td>
</tr>
<tr>
<td>Taxes</td>
<td>0</td>
</tr>
<tr>
<td>Profit after tax</td>
<td>0</td>
</tr>
</tbody>
</table>
Calculation:

**Break-even point (BEP) shows by a graph**

![Graph showing Break-even Point (BEP)](image)

**Sensitivity Analysis**

A tool that allows to investigate the impact of individual assumptions on a decision variable (such as a project’s NPV) by determining the effect of changing one variable (e.g.: price, sales, costs of raw materials) while holding all others fixed.

Notably, in conducting sensitivity analysis, a manager needs to change only a single variable values and keep all other variables constant; then recomputed cash flows as well as NPV.

**Sensitivity Analysis Graph**

The results of sensitivity analysis can be graphed (refer to Figure 6.1). Simply graph the result of NPV for % deviations from the base case (e.g. a change in sales).
Figure 6.1: Changes in NVP

Figure 6.1 above shows that a total sales increase from "a" units to "b" units, which lead to changes in NPV values. The NPV values increase from NPV1 to NPV2.

**Strengths and Weaknesses of Sensitivity Analysis**

1. Does not look at the plausibility of different deviations.
2. Does not consider interactions between changes.
3. Does not consider many changes at once.
4. However, it does offer clues as to which variables are the "success drivers" of a project.

**Scenario Analysis**

Scenario analysis is defined as "an analysis technique in which 'good' or 'bad' scenarios are compared with the 'base' or 'base guess' case". The method of estimating the expected value of a project after a given period of time, assuming a particular change in the values of the project’s securities or key factors that would affect security values, such as changes in the interest rate. Scenario analysis addresses the weaknesses of sensitivity analysis by:

1. Looking at several deviations at once.
2. Using plausible ranges of deviations.
3. Assigning probabilities to each measure.
Uses of Scenario Analysis
1. One can get an assessment of the project’s stand-alone risk.
2. One can also get a sense of how much money is being placed at risk.

Strengths and Weaknesses
1. Addresses some of the weaknesses of sensitivity analysis.
2. However, it considers only a limited number of scenarios.
3. Also assumes a definite relationship among the variables—all good values occur at the same time, etc.

Steps to Conduct Scenario Analysis
1. Look at the best, worst and average scenarios for each variable and then from 3 to 5 scenarios for the project as a whole.
2. Find the impact of the different scenarios on the project’s NPV.
3. Then assess the standard deviation and CV for project’s NPV.

Example 1:

Scenario Analysis
Firm Biho is looking at the three possible outcomes for its proposed project. Calculate the Expected NPV, Standard Deviation of NPV and Coefficient of Variation (CV) of NPV.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Probability</th>
<th>NPV (000's)</th>
<th>Prob. x NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worst Case</td>
<td>0.25</td>
<td>-5,761</td>
<td>-1,440</td>
</tr>
<tr>
<td>Base Case</td>
<td>0.5</td>
<td>6,996</td>
<td>3,498</td>
</tr>
<tr>
<td>Best Case</td>
<td>0.25</td>
<td>23,397</td>
<td>5,849</td>
</tr>
<tr>
<td><strong>Expected NPV</strong></td>
<td></td>
<td><strong>7,907</strong></td>
<td></td>
</tr>
</tbody>
</table>

Calculation:

Standard Deviation (SD) = \[\sqrt{\sum P_i (NPV_i - \text{Expected NPV})^2}\]
= 10,349
Coefficient of Variation (CV) = Std. Deviation / Expected NPV
= 1.3

Example 2:
Scenario Analysis
Huang Industries is considering a proposed project for its capital budget. The company estimates that the project NPV is RM12 million. This estimation assumes that the economy and market conditions will be average over the next few years. The company CEO, however, forecasts that there is only 50% chance that the economy will be average. Recognizing this uncertainty, he has also performed the following scenario analysis:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Probability of Outcome</th>
<th>NPV (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recession</td>
<td>0.05</td>
<td>-70</td>
</tr>
<tr>
<td>Below average</td>
<td>0.2</td>
<td>-25</td>
</tr>
<tr>
<td>Average</td>
<td>0.5</td>
<td>12</td>
</tr>
<tr>
<td>Above average</td>
<td>0.2</td>
<td>20</td>
</tr>
<tr>
<td>Boom</td>
<td>0.05</td>
<td>30</td>
</tr>
</tbody>
</table>

What are the project’s expected NPV, Standard Deviation (SD) and Coefficient of Variation (CV)?

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Probability</th>
<th>NPV</th>
<th>(Prob) X (NPV)</th>
<th>(Prob) X (NPV - Exp.NPV)^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recession</td>
<td>0.05</td>
<td>-70</td>
<td>-3.5</td>
<td>266.45</td>
</tr>
<tr>
<td>Below average</td>
<td>0.2</td>
<td>-25</td>
<td>-5</td>
<td>156.80</td>
</tr>
<tr>
<td>Average</td>
<td>0.5</td>
<td>12</td>
<td>6</td>
<td>40.50</td>
</tr>
<tr>
<td>Above average</td>
<td>0.2</td>
<td>20</td>
<td>4</td>
<td>57.80</td>
</tr>
<tr>
<td>Boom</td>
<td>0.05</td>
<td>30</td>
<td>1.5</td>
<td>36.45</td>
</tr>
</tbody>
</table>

Expected NPV = 3
Std. Deviation = 23.62
CV = 7.87

Calculation:
Prob x NPV for recession = 0.05 X -70
= -3.5
Expected NPV = ∑ Prob x NPV
               = (-3.5) + (-5) + 6 + 4 + 1.5
               = 3

(Prob) X (NPV - Exp. NPV)² for recession = (0.05) X (-70 - 3)²
                                           = (0.05) X (-73)²
                                           = (0.05) X 5,329.00
                                           = 266.45

Σ Pᵢ (NPVᵢ - Expected NPV)² = 266.45 + 156.80 + 40.50 + 57.80 + 36.45
                               = 558.00

Standard Deviation (SD) = [Σ Pᵢ (NPVᵢ - Expected NPV)²]^{½}
                         = [558.00]^{½}
                         = 23.62

Coefficient of Variation (CV) = Std. Deviation / Expected NPV
                               = 23.62 / 3
                               = 7.87

Conclusion

This chapter explains the cost-benefit analysis, break-even analysis, sensitivity analysis, and scenario analysis. Each analysis is measured with its own example. The analysis must be chosen by the manager based on the need and objectives of the projects. By conducting these analyses, further information and understanding on the viability and feasibility of projects, consequently assist the managers to make better decision for the betterment of the project.
Exercises/Activity

Question 1
A project has an initial outlay of RM1,000. The projected cash inflows are as follows:
- Year 1 RM200
- Year 2 RM200
- Year 3 RM400
- Year 4 RM400
What is the investment payback period?

Question 2
If you wanted to cut the advertising cost by RM100 repeatedly so that you could see its relationship with sales, what is the most suitable analysis that you could carry out? Explain your answers.

Answer
1. 3.5 years or 3 years 6 months
2. Sensitivity analysis
UNIT 7
GOVERNMENT INCENTIVES FOR AGRIBUSINESS PROJECTS

Introduction

The development of agriculture sector in this country, mainly influenced by monetary incentive and fiscal incentive. The policy is effective on the incentive that has great impact on particular industries and keeps the industry sustainable in a long term. Relevant modifications in monetary policy will have great impact on both price (substitution) and income.

