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Activity 04

Software Project Management

2025-2026

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In-Class Activity: Project selection, financial models

Students will evaluate three distinct project proposals using financial selection models and recommend the most viable investment.

A- Scenario: about the organization

AlManar Group is a mid-sized Saudi enterprise operating across retail, logistics, and digital services. With a growing footprint in the GCC region, the company is undergoing a strategic transformation to enhance operational efficiency, embrace sustainability, and invest in digital innovation.

Strategic Goals for 2025–2030:

- **Sustainability Leadership:** Reduce carbon footprint and align with Vision 2030 environmental targets.
- **Digital Transformation:** Improve customer experience and internal processes through AI and automation.
- **Operational Excellence:** Streamline workflows and integrate systems to support scalable growth.

B- Investment Decision Simulation

You are part of AlManar Group's **Strategic Investment Committee**, tasked with evaluating three proposed projects. Each project aligns with a different strategic pillar:

- **Project X – AI Chatbot for Customer Service**

  Strategic Focus: Digital transformation and customer engagement

  Goal: Reduce response time, improve satisfaction, and cut support costs

- **Project Y – Solar Panel Installation**

  Strategic Focus: Sustainability and long-term cost savings

  Goal: Lower energy costs, reduce emissions, and enhance brand reputation

- **Project Z – ERP System Upgrade**

  Strategic Focus: Operational efficiency and data integration

  Goal: Improve decision-making, reduce manual errors, and support growth

Project Scenarios and financial projections

Year	Project X: AI Chatbot for Customer Service	Project Y: Solar Panel Installation	Project Z: ERP System Upgrade
0	-400,000 SAR	-600,000 SAR	-500,000 SAR
1	80,000 SAR	100,000 SAR	120,000 SAR
2	120,000 SAR	150,000 SAR	180,000 SAR
3	200,000 SAR	200,000 SAR	250,000 SAR
4	250,000 SAR	250,000 SAR	300,000 SAR
5	300,000 SAR	300,000 SAR	350,000 SAR

Assumptions:

- Required rate of return: 8%
- Inflation rate: 3%

C- Tasks

1. **Payback Period**
   - Calculate the number of years needed to recover the initial investment for each project using the payback period then using the discounted payback period.
   - Rank the projects by speed of recovery.

2. **Net Present Value (NPV)**
    - Calculate NPV for each project at the end of the fifth year.
    - Discuss which project adds the most value.
3. **Strategic Reflection**

- Which project aligns best with long-term strategic goals?

My Solution

1. Payback Period

The payback period determines how long a project takes to recover its initial investment and reach the break-even point. A shorter payback period is preferred.

Project X: AI Chatbot

Year	Cash flow	Cumulative cash flow
0	−400,000	−400,000
1	80,000	−320,000
2	120,000	−200,000
3	200,000	0

The full initial investment is recovered at the end of Year 3.

Payback Period for X = 3 years

Project Y: Solar Panel Installation

Year	Cash flow	Cumulative cash flow
0	−600,000	−600,000
1	100,000	−500,000
2	150,000	−350,000
3	200,000	−150,000
4	250,000	100,000

At the end of Year 3, SAR 150,000 remains unrecovered. Project Y generates SAR 250,000 during Year 4.

$$\text{Payback Period} = 3 + \frac{150{,}000}{250{,}000}$$

Payback Period for Y $= 3.6$ years

Project Z: ERP System Upgrade

Year	Cash flow	Cumulative cash flow
0	−500,000	−500,000
1	120,000	−380,000
2	180,000	−200,000
3	250,000	50,000

At the end of Year 2, SAR 200,000 remains unrecovered. Project Z generates SAR 250,000 during Year 3.

$$\text{Payback Period} = 2 + \frac{200{,}000}{250{,}000}$$

Payback Period for Z $= 2.8$ years

Payback Period Ranking

Rank	Project	Payback period
1	Project Z	**2.8 years**
2	Project X	**3 years**
3	Project Y	**3.6 years**

Therefore, **Project Z has the fastest regular payback period**.

2. Discounted Payback Period

The discounted payback period considers the time value of money. According to the slides, each cash flow is discounted using the required return plus inflation:

$$PV_t = \frac{CF_t}{(1 + r + p)^t}$$

Therefore:

$$PV_t = \frac{CF_t}{(1.11)^t}$$

Discounted Cash Flows

Year	Project X	Project Y	Project Z
1	72,072.07	90,090.09	108,108.11
2	97,394.69	121,743.36	146,092.04
3	146,238.28	146,238.28	182,797.85
4	164,682.74	164,682.74	197,619.29
5	178,035.40	178,035.40	207,707.96

