IIM

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Project Selection

Types of Project Selection Models

- **Nonnumeric models**
- **Numeric models**
- These can be used simultaneously

Nonnumeric Models

- Models that do not return a numeric value for a project to be compared with other projects
- These are really not "models" but rather justifications for projects
- Just because they are not true models does not make them all "bad"

Types of Nonnumeric Models

Sacred Cow

- Often suggested by top management
- Maintained until completion or boss terminates it

Operating Necessity

- A project that is required in order to protect lives or property or to keep the company in operation

Competitive Necessity

- A project that is required in order to maintain the company's position in the marketplace

Types of Nonnumeric Models

Product Line Extension

- Project evaluated on fit with existing product line, fills a gap, strengthens a weak link, or extends a line

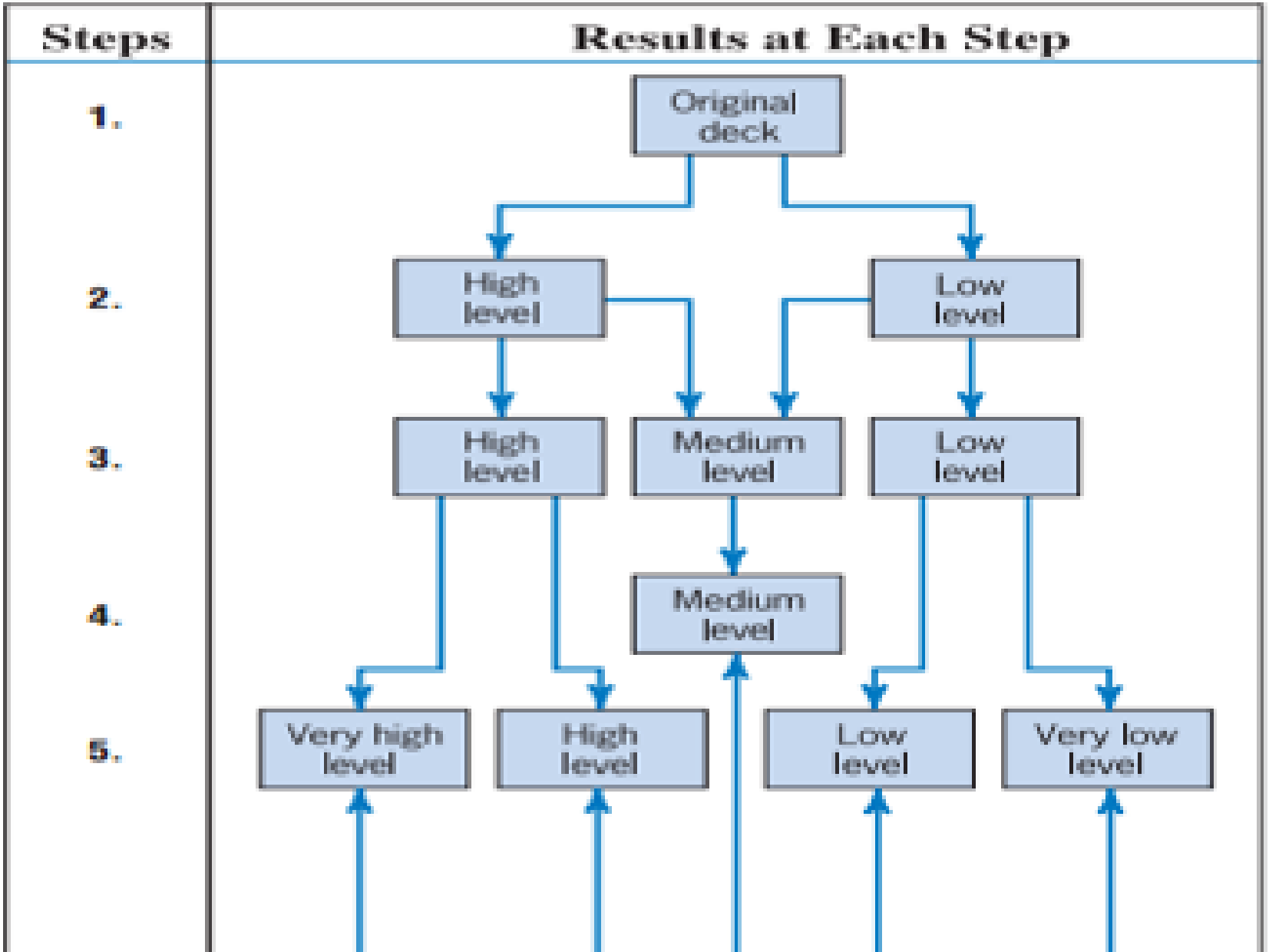
Comparative Benefit

- Projects are subjectively rank ordered based on their perceived benefit to the company

Sustainability

- Focusing on long-term profitability rather than short-run payoff

Q-Sort Method



Numeric Models

- Models that return a numeric value for a project that can be easily compared with other projects
- Major types
  -Profit/profitability
  -Real Options
  -Scoring
  -Window-of-opportunity analysis
  -Discovery-driven planning

Numeric Models: Profit/Profitability

- Models that look at costs and revenues
  -Payback period
  -Discounted cash flow (NPV)

Payback Period

- The length of time until the original investment has been recouped by the project
- A shorter payback period is better
- Firms using this criterion generally specify the maximum acceptable payback period

Payback Period

$$\text{Payback Period} = \frac{\text{Project Cost}}{\text{Annual Cash Flow}}$$

$$\text{Payback Period} = \frac{\$100{,}000}{\$25{,}000} = 4$$

Payback Period Drawbacks

- Does not consider time value of money
- It ignores cash flows beyond the payback period
- It is a measure of project's capital recovery, not profitability