Objective

Upon completion of this chapter you will able to:

1. Understand about monetary incentive.
2. Understand about fiscal incentive.
3. Explain the effect of monetary and fiscal incentives towards agriculture sector.
TOPIC 7: GOVERNMENT INCENTIVES FOR AGRIBUSINESS PROJECTS

1. Monetary incentive
2. Fiscal incentive

Main points

Monetary Incentive

Monetary incentive is an action of a central bank, currency board or other regulatory committee that determines the size and rate of growth of the money supply, which in turn affects interest rates. Monetary policy is maintained through actions such as increasing the interest rate, or changing the amount of money banks need to keep in the bank reserves. It’s mainly set up for the purpose of promoting economic growth and stability. Monetary incentive basically develops from monetary policy. Monetary policy can be explained as the volume of money circulates in the economy, and the value of that money is worth.

The global growth momentum has continued to be modest. Latest economic data suggests that the recovery is uneven, while downside risks to global growth prospects remain. Growth in the major advanced economies continues to be constrained by ongoing fiscal consolidation, slow recovery in financial intermediation and weak labour market conditions. In Asia, while growth has been affected by the weak external environment, domestic demand continues to support growth. Despite the improvements in international financial market conditions, markets remain vulnerable to setbacks and changes in the sentiments.

In the Malaysian economy, while the external sector is affected by global developments, domestic demand has continued to provide support for growth. Investment activity and private consumption have remained firm. Going forward, the domestic economy is expected to sustain a steady growth. Private consumption is supported by sustained income growth amid stable labour market conditions, while
investment activity is being led by capital spending in the domestic-oriented sectors, and progress in the implementation of infrastructure projects.

Good monetary policy will keep low, stable and predictable inflation rate, which influences productive, well-functioning economy. It allows Malaysians to make spending and investment decisions with more confidence. This encourages longer-term investment in Malaysia's economy, and contributes to sustained job creation and greater productivity. This in turn leads to real improvements in our standard of living. The monetary incentive for agriculture sector will help to boost the production level.

In agriculture sector, one of the monetary incentives made by the government for paddy sector is Rice Yield Improvement Incentive (Insentif Pengeluaran Padi). The value of this incentive is about RM10 million for a total of 73,291 paddy farmers who benefit on this incentive. This incentive was given to the farmers who successfully increase the production level since year 2007. The increasing in paddy production that exceeds one metric ton is qualified to receive this incentive for RM650. About RM1,300 will be awarded to farmers that able to produce 10 metric tons of paddy. Thus, this incentive is actually given to the farmers who manage to increase their yield about 1% at least.
Production Incentive Program
This program was started under Food Security Policy for 2008 - 2010. The increase in fuel prices has resulted in the increase of agricultural production cost. It also burdens farmers, ranchers and agriculture industry players. Cabinet on 16 April 2008 has approved the proposal of the Ministry of Agriculture and Agro-based Industry on production incentives with a view to lessen the farmers’ burden, which will uplift the production of agriculture sector in Malaysia.

Incentive grant rate production example: -
Crop sub-sector
Fruits : RM78/metric ton
Vegetables : RM81/metric ton

National Key Economic Areas
For food security reasons, it is necessary for Malaysia to ensure a certain level of self-sufficiency in rice and key proteins. The National Key Economic Areas (NKEAs) target to increase domestic production, so that Malaysia can produce 85% of domestic consumption in rice, 40% of domestic consumption in beef and 5% of domestic milk consumption by 2020. However, the key issues such as lack of economy of scale and poor value chain integration are causing domestic producers to be uncompetitive and dependant on a significant level of government assistance. Under NKEA the 10th entry point project (EPP) is scaling up and strengthening the productivity of paddy farming in the Muda area.
The Muda granary area accounts for 40% of national rice production and 22% of rice cultivation area. The average yield is five tonnes per hectare per season, higher than the national average of 3.74. Although soil quality is generally good, irrigation intensity is low, the majority of farms are small and the farming community is elders.

The government will promote commercial-scale farming, improve irrigation density and accelerate the use of new technologies with the target of increasing average yield to eight tonnes per hectare by 2020. Establish a unit in the Muda Agriculture Development Authority (MADA) by 2011 to provide standardised land management contracts and monetary incentives to encourage land owners to outsource management of their land. This project will increase farmers’ income and paddy production in the Muda area while at the same time, contribute towards achieving national food security.

Fiscal Incentive
Fiscal policy is the use of government spending and taxation to influence the economy. When the government decides on the goods and services it purchases, the transfer payments it distributes, or the taxes it collects, it is engaging in fiscal policy. The primary economic impact of any change in the government budget is felt by a particular group, a tax cut for new agriculture players. Discussions of fiscal policy, however, generally focus on the effect of changes in the government budget on the overall economy.
Incentives for the Agricultural Sector
The Promotion of Investments Act 1986 states that the term "company" in relation to agriculture includes:

- Agro-based cooperative societies and associations
- Sole proprietorships and partnerships engaged in agriculture

According to Malaysian Investment Development Authority (MIDA), companies producing promoted products or engaged in promoting activities the agricultural sector qualifies for the following incentives:

Pioneer Status
As in the manufacturing sector, companies producing promoted products or engaged in promoting activities are eligible for Pioneer Status (PS). The grant of Pioneer Status to an industry is aimed at enabling the industry concerned to make a reasonable level of profit within its formative years. The profit made is expected to be ploughed back into the business. A Pioneer Status company enjoys a partial exemption from income tax. It pays tax on 30% of its statutory income for five years, commencing from its production day. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company.

Investment Tax Allowance
As an alternative to Pioneer Status, companies producing promoted products or engaged in promoting activities can apply for Investment Tax Allowance (ITA). A company granted ITA is eligible for an allowance of 60% of its qualifying capital
expenditure incurred within five years from the date the first qualifying capital expenditure is incurred. Companies can offset this allowance against 70% of their statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised. The remaining 30% of the statutory income is taxed at the prevailing company tax rate.

To increase the benefits of agricultural projects, qualifying capital expenditure is defined to include expenditure incurred on:

- Clearing and preparation of land
- Planting of crops
- Provision of plant and machinery used in Malaysia for the purpose of crop cultivation; and
- Construction of access roads including bridges, construction or purchase of buildings (including those provided for the welfare of people or as living accommodation), and structural improvements on land or other structures which are used for crop cultivation. Such roads, bridges, buildings, structural improvements on land and other structures should be on land forming part of the land used for the purpose of such crop cultivation.

In view of the time lag between start-up and processing of the produce, integrated agricultural projects qualify for ITA for an additional five years for expenditure incurred for processing or manufacturing operations.