Project X: Discounted Payback

After Year 3, the cumulative discounted cash inflow is:

$$72{,}072.07 + 97{,}394.69 + 146{,}238.28 = 315{,}705.04$$

The amount still unrecovered is:

$$400{,}000 - 315{,}705.04 = 84{,}294.96$$

The discounted cash flow in Year 4 is SAR 164,682.74:

$$\text{Discounted Payback} = 3 + \frac{84{,}294.96}{164{,}682.74}$$

$$\text{Discounted Payback for X} = 3.51 \text{ years}$$

Project Y: Discounted Payback

After Year 4, the cumulative discounted cash inflow is:

$$90{,}090.09 + 121{,}743.36 + 146{,}238.28 + 164{,}682.74 = 522{,}754.47$$

The amount still unrecovered is:

$$600{,}000 - 522{,}754.47 = 77{,}245.53$$

The discounted cash flow in Year 5 is SAR 178,035.40:

$$\text{Discounted Payback} = 4 + \frac{77{,}245.53}{178{,}035.40}$$

$$\text{Discounted Payback for Y} = 4.43 \text{ years}$$

Project Z: Discounted Payback

After Year 3, the cumulative discounted cash inflow is:

$$108{,}108.11 + 146{,}092.04 + 182{,}797.85 = 436{,}998$$

The amount still unrecovered is:

$$500{,}000 - 436{,}998 = 63{,}002$$

The discounted cash flow in Year 4 is SAR 197,619.29:

$$\text{Discounted Payback} = 3 + \frac{63{,}002}{197{,}619.29}$$

$$\text{Discounted Payback for Z} = 3.32 \text{ years}$$

Discounted Payback Ranking

Rank	Project	Discounted payback period
1	Project Z	**3.32 years**
2	Project X	**3.51 years**
3	Project Y	**4.43 years**

After considering the time value of money and inflation, **Project Z still recovers its investment the fastest**.

3. Net Present Value

NPV measures the value added by a project after discounting all future cash flows and subtracting the initial investment.

According to our slides:

$$NPV = -I + \sum_{t=1}^{5} \frac{F_t}{(1 + r + p)^t}$$

Where:

- F_t= net cash flow during period t
- p= inflation rate
- r= required rate of return
- I= initial investment

A higher NPV indicates a more financially attractive project.

Project X: NPV

$$NPV_X = -400{,}000 + \frac{80{,}000}{1.11} + \frac{120{,}000}{1.11^2} + \frac{200{,}000}{1.11^3} + \frac{250{,}000}{1.11^4} + \frac{300{,}000}{1.11^5}$$

$$NPV_X = -400{,}000 + 658{,}423.18$$

$$NPV_X = 258{,}423.18 \text{ SAR}$$

Project Y: NPV

$$NPV_Y = -600{,}000 + \frac{100{,}000}{1.11} + \frac{150{,}000}{1.11^2} + \frac{200{,}000}{1.11^3} + \frac{250{,}000}{1.11^4} + \frac{300{,}000}{1.11^5}$$

$$NPV_Y = -600{,}000 + 700{,}789.87$$

$$NPV_Y = 100{,}789.87 \text{ SAR}$$

Project Z: NPV

$$NPV_Z = -500{,}000 + \frac{120{,}000}{1.11} + \frac{180{,}000}{1.11^2} + \frac{250{,}000}{1.11^3} + \frac{300{,}000}{1.11^4} + \frac{350{,}000}{1.11^5}$$

$$NPV_Z = -500{,}000 + 842{,}325.25$$

$$NPV_Z = 342{,}325.25 \text{ SAR}$$

NPV Comparison

Rank	Project	PV of cash inflows	Initial investment	NPV
1	Project Z	842,325.25	500,000	**342,325.25 SAR**
2	Project X	658,423.18	400,000	**258,423.18 SAR**
3	Project Y	700,789.87	600,000	**100,789.87 SAR**

All three projects have positive NPVs, which means that all three are financially acceptable. However, **Project Z adds the most financial value** because it has the highest NPV of SAR 342,325.25.

4. Strategic Reflection

Each project supports one of AlManar Group's strategic goals:

- **Project X** supports digital transformation by using AI to improve customer service, reduce response times, increase customer satisfaction, and lower support costs.
- **Project Y** supports sustainability leadership by reducing energy costs and carbon emissions while helping the organization align with Saudi Vision 2030 environmental objectives.
- **Project Z** supports operational excellence by integrating organizational systems, reducing manual errors, improving access to information, supporting decision-making, and enabling scalable growth across the GCC.

Although all three projects offer strategic benefits, **Project Z, the ERP System Upgrade, provides the best overall alignment with AlManar Group's long-term objectives**. It supports operational efficiency and future growth while also producing the highest NPV and the fastest regular and discounted payback periods.

Therefore, the Strategic Investment Committee should select **Project Z** because it offers the strongest combination of financial value, fast investment recovery, improved organizational efficiency, and long-term strategic benefits.