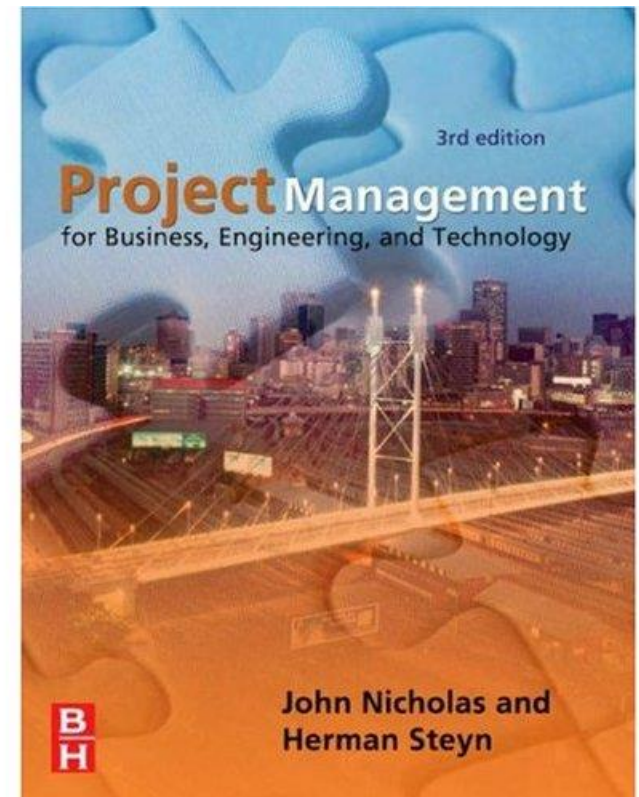


Chapter 17

Project Selection and Portfolio Management

Project Management for Business,
Engineering, and Technology

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Project Portfolio Management

- Organizations have limited resources to devote to projects
 - Like an