Incentives for Food Production

a. Incentives for New Projects
Specific incentives are introduced to attract investment into food projects both at the farm level as well as at the production or processing level. These will enhance the supply of the raw materials for the food processing sector and thus reducing reliance on imports of such raw materials. Tax incentives are given to both companies which invest in a subsidiary company engaged in an approved food production project and its subsidiary company undertaking the food production activities.
b. **Incentives for Existing Companies which Reinvest**

An existing company that reinvests in the production of the above food products qualifies for the same incentives for a period of five years. The food production project for both new (a) and existing companies (b) should commence within a year from the date the incentive is approved.

c. **Incentives for 'Halal' Products**

**Incentives for Production of Halal Food**

To encourage new investments in halal food production for the export market and to increase the use of modern and state-of-the-art machinery and equipment in producing high quality halal food that comply with the international standards, companies which invest in halal food production and have already obtained halal certification from JAKIM are eligible for the Investment Tax Allowance (ITA) of 100% of qualifying capital expenditure incurred within a period of five years. The allowance can be set-off against 100% of statutory income in the year of assessment. Any unutilised allowance can be carried forward to subsequent years until the whole amount has been fully utilised.

**Halal Industry Development Corporation (HDC) Incentive**

a) **Incentive for Halal Park Operator**

In an effort to promote the attractiveness of the Halal Parks, halal park operators are eligible for the following incentives:

i. **Pioneer Status with income tax exemption of 100% of the statutory income** for a period of 10 years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be...
carried forward and deducted from the post pioneer income of the company; or

ii. Investment Tax Allowance of 100% on the qualifying capital expenditure incurred within a period of five years. The allowance can be offset against 100% of the statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised.

b) Incentives for Halal Industry Players

Companies proposing to undertake projects in the designated Halal Parks are eligible for:

i. Investment Tax Allowance of 100% on the qualifying capital expenditure incurred within a period of 10 years. The allowance can be offset against 100% of the statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised; or

ii. Income tax exemption on export sales for a period of five years. The activities must be in the following four industry sectors:

- Specialty processed food
- Pharmaceuticals, cosmetics and personal care products
- Livestock and meat products
- Halal ingredients

b) Incentives for Halal Logistics Operators

In an effort to promote the halal industry and halal supply chain in Malaysia, the following incentives are granted to the following halal operator.

i. Income tax exemption of 100% of the statutory income for a period of five years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company; or
ii. Investment Tax Allowance of 100% on the qualifying capital expenditure incurred within a period of five years. The allowance can be offset against 100% of the statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised; or

Services provided by halal logistic operators must be integrated which comprises of the three (3) principal activities:

- Forwarding
- Warehousing
- Transportation

iii. Double Deduction for Expenses to Obtain Halal Certification and Quality Systems and Standards Certification.

To enhance the competitiveness of Malaysian companies in the global market for “halal” products including “halal” food, double deduction is granted for the purpose of income tax computation to companies which incur expenses in obtaining:

- Quality system and standard certification as well as ‘halal’ certification from JAKIM
- International quality systems and standards certification

**Reinvestment Allowance**

Companies engaged for at least 36 months in the production of essential food such as rice, maize, vegetables, tubers, livestock, aquatic products, and any other
activities approved by the Minister of Finance are eligible for Reinvestment Allowance. The reinvestment allowance is in the form of an allowance of 60% of the qualifying capital expenditure incurred within a period of 15 years beginning from the year the first reinvestment is made. The allowance can be offset against 70% of the statutory income in the year of assessment. Unutilised allowances can be carried forward to the following years until fully utilised.

**Incentives for Reinvestment in Resource-Based Industries**

These incentives are offered to companies that are at least 51% Malaysian-owned and are in the rubber, oil palm and wood-based industries producing products which have export potential. Companies in these industries (See List of Promoted Activities and Products – Reinvestment) reinvesting for expansion purposes are eligible for:

i. Pioneer Status with income tax exemption of 70% of statutory income for a period of five years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company; or

ii. Investment Tax Allowance of 60% on the additional qualifying capital expenditure incurred within a period of five years. The allowance can be offset against 70% of the statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised.

**Incentives for Reinvestment in Food Processing Activities**

A locally-owned manufacturing company with Malaysian equity of at least 60% that reinvests in promoting food processing activities is eligible for:

i. Pioneer Status with income tax exemption of 70% of statutory income for a period of five years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company; or

ii. Investment Tax Allowance of 60% on the additional qualifying capital expenditure incurred within a period of five years. The allowance can be offset against 70% of
the statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised.

**Accelerated Capital Allowance**

Upon the expiry of the Reinvestment Allowance (RA), companies that reinvest in promoted agricultural activities and food products are eligible to apply for the Accelerated Capital Allowance (ACA). These activities include the cultivation of rice, maize, vegetables, tubers, livestock, aquatic products and any other activities approved by the Minister of Finance. The ACA provides a special allowance to write off the capital expenditure within two years, i.e. an initial allowance of 20% in the first year and an annual allowance of 40%. Claims should be submitted to the IRB, accompanied by a letter from MIDA certifying that the companies are undertaking promoted agricultural activities are producing promoted food products.

**Agricultural Allowance**

A person or a company carrying on an agricultural activity can claim Capital Allowances and special Industrial Building Allowances under the Income Tax Act 1967 for certain capital expenditure. Capital expenditure which qualifies includes expenditure incurred on:

- Clearing and preparation of land
- Planting of crops
- Breeder stock for aquaculture
- Breeder stock for animal farming
Allowance on Capital Expenditure for Approved Agricultural Projects

Schedule 4A of the Income Tax Act 1967 provides for a 100% allowance on capital expenditure for Approved Agricultural Projects as approved by the Minister of Finance. This covers qualifying capital expenditure incurred within a specific time frame for a farm that cultivates and utilises a specified minimum acreage as stipulated by the Minister of Finance.

Approved agricultural projects are those for the cultivation of vegetables, fruits (papaya, banana, passion fruit, star fruit, guava and mangosteen), tubers, roots, herbs, spices, crops for animal feed and hydroponic-based products; ornamental fish culture; fish and prawn rearing (pond culture, tank culture, marine cage culture, and offshore marine cage culture); cockles, oysters, mussels, and seaweed culture; shrimp, prawn and fish hatchery; and certain species of forest plantations.

The incentive enables a person carrying on such a project to elect to deduct the qualifying capital expenditure incurred in respect of that project from his aggregate income, including income from other sources. Where there is insufficient aggregate income, the unabsorbed expenditure can be carried forward to subsequent years of assessment. Where he so elects, he will not be entitled to any capital allowance or agricultural allowance on the same capital expenditure.

Tax Exemption on the Value of Increased Exports

A company which exports fresh and dried fruits, fresh and dried flowers, ornamental plants and ornamental fish is eligible for a tax exemption of its statutory income equivalent to 10% of the value of its increased exports.

Incentives for Companies Providing Cold Chain Facilities and Services for Food Products

Companies providing cold room and refrigerated truck facilities and related services such as the collection and treatment of locally produced perishable food products qualify for Pioneer Status or Investment Tax Allowance (ITA).
Incentives for New Companies
New companies that provide cold chain facilities and services for perishable agricultural produce are eligible for:

i. Pioneer Status with income tax exemption of 70% of the statutory income for a period of five years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company; or

ii. Investment Tax Allowance of 60% on the additional qualifying capital expenditure incurred within a period of five years. The allowance can be offset against 70% of the statutory income for each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised.
Incentives for Existing Companies that Reinvest

Existing locally owned companies that reinvest in cold chain facilities and services for perishable agricultural produce (See List of Promoted Activities and Products – Reinvestment) are eligible for the following incentives:

i. Pioneer Status with a tax exemption of 70% on the increased statutory income arising from the reinvestment for a period of five years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company; or

ii. Investment Tax Allowance of 60% on the additional qualifying capital expenditure incurred within a period of five years. The allowance can be offset against 70% of the statutory income in each year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised.