- More difficult to use when cash flows change over time
- Less meaningful for longer periods of time (due to time value of money)

Discounted Cash Flow

- The value of a stream of cash inflows and outflows in today's dollars
- Also know as discounted cash flow or just discounting
- Widely used to evaluate projects
- Includes the time value of money
- Includes all inflows and outflows, not just the ones through payback point

Discounted Cash Flow

- Requires a percentage to use to reduce future cash flows
- This is known as the discount rate
- The discount rate may also be known as a hurdle rate or cutoff rate
- There will usually be one overall discount rate for the company
- NPV Calculation Permits Time Varying Discount Rates
- NPV of a Simple Project Decreases as the Discount Rate Increases

NPV Formula

$$\text{NPV (project)} = A_0 + \sum_{t=1}^{n} \frac{F_t}{(1 + k + p_t)^t}$$

NPV Formula Terms

A_0	Initial cash investment
F_t	Cash flow in time period t (negative for outflows)
k	The discount rate
p_t	Predicted rate of inflation during period t
t	The number of years of life

- A higher NPV is better
- Higher the discount rate lower the NPV

NPV Example

$$\text{NPV (project)} = -\$100{,}000 + \sum_{t=1}^{8} \frac{\$25{,}000}{(1+0.15+0.03)^t}$$

$$= \$1{,}939$$

BENEFIT COST RATIO (OR PROFITABILITY INDEX)

- the net present value of all future expected cash fl ows divided by the initial cash investment
- If this ratio is greater than 1.0, the project may be accepted

$$\text{Benefit-cost ratio: BCR} = \frac{\text{PVB}}{I}$$

$$\text{Net benefit-cost ratio: NBCR} = \frac{\text{PVB} - I}{I} = \text{BCR} - 1$$

- where I= Initial Investment And PVB= Present Value of Benefit

Internal rate of Return

- The internal rate of return (IRR) of a project is the discount rate which makes its NPV equal to zero.
- It is the discount rate which equates the present value of future cash flows with the initial investment.

$$\text{Investment} = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t}$$

- Accept : If the IRR is greater than the cost of capital
  Reject : If the IRR is less than the cost of capital