Conclusion

Both monetary and fiscal incentives have given significant effects to the agriculture sector development. The effective policy will stimulate the growth of the industry. A simulative fiscal policy is good for the economy when it is operating below full employment levels. There are a couple of factors that will mitigate the positive effects. One factor is that government deficits will work to increase interest rates, which can crowd out private investment. Another factor is that after foreign capital comes in (due to higher interest rates) the domestic currency exchange rate rises. This leads to a rise in imports, which reduces GDP.
Exercises/Activity
The Government of Malaysia has provided some incentives for agribusiness projects to increase the productivity of the projects. Based on your chosen project, discuss the following incentives:

a. Monetary Incentives
b. Fiscal Incentives

Answer (Key Points)

1. Capital subsidy, grant or rebate.
2. Tax incentive
3. Reinvestment allowances
4. Accelerated capital allowances
UNIT 8
FINANCING AGRIBUSINESS PROJECTS

Introduction
This chapter describes two important aspects of agribusiness project. The first section will explain the barriers and challenges that involve in the agriculture sector. The second section will discuss different types of funding that available for agriculture projects in Malaysia.

Objective
Upon completion of this chapter you will be able to:
1. Understand about the barriers and challenges that involve in the agriculture sector.
2. Understand about the types of funding that are available for agribusiness projects.
TOPIC 8: FINANCING AGRIBUSINESS PROJECTS

1. Barriers and challenges
2. Types of financing

Main points

Barriers and Challenges
The traditional role of agricultural sector is the mechanism of growth for the Malaysian economy ever since the 70’s ceased its domain, finally being overtaken by the manufacturing, industrial, and services sectors. Some of the reasons for the decline of the agricultural sector were the unfavourable prices of the agricultural commodities; increased prices of farm inputs; shortage of agricultural labour; increased competition for land use; and more favourable policies according to the industry sector that could have made investment in agriculture a less attractive alternative.

Agricultural lands are one of the most important challenges in agribusiness. The world must double the food supplies and renewable energy in the future due to an increase of world population. According to FAO’s data, it shows that around 70% of world food supplies and renewable energy can be increased with the use of better technology, and the remaining 10% of the intensity of agricultural cycles and 20% by keeping in the existing area. It means that the agricultural land will became the worth of gold. The expansion of new frontiers has been limited and the relation of ownership of agricultural lands has a different story which is one of the most valuated active elements in the world over the last five years. Farmers from Cameron Highlands supply over half of Malaysian vegetable needs, in addition to generate sizable foreign earnings. The authorities have been trying to control pesticide usage for decades, but large numbers of growers are recently reported to be using banned compounds imported from Thailand and other countries. Unfortunately, illegal agrochemicals are cheaper and seen by farmers to be more effective. Across highland Southeast Asia, smallholders are causing agrichemical
pollution, biodiversity loss, soil erosion, and sediment and nutrient enrichment of streams.

**Labour**

The agricultural sector is presently facing acute shortage of labour. During the early 80s, there was immigration of labour from the agricultural sector to the manufacturing sector. An area of concern in the agricultural sector is the mismatch between increases in labour factor prices with that of productivity. For the period of 1990-1995 labour productivity has been increased by only 5.9% per annum, whereas, the farmers wages increased more than 45%. Abandoned farms were a common feature and the labour, lots that remain these days are mostly elders who are now well into their 50s. The sector is highly dependent on migrant labour. However, even migrant labour would prefer employment with the non-farm sector. The labour problems can be overcome by accelerating the adoption of labour saving techniques, mechanization, and automation with the aim of reducing dependency on foreign labour.

![Labourer](image)

**Price of Agriculture Products**

The prices of agricultural products in the market are not stable which, is the hardest challenge for the farmers. Malaysia’s main agricultural products such as palm oil, rubber, and cocoa faced deep price decline due to global scenario. Poor demand from importing countries let the price down in the market. The slowdown in economic growth is the main reason for a decrease in the volume of demand by the importing country. The international markets become stiffer and highly competitive in the international markets. As for rubber, Malaysia has to compete with Thailand and Indonesia who are relatively lower cost producers. Malaysia’s oil palm needs to
compete with not only other oil palm producing countries, but also with other edible oil products such as soybean, rape seed, sunflower, and corn. The scenario is made worse if these countries have a bumper harvest.

**Non Tariff Trade**
There are many instances when professional international lobbyists were paid to run down oil palm, claiming dubious side effects and health hazard potentials. Another example is stringent import conditions were imposed, such as meeting certain dubious quality standards, in order to keep new players away from their monopolistic market.

**Capital**
Most new generation or young farmers faced financial problem in developing their agricultural activities. Because of the better, higher and steadier return generated by the manufacturing sector, preference for capital to be invested in the manufacturing firms as opposed to the agricultural firms are quite obvious. Agricultural investments are in many ways highly risky. Faced with uncertainties due to the impulses of
weather, diseases, price fluctuations, and perishability to have an agricultural portfolio remain least attractive.

Infrastructure Barriers
These will consist of the limitations and defects in the existing production facilities, for instance; water, buildings, farms, storage, outlets, transport facilities (roads, highway, and waterway), power supply and marketing for the products. These barriers are due to the low price of commodities, especially export commodities such as palm oil, rubber, and cocoa.

Population
The next challenge in agribusiness is the population of Malaysia and the world. The population grows in proportion to of four new births per second. Now the total Malaysian is about 28 million and the global population is reached seven billion. So the challenge is not only about sufficient food production, which should be double, but also the output quality. The raw materials produced from the field begin to import and perceived in the analysis of the marks of processors and distributors of food, fibre, energy, protein and other derivatives of agribusiness. Food and energy, their
production, distribution and perception of the interconnected markets become a new challenge for the management of the entire value chain, from the first, passing through the inside and by post farms gate. The farmers must able to feed the population at the right amount of food to every human being.

Barriers in Agribusiness

According to Don Hofstrand from Iowa State University, a barrier to agribusiness entry is something that blocks or hampers the ability of a company (competitor) to enter into the industry. A barrier to exiting is something that blocks or hampers the ability of a company (competitor) to leave an industry.

In general, agriculture sector which is difficult for new players to enter may enjoy periods of good profitability and limited competition among competitors. Conversely, industries that are easy to enter attract new companies in the sector during periods of profitability. So, the competition among competitors can be intense. On the other end, the industry players that are difficult to exit have more competition than industry players that are easy to leave. Here are some typical barriers to enter and exit from the agriculture sector.

Barriers to Entry

Economies of scale – The need for a large volume of production and sales to reach the cost level per unit of production for profitability is a barrier to entry. The production cost must be relatively low than the current market price so that the player can compete with the current market.

- Capital intensive – A large capital investment per unit of output in facilities tends to limit industry entry.
- **Intellectual property** – Patents and other types of proprietary intellectual property are very effective in limiting industry entry. The cost of owning the intellectual property by paying the loyalty which is charge according to current market value.

- **High switching costs** – The tendency for buyers of an industry's products to be reticent about switching to a new supplier tends to limit entry.

- **Established brand identity** – Industries dominated by branded products are difficult to enter due to the large amount of time and money required to create a competing branded product.

- **Permitting requirements** – Industries where permits and licenses are required to establish production tend to have limited entry.

- **Government standards** – Industries where rigid industry standards exist tend to have limited entry.

**Barriers to Exit**

- **Investment in specialist equipment** – Investments in specialized equipment that cannot readily be used in other industries tend to be an impediment to leave the industry.

- **Specialized skills** – Highly specialized skills of industry participants that cannot be utilized in other industries tend to be an impediment to leaving the industry.

- **High fixed costs** – High levels of dedicated fixed costs tend to be an impediment to leaving an industry.

**Types of Funding**

In Malaysia the development of agriculture was given high weightage by supporting the industry players. The support for agriculture industry players is given in terms of marketing, storage, funding and many more. The funding for agriculture industry is provided according to the applicant capability. The AgroBank works together with government to provide financial assistance to the agriculture industry players.
AgroBank is a Government-linked-Company (GLC) under the Minister of Finance Incorporated (MFI). The bank’s financing of the agricultural sector is driven by a policy set forth by the Ministry of Agriculture and Agro-based Industry.

Credit Guarantee Scheme
The main objective of this scheme is to assist agriculture entrepreneurs who have viable projects, but lack of collateral to obtain the required loans/financing amount. This will help those who would like to start a new venture.

Eligible Credit Facilities
- Eligible loans/financing facilities are granted to those without any collateral (i.e. “cleanloans”) and those, which are partially secured.
- Loans/financing that is fully secured is not eligible for guarantee cover.
- The guarantee is applicable only for new or additional loans.
- Existing non-CGC loans shall not be eligible for guarantee unless additional loans are granted.

Fund for Food (3F)
Fund for Food (3F) was launched by the Government in 1993, and as of today the Government has allocated RM1 billion for this fund. The objective of this fund is to support the Government’s efforts to promote investment in the food production activities at reasonable cost. Since the establishment of the scheme, the criteria for loans has been liberalized, the interest rates reduced (from 7.75 to 4 per cent per annum) and the size of the loans has been increased. To further encourage the private sector to expand the production of agricultural products and livestock, the fund has been expanded to RM600 million. The scheme provides financing at a reasonable cost, covering:
• Primary food production (including freshwater and marine seafood, animal husbandry, vegetables and fruit);
• Related food products covering mainly processed food, provided the food raw materials are from domestic sources;
• The efficient distribution of food and food products.

Individuals or companies can obtain financing up to 90% of the project costs for a maximum of eight years beginning from the first drawdown date of the funds from Bank Negara. Small, medium- and large-size food projects are eligible to apply for the financing. The size of projects which Bank Negara will fund is from RM10,000 up to RM3 million. However, exceptions are possible.

Export Credit Refinancing Scheme of Bank Negara
The Export Credit Refinancing Scheme (ECR) was designed specifically to meet the needs of exporters. It is aimed to promote the exports of manufactured and agricultural products that have significant value-added and that utilize local indigenous resources. Agricultural products include livestock, fish, prawns, fruit, vegetables and flowers. In short, it is a reference to items in section I and II of the Harmonized Commodity Description and Coding System. ECR provides short-term credit at a preferential rate of interest to enable Malaysian exporters to price their
export products competitively in the international markets. Two ECR schemes are operated by commercial banks. Bank Negara refines those banks.

A pre-shipment ECR facility provides working capital, both for direct and indirect exporters. Indirect exporters are domestic suppliers of inputs to final exporters. The maximum period of financing for pre-shipment will require four months. A post-shipment ECR facility enables Malaysian exporters to obtain immediate funds upon the shipment of eligible goods sold on credit terms. The maximum period of financing for post-shipment is six months.

It should be noted that not all products are eligible for the ECR. Only products that are not listed on the "negative list" are eligible for the ECR. Furthermore, eligible products should comply with the minimum value-added to 20 percent and a minimum of 30 percent domestic resource content criteria. Crude palm oil, rubber, vegetable oil products, agricultural food products and textile products are exempted from those requirements.

Micro Credit Scheme
Provide credit to micro entrepreneurs to carry out economic activities in the sectors of agriculture and agro-based activities covering all stages of production, processing, services, marketing and consumer needs under the allocation of funds by Bank Negara Malaysia (BNM). The loans apply for up to RM50,000.

MYAGROSIS
MyAgrosis, or the Agriculture Graduate Entrepreneurs Club, was recently launched on Saturday, 17 December 2011 by Malaysian Prime Minister Datuk Seri Mohd Najib Tun Abdul Razak. The MyAgrosis would be able to take tertiary institutions to the core of the country's food production as well as help the country tackle its food import deficit.

With a high cost of living due to the cost of food in the country, the population is burdened with a future of steadily rising prices of basic necessities. However, with an increase in food production, through the efforts of MyAgrosis, this problem may ease
many Malaysians in their day-to-day lives. MyAgrosis also received an allocation of RM30 million to help the development of its programme.

Agriculture and agro-based industry through its agencies: FAMA, AgroBank, and TEKUN to assist in food production. Therefore, of the total RM30 million, RM10 million will go to AgroBank to provide guarantor-free loan scheme to MyAgrosis members with a ceiling amount of RM30,000 to venture into agribusiness. The rest of the amount will be allocated to Tekun Nasional and the Ministry of Agriculture and Agro-based Industry, with an allocation of RM10 million each. Tekun will provide funds for MyAgrosis participants while the ministry will provide facilities for MyAgrosis programmes such as hydroponics and water supply systems. The new allocation for AgroBank brings the bank’s total fund for the program to RM20 million.

Paddy Cash-I
Providing easy financing to farmers to finance daily needs and other personal use as follows:

- Buying land
- Renting/leasing of land rice
- Levelling of paddy land
- Children’s education
- Home repair and purchase equipment/furniture home
- Purchase of agricultural machinery and motor vehicle/motorcycle
- Other uses and family farmers
Total funding for this scheme is the maximum aggregate amount of financing is RM50,000 and the minimum amount of RM3,000.

**Project Financing**
To provide financing of primary agriculture activities such as fisheries, forestry, and horticulture for production, processing, and marketing activities. The company must be Malaysian-owned Company with minimum ownership of 51 partnership or sole proprietor. The bank prefers to the customer who had at least three years of business track record or history.

**Tasks (Sawit-i)**
This scheme known as “Skim Tanaman Semula Kelapa Sawit” (TASKS). This scheme will provide financing for replanting of palm oil and increase the existing planting area.

Eligibility: -
- Individual smallholder/government agency managing small holders and companies with paid up capital of less than RM2.5 million
- Individual with land area of 0.28 up to 4.0 hectares
- Oil palm of more than 25 years of age or no longer economic

**Agricultural Entrepreneur Loan Fund (DPUP)**
Agricultural Entrepreneur Loan Fund (DPUP) is a term loan facility specifically for Small-Medium Enterprises (SMEs) involved in agricultural based activities which include production, processing, marketing and biotechnology activities. DPUP can provide the financing amount from RM10,000 up to RM10 million with the maximum of 10 years repayment periods.

Eligibility: -
- Individual
- Partnership
- Company
- Malaysian-owned company (minimum ownership of 51%)
Letter of Credit-

LC-i is written to undertake issued by the bank to the supplier (beneficiary) upon request by the buyer (applicant). The bank undertakes to make payment at a determinable future date upon presentation of stipulated documents and upon compliance of the LC-i terms and conditions.

Bumiputera Entrepreneurs Project Fund (TPUB)

The establishment of TPUB with an allocation of RM300 million to assist small and medium scale Bumiputera entrepreneurs. The main objective of TPUB is to provide financing at a reasonable cost to enable Bumiputera entrepreneurs who are facing difficulty in obtaining financing from financial institutions to undertake new projects or continue the viable project in hand. This will lead to the revival of the Bumiputera entrepreneurs and ensure that their continued involvement in the business. Ultimately, the establishment of TPUB is targeted towards maintaining the survival of the current pool of Bumiputera entrepreneurs. The scope of TPUB assistance will cater all economic sectors including construction, supply, manufacturing and service sectors. In line with its objective of assisting Bumiputera entrepreneurs, the interest chargeable for the loan under TPUB is 5.0% per annum.

Low Intensity Tapping System (LITS)

LITS is to increase the income of rubber smallholders through increased revenue tapping and overcome the shortage of rubber tappers. Under this scheme RM1,000 will be given for per hectare with 12-month tenure. The rubber land area must be in excess of 4 hectares to 40.5 hectares. The interest rate is about 3% per annum.
Conclusion

The agricultural sector also has to face the challenge of natural problems. Malaysia never had a comparative advantage in the production of food. Clearly, it is time to look at young and low productive farmers in a completely new way as it is not charity cases, but as people whose innovation, dynamism and hard work will bring prosperity to their communities and greater food security to the world in the decades ahead.

Exercises/Activity
Discuss types of financing in agribusiness projects and explain what are the challenges and barriers faced by most of the projects.

Answer (Key Points)
1. Tekun Financing Scheme
2. Youth Agriculture Scheme under AgroBank program
3. Loan by SME factory
4. Challenges and barriers
   a. Inadequate number of beneficiaries
   b. Uneven distribution of agricultural credit
   c. Low level of monitoring and evaluation of implementation
This chapter describes elements in project management. Project management keeps track for the planning, scheduling and controlling of project activities, subject to resource, budget, and time constraints. In today’s competitive business world, managers have to deliver results on time and within budget. Project management able to achieve this by focusing on priorities, tracking performance, overcoming barriers, and adapting to change. Thus, effectively managing agribusiness project will maximize the performance and ensure the best results of the project.

Upon completion of this chapter you will be able to:

1. Understand project management process.
2. Understand basic functions and components in project evaluation.
3. Establish a CPM/PERT to manage a project.
TOPIC 9: PROJECT MANAGEMENT

1. Project management process
2. Network management technique
3. Network analysis

Main points

Project Evaluation Tools

In every project presentation, the creativity aspect usually will give high weightage. There are several ways that we can present and express our project to explain to the target audience in a better way. The use of visualization aids for project presentation is the best way to explain about the projects. The examples of visualization aids are graphs (schedules), trees like work breakdown structure (WBS), and tables (resources). The time frame of each project will be expressed by Gantt chart. The work schedule needs to be planned and developed carefully because it is the cornerstone in many project management tools. The schedule chart is a chart where graphically shows dependencies of tasks and milestones. There are two techniques commonly used in project management, namely Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM).

Gantt Chart

Gantt chart is a bar type chart which illustrates the start and finish dates of the individual activity and summary elements of a project. Graphical technique that shows the amount of time required for each activity and the sequence in which the activities are to be performed. It is a chart that shows project activities and tasks in parallel. It enables a project manager to understand which tasks can be performed concurrently. Figures 9.1, 9.2, and 9.3 show examples of charts that can be used to show breakdown of tasks or activities, costs, and time which are required to complete a project.
Figure 9.1: Gantt Chart

Figure 9.2: Total Program Cost Breakdown
Developing Project Plan

The Project Network
The project network is a flow chart that graphically depicts the sequence, interdependencies, and start and finish times of the projected job that plan the activities through the critical path network model. It is called as a Project Evaluation Review Technique (PERT). PERT is a statistical tool, used in project management, which is considered to analyse and represent the activities that involved in completing a given project. The benefits of PERT are:

- Provides the basis for scheduling, labour, and equipment.
- Enhances communication among project participants.
- Provides an estimate of the project’s duration.
- Provides a basis for budgeting, cash flow.
- Identifies activities that are critical.
- Highlights activities that are “critical” and cannot be delayed.
- Help managers get and stay on plan.
In this analysis, a PERT chart assumes normal distribution of task durations. This chart helps to figure out the critical path and assist in critical path analysis (Figure 9.4).

**Figure 9.4: Example of PERT**

**Airplane Design Process**

**Critical Path Method (CPM)**

Critical Path Method or commonly known as CPM is the technique developed by J. E. Kelly and M. R. Walker to schedule preventative maintenance shutdowns of chemical processing plants in 1950s. It is an important tool for effective project management. CPM identifies the longest time-consuming path through a network of tasks required to complete a project. CPM will let the manager know about “the longest path from the beginning event to the end event”. It is also the shortest expected time in which the entire project can be completed. Delays on the critical path will delay completion of the entire project.

**Constructing a Project Network**

There are several terminologies in a project network as follows:

i. **Activity**
   
   An activity is an element in the project that requires time. It is represented as a "node" (box).
ii. **Predecessor and successor activity**

Predecessor activity is an activity that determines the start date or finish date of a successor activity based on a logical relationship. A successor activity is an activity that succeeds another activity (which is called a predecessor activity). A successor activity is dependent on the predecessor activity and usually cannot start without the predecessor activity being finished.

Example: Let’s say a farmer wants to replace his crop in farm because the plant it’s old and not productive anymore. The first thing that he needs to do is to remove the old crop, and after that he can start replanting new crop. So he has two activities:

- Activity 1: Removing old crops
- Activity 2: Replanting new crop

Since Activity 2 can only start after Activity 1 is done. So Activity 2 is called as a successor activity, and activity 1 as a predecessor activity.

iii. **Merger activity**

Merger activity is an activity that has two or more preceding activities on which it depends. This means that merge activity is an activity where two or more activities merge together. For example, let’s say we have three activities: Activity A, Activity B, and Activity C. If Activity C is a successor of Activity A and Activity B, then this means that Activity C is a merger activity.

iv. **Parallel (Concurrent) Activities**

Activities that can occur independently and, if desired, not at the same time. When two or more activities that performed at the same time, without disturbing the performance of the either one is called as parallel activities.
v. Path
Path is a sequence of connected, dependent activities.

vi. Critical path
The longest path through the activity network that allows for the completion of all project-related activities; the shortest expected time in which the entire project can be completed. Delays on the critical path will delay completion of the entire project.

\[ \text{Critical path: } A + B + D \]

vii. Event
Event is a point in time when an activity is started or completed. It does not consume time.

viii. Burst activity
An activity that has more than one activity immediately following it (more than one dependency arrow flowing from it).

ix. Two approaches
- Activity-on-Node (AON) - Uses a node to depict an activity.
- Activity-on-Arrow (AOA) - Uses an arrow to depict an activity.

Basic Rules to Follow in Developing Project Networks

1. Networks typically flow from left to right.
2. An activity cannot begin until all preceding connected activities are complete.
3. Arrows indicate precedence and flow and can cross over each other.
4. Each activity must have a unique identifier number that is greater than any of its predecessor activities.
5. Looping is not allowed.
6. Conditional statements are not allowed.
7. Use common start and stop nodes.