Numeric Models: Real Options

- Project selection model was developed based on a notion well known in financial markets.
- The opportunities that managers have are called managerial options or real options, as they involve real assets, not financial assets.
- The important types of real options found in capital projects are:
  -To delay the project
  -The option to expand the project
  -The option to contract or abandon the project
  -The option to change the outputs or inputs of the project.
- Positions the organization to capitalize on future opportunities
- Utilized to reduce both technological and commercial risk

Numeric Models: Scoring

- Mimics how managers actually evaluate investments
- Uses multiple criteria

  -Can utilize both monetary and qualitative factors
- Weighted factor scoring model

Unweighted 0–1 Factor Model

- A set of relevant factors is selected by management
- One or more raters score the project on each factor

Unweighted 0–1 Factor Model

Project _____

Rater _____ Date _____

	Qualifies	Does Not Qualify
No increase in energy requirements	x	
Potential market size, dollars	x	
Potential market share, percent	x	
No new facility required	x	
No new technical expertise required		x
No decrease in quality of final product	x	
Ability to manage project with current personnel		x
No requirement for reorganization	x	
Impact on work force safety	x	
Impact on environmental standards	x	
Profitability		
Rate of return more than 15% after tax	x	
Estimated annual profits more than $250,000	x	
Time to break-even less than 3 years	x	
Need for external consultants		x
Consistency with current line of business		x
Inpact on company image		
With customers	x	
With our industry		x
Totals	12	5

Unweighted Factor Scoring Model

- Rating scale used
- The column of scores is summed, and those projects with a total score exceeding some critical value are selected.

Weighted Factor Scoring Model

- Each factor is weighted relative to its importance
  -Weighting allows important factors to stand out
- A good way to include nonnumeric data in the analysis
- Factors need to sum to one
- All weights must be set up, so higher values mean more desirable
- Small differences in totals are not meaningful

Weighted Factor Model Example

	Criteria and Weights							
Alternatives	*Appearance (0.10)*	*Braking (0.07)*	*Comfort (0.17)*	*Cost, operating (0.12)*	*Cost, original (0.24)*	*Handling (0.17)*	*Reliability (0.12)*	$\sum s_{ij}w_j$
Leviathan 8	3 x 0.10 = 0.30	1 x 0.07 = 0.07	4 x 0.17 = 0.68	2 x 0.12 = 0.24	1 x 0.24 = 0.24	2 x 0.17 = 0.34	3 x 0.12 = 0.36	2.23
NuevoEcon	3 x 0.10 = 0.30	3 x 0.07 = 0.21	2 x 0.17 = 0.34	5 x 0.12 = 0.60	4 x 0.24 = 0.96	2 x 0.17 = 0.34	4 x 0.12 = 0.48	3.23
Maxivan	2 x 0.10 = 0.20	1 x 0.07 = 0.07	4 x 0.17 = 0.68	4 x 0.12 = 0.48	3 x 0.24 = 0.72	1 x 0.17 = 0.17	3 x 0.12 = 0.36	2.68
Sporticar 100	5 x 0.10 = 0.50	4 x 0.07 = 0.28	3 x 0.17 = 0.51	2 x 0.12 = 0.24	2 x 0.24 = 0.48	5 x 0.17 = 0.85	2 x 0.12 = 0.24	3.10
Ritzy 300	4 x 0.10 = 0.40	5 x 0.07 = 0.35	5 x 0.17 = 0.85	2 x 0.12 = 0.24	1 x 0.24 = 0.24	4 x 0.17 = 0.68	5 x 0.12 = 0.60	3.36

Advantages of Scoring Models

- Allow multiple criteria
- Structurally simple
- Intuitive and reflect actual thinking process
- Direct reflection of managerial policy
- Easily altered
- Allow for more important factors
- Allow easy sensitivity analysis

Disadvantages of Scoring Models

- Relative measure
- Linear in form
- Can have large number of criteria
- Unweighted models assume equal importance

Numeric Models: Window-of-Opportunity Analysis

- A process where the cost, time, and performance specs are defined that must be met before any RD work

Numeric Models: Discovery-Driven Planning

- Similar to W-o-O
- Funds enough of the project to determine if the initial assumptions were accurate
- Used to learn more about the project, rather than necessarily implement it