**Activity-on-Node (AON) Fundamentals**

(A) A is preceded by nothing
    B is preceded by A
    C is preceded by B

(B) X is a burst activity
    Y and Z are preceded by X
    Y and Z can begin at the same time, if you wish

(C) M is a merge activity
    J, K, & L can all begin at the same time, if you wish (they need not occur simultaneously)
    but
    All (J, K, L) must be completed before M can begin

(D) Z is preceded by X and Y
    AA is preceded by X and Y
### Koll Business Center: Network Information

#### KOLL BUSINESS CENTER
County Engineers Design Department

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Preceding Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Application approval</td>
<td>None</td>
</tr>
<tr>
<td>B</td>
<td>Construction plans</td>
<td>A</td>
</tr>
<tr>
<td>C</td>
<td>Traffic study</td>
<td>A</td>
</tr>
<tr>
<td>D</td>
<td>Service availability check</td>
<td>A</td>
</tr>
<tr>
<td>E</td>
<td>Staff report</td>
<td>B, C</td>
</tr>
<tr>
<td>F</td>
<td>Commission approval</td>
<td>B, C, D</td>
</tr>
<tr>
<td>G</td>
<td>Wait for construction</td>
<td>F</td>
</tr>
<tr>
<td>H</td>
<td>Occupancy</td>
<td>E, G</td>
</tr>
</tbody>
</table>

### Koll Business Center: Partial Network

![Network Diagram](https://via.placeholder.com/150)
Network Computation Process

- **Forward Pass - Earliest Times**
  - How soon can the activity start? (Early Start - ES)
  - How soon can the activity finish? (Early Finish - EF)
  - How soon can the project finish? (Expected Time - ET)

- **Backward Pass - Latest Times**
  - How late can the activity start? (Late Start - LS)
  - How late can the activity finish? (Late Finish - LF)
  - Which activities represent the critical path?
  - How long can an activity be delayed? (Slack or Float - SL)

**Earliest Times and Latest Times**

- **Early Start Schedule**
  - The earliest time that each activity in the project can be started.
    - Early Start (ES): the earliest possible time an activity can begin.
    - Early Finish (EF): the early start time plus the time needs to complete the activity.
Late Start Schedule

- The latest start time that each activity can be started without affecting the overall completion time.
  - Late Finish (LF): the latest time an activity can end without delaying the project.
  - Late Start (LS): the late finish time minus the time needed to complete the activity.

### Koll Business Center: Network Information with Activity Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Preceding Activity</th>
<th>Activity Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Application approval</td>
<td>None</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>Construction plans</td>
<td>A</td>
<td>15</td>
</tr>
<tr>
<td>C</td>
<td>Traffic study</td>
<td>A</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>Service availability check</td>
<td>A</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>Staff report</td>
<td>B, C</td>
<td>15</td>
</tr>
<tr>
<td>F</td>
<td>Commission approval</td>
<td>B, C, D</td>
<td>10</td>
</tr>
<tr>
<td>G</td>
<td>Wait for construction</td>
<td>F</td>
<td>170</td>
</tr>
<tr>
<td>H</td>
<td>Occupancy</td>
<td>E, G</td>
<td>35</td>
</tr>
</tbody>
</table>
Critical Path Method (CPM)

- How long it takes to complete the project?
  - 235 days
- Find the CPM.
  - $A + B + F + G + H$
  - $5 + 15 + 10 + 170 + 35$
  - 235 days
Activity-on-Node (AON) Network Forward Pass

Forward Pass Computation

- Add activity times along each path in the network (ES + Duration = EF).
- Carry the early finish (EF) to the next activity where it becomes its early start (ES) unless...
- The next succeeding activity is a merge activity, in which case the largest EF of all preceding activities is selected.
Activity-on-Node (AON) Network Backward Pass

Backward Pass Computation

- Subtract activity times along each path in the network (LF - Duration = LS).
- Carry the late start (LS) to the next activity where it becomes its latest finish (LF) unless
  - The next succeeding activity is a burst activity, in which case the smallest LF of all preceding activities is selected.

Slack

Slack time is the amount of time the starting of an activity can be delayed without affecting the earliest completion date of the overall project. It's also known as 'float'.

Formula: -

\[ \text{Slack} = \text{LS} - \text{ES or LF} - \text{EF} \]
Activity-on-Node Network with Slack

Activity-on-Arrow (AOA) Network

Activity-on-Arrow Network Building Blocks
Activity-on-Arrow (AON) Network Fundamentals

(A)

Y is preceded by X

(B)

U is preceded by R, S, T
R, S, T can occur concurrently, if you wish

(C)

N and O are preceded by M
When M is complete, N and O can occur concurrently, if you wish

CPM with Three Activities Time Estimates

\[ ET = \frac{to + 4tm + tp}{6} \]

Where,
- \( ET \) = expected time
- \( to \) = optimistic time - no hurdles of complications arise
- \( tm \) = most likely time - the time in which the activity is most likely to be completed
- \( tp \) = pessimistic time - the time required if unusual complication and/or unforeseen circumstance/difficulties arise
Example:

### Expected Time (ET)

<table>
<thead>
<tr>
<th>Activity (week)</th>
<th>Optimistic time (to)</th>
<th>Most likely time (tm)</th>
<th>Pessimistic time (tp)</th>
<th>Expected time/Average time (ET) = (to + 4tm + tp) / 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerical description</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a 1-2</td>
<td>9</td>
<td>12</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>b 1-3</td>
<td>6</td>
<td>12</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>c 2-4</td>
<td>1</td>
<td>1.5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>d 3-4</td>
<td>4</td>
<td>8.5</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>e 2-5</td>
<td>4</td>
<td>6</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>f 4-5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### Network Diagram (AOA)

![Network Diagram (AOA)](image)
Conclusion

In a nutshell, you will have gained knowledge and learning the fundamental concepts of a project management process and understand to interpret large project with many activities. Understand the process of PERT/CPM enables you to achieve best result by focusing on priorities, tracking performance, and adapting to change leads to a successful project.

Exercises/Activity

Diagram 1 and Diagram 2 show Activity-on-Node (AON) for Activity A, B, C, D, E, F, G, and H. Explains the fundamentals of those activities.

Question 1

Diagram 1 and Diagram 2 show Activity-on-Node (AON) for Activity A, B, C, D, E, F, G, and H. Explains the fundamentals of those activities.

Question 2

Table below shows details of Ecopark and Ride Project

<table>
<thead>
<tr>
<th>Activity ID</th>
<th>Description</th>
<th>Predecessor</th>
<th>Time (Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Survey</td>
<td>None</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>Soils report</td>
<td>A</td>
<td>20</td>
</tr>
<tr>
<td>C</td>
<td>Traffic design</td>
<td>A</td>
<td>30</td>
</tr>
<tr>
<td>D</td>
<td>Lot layout</td>
<td>A</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>Approve design</td>
<td>B, C, D</td>
<td>80</td>
</tr>
<tr>
<td>F</td>
<td>Illumination</td>
<td>E</td>
<td>15</td>
</tr>
</tbody>
</table>
Residents of Bandar Baru Bangi are requesting Bandar Baru Bangi Council for an ecopark and ride project. One of the requirements in the request application is a network plan for the design phase of the project. En. Helmi, the Chief Engineer, wants you to develop a project network plan to meet this requirement. He has gathered the activity time estimates and their dependencies are shown in table 1. Based on the information available, answer the following questions:

1. Draw the project network using an AON network
2. How many days will the project take?
3. Complete the forward and backward pass (ES, EF, LS and LF)
4. Compute slack. Why a project manager needs to compute the slack?
5. What is Critical Path? Identify the Critical Path (CPM) for the project.

### Question 3

<table>
<thead>
<tr>
<th>Activity</th>
<th>Optimistic Time</th>
<th>Most Likely Time</th>
<th>Pessimistic Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>8</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Y</td>
<td>7</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>P</td>
<td>4</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>10</td>
<td>17</td>
</tr>
</tbody>
</table>

Calculate expected time (ET) for each activity. Which activity has the shortest time? Show your calculation.

### Answer

Note: All answers will be discussed and explained in the tutorial classes.
UNIT 10
PROJECT ORGANISATION

Introduction

This chapter describes different types of organisation structure and highlights the advantages and disadvantages of each type of project organisation. Majority of organisations executes projects. These projects can be long or short term projects, large or small scale projects, or it provides services to agriculture or manufacturing based sector. Therefore, to ensure that the project runs smoothly and achieved its goal that is decided by the top level management, the organisation needs to be a systematic organisation.

Objective

Upon completion of this chapter, you will be able to:

1. Identify and describe different types of organisation.
2. Identify advantages and disadvantages of different types of organisation.
3. Develop practical and effective ways in managing the project.
TOPIC 10: PROJECT ORGANISATION

1. Types of organisation
2. Matrix organisation
3. Project arrangement in organisation

Main points

The organisation is known as a social structure of people that is structured and managed to meet a need or to pursue mutual goals. All organisations have a management structure that determines the relationships between the different activities within the members, assigning roles and subdivision, responsibilities, and authority to carry out different tasks.

A project organisation is a structure that facilitates the coordination and implementation of project activities. Its main reason is to create an environment that adopts and interact among the team members with a minimum amount of disturbances, overlaps and conflict. One of the important decisions of project management is to form the organisational structure that will be used for the project. Each project has its unique characteristics and the design of an organisational structure should consider the organisational environment, the project characteristics in which it will operate, and the level of authority the project manager is given. A projecting structure can take on various forms that have advantages and disadvantages.

One of the main objectives of the structure is to reduce uncertainty and confusion that typically occur in the project initiation phase. The structure defines the relationships among members of the project management and the relationships with the external environment. The structure also defines the authority by means of a graphical illustration called an organisation chart. Usually there are three types of project organisation, which is known as functional, project and matrix.
Functional Organisation

Functional organisation is used in businesses that sell and produce standard products. In each group consists of individuals performing the same function. For example, in production unit everyone will focus on producing the product at the same quality. Periodically undertake in-house projects. Team members can be assigned to the new project at the same time they continue their regular functional jobs. In this type of organisation, the project manager does not have complete authority over the team. Figure 10.1 shows an example of functional organization chart.

Figure 10.1: Functional Organisation Chart
Advantages
The advantages of functional organisation are reduced the duplication and overlap of activities. The duplication and overlap of activities in an organisation can lead to conflicts among the employees. It also provides the specialization and functional excellence, which the employee will become an expert in his/her job.

Disadvantages
There are some disadvantages in functional organisation as well. It can lead the employee to be narrow-minded. They just focus in their job and ultimately the teamwork is not emphasized much in the organisation. The decision making will be unsophisticated. The decision maker might focus on one unit and is careless on others units wellbeing. The focus on customer might become less importance and all the unit focus on their own task. The employee might be stronger to have commitment to different function other than project. The attention on project development will be lesser.

Project Organisation
Project organisation structure refers to the formation of an independent project team. The team’s management split from the parent organisation’s to other units, to have their own technical staff and management, to assign certain resources to project team, and grant project manager to implement the project freely. The structures used for companies that involve in project business are not for selling products. Since it splits out from parent organisation, the organisations will be able to work on multiple projects at the same time. The project team is dedicated to one project and project manager has complete authority over the team. Figure 10.2 shows example of project organisation chart.
**Figure 10.2: Project Organisation Chart**

---

**Advantages**
The advantages of project organisation structure are first, the project team has full control over the resources. The project manager focuses on this project team, solely and is responsible for the project; the only task for project members is to complete the project. The project team member will report to the project manager to avoid multiple leaderships. The project team’s decision is to develop the project within the shortest time. In this structure, the project team members work with strong power and high cohesion to participants and shared in the common goal of the project while having clear responsibilities for the individual. The organisation is highly responsive to customer.

**Disadvantages**
The disadvantage of project organisation structure is when a company has several projects; each project has its own separate team, which will lead to duplication of efforts and the loss of scalable economies. The costs involved in this structure can be inefficient. There is possible to stretch out the work during slow periods.
The project team itself is an independent entity which is prone to a condition known as “Project inflammatory” disease. This makes a clear divided line between the project team and the parent organisation that weaken the integration of the effective project team and the parent organisation. The knowledge transformation might be at low level. There is a possibility of duplication of concurrent projects. The project team members having a lack of a business continuity and security, once the project is finished and return to their original functions would be more difficult. The people that involve in the project may layoff at the end of the project.

Matrix Organisation
Matrix organisation structure is a hybrid form; it’s a mix of functional and project organisation structures. Matrix organisation structure that used by companies, work on multiple projects at a time and it provides project and customer focus. In matrix structure, the expertise on functional will remain intact. The individuals in an organisation can be assigned to various types of projects. Both the project managers and functional managers have responsibilities over the project. The project manager is the intermediary between customer and company, whereas the functional manager decides how tasks will be accomplished. Figure 10.3 shows example of matrix organisation chart.

Figure 10.3: Matrix Organisation Chart
Advantages
The advantage of the matrix organisational structure is the same as functional structure that the resources can be shared with multiple projects, which can be significantly reduced the problem of redundant staff. In other words, the resources will be utilized efficiently. When there are multiple projects simultaneously, the company can balance the resources to ensure that all the projects can progress to complete their respective costs and quality requirements. The project is the focus of work, with a formal designated project manager will make him give more attention to the project, and responsible for the coordination and integration of the work between different units. The individuals can be moved between projects. The communication among team members with project and functional managers can be improved, which will facilitate the information flow among the team members. The needs of customers were well focused with providing a core of functional expertise.

Disadvantages
The disadvantage of matrix organisational structure is the matrix structure that has intensified the tensions between functional manager and project manager. The team members have a dual reporting relationship. It needs to be a proper balance of power that must be established between project and functional managers. In the process of project implementation, the project manager must negotiate and consult within the department managers on various issues, which lead to the delay in decision making. Since there are two bosses, the conflicts regarding priorities can arise between managers.

Conclusion
In a nutshell, understanding each style of organisational functions is useful to identify the strengths and weaknesses in every level of work expertise. As we know, the most crucial part to be utilized optimally is resourced either physical or human resources. Each of functional organisations should clarify their task and role of the manager of the team work and this can improve work performance in managing projects and minimize a risk.
Exercise/Activity

Discuss two advantages and two disadvantages of functional organization.

Answer

Advantages

- Reduces the duplication and overlap of activities
- Provides the specialization and functional excellence

Disadvantages

- Some staff are narrow-minded
- Decision making will be unsophisticated