Choosing a Project Selection Model

- Weighted scoring models favored:
  -Allow multiple objectives to be considered
  -Easily adapted
  -Not biased toward short-run like the profitability models

Project Portfolio Management (PPM)

- Organizations should maintain portfolios of projects
- Links projects directly to the goals and strategy of the organization
- Means for monitoring and controlling projects

Symptoms of a Misaligned Portfolio

- More projects
- Inconsistent determination of benefits
- Projects that don't contribute to the strategy
- Competing projects
- Costs exceed benefits
- No risk analysis of projects
- Lack of tracking against the plan
- No client for project

Purpose of Project Portfolio Process

- Identify non projects
- Prioritize list of projects
- Limit number of projects
- Identify the real options for each project
- Identify projects with good fit
- Identify co-dependent projects

Purpose of Project Portfolio Process

- Eliminate risky projects
- Eliminate projects that skip the formal selection process
- Keep from overloading the organization
- To balance the resources with needs
- To balance returns
- To balance short-, medium-, and long-term returns

Project Portfolio Process Steps

1. Establish a project council
2. Identify project categories and criteria
3. Collect project data
4. Assess resource availability
5. Reduce the project and criteria set
6. Prioritize the projects within categories
7. Select the projects to be funded and held in reserve
8. Implement the process

Step 1: Establish a Project Council

- Senior management
- The project managers of major projects
- The head of the Project Management Office
- Particularly relevant general managers
- Those who can identify key opportunities and risks facing the organization
- Anyone who can derail the PPP later on

Step 2: Identify Project Categories and Criteria

- Derivate projects
- Platform projects
- Breakthrough projects
- RD projects

Step 3: Collect Project Data

- Assemble the data
- Document assumptions
- Screen out weaker projects
- The fewer projects that need to be compared and analyzed, the easier the work of the council

Step 4: Assess Resource Availability

- Assess both internal and external resources
- Assess labor conservatively
- Timing is particularly important

Step 5: Reduce the Project and Criteria Set

- Organization's goals
- Have competence
- Market for offering
- How risky the project is
- Potential partner
- Right resources
- Good fitUse strengths
- Synergistic
- Dominated by another
- Has slipped in desirability

Step 6: Prioritize the Projects Within Categories

- Apply the scores and criterion weights
- Consider in terms of benefits first and resource costs second
- Summarize the returns from the projects

Step 7: Select the Projects to be Funded and Held in Reserve

- Determine the mix of projects across the categories
- Leave some resources free for new opportunities
- Allocate the categorized projects in rank order

Step 8: Implement the Process

- Communicate results
- Repeat regularly
- Improve process

Project Proposal

- The set of documents submitted for evaluation is called the project proposal and these document is needed to evaluate the project.
- All proposals should begin with a short summary statement and cover letter
- proposal should deal with four distinct issues:
  (1) the nature of the technical problem and how it is to be approached
  (2) the plan for implementing the project once it has been accepted
  (3) the plan for logistic support and administration of the project
  (4) A description of the group proposing to do the work, plus its past experience in similar work.

Technical Approach

- The proposal begins with a general description of project to be undertaken

The Implementation Plan

- Contains estimates of the time required, the cost, and the materials used
- Project task schedules (e.g. Gantt charts) are given for each subsystem and for the system as a whole.
- Major milestones are indicated on the time charts

The Plan for Logistic Support and Administration

- A description of the ability of the proposer to supply the routine facilities, equipment, and skills needed during any project
- Nature and timing of all progress reports, budgetary reports, audits, and evaluations are covered
- Final documentation to be prepared for users of the proposed deliverable
- Detailed description of how change orders will be handled

Past Experience

- Describes the past experience of the proposing group. Contains a list of key project personnel together with their titles and qualifi cations.

References

- **Contemporary Project Management by Kloppenborg, Pearson India.**
- **Projects:Planning, Analysis,Selection, Financing, implementation and Review by Prasanna Chandra, Mc Graw Hill India.**
- **Project Management A Managerial Approach by Meredith and Mantel, John Wiley Sons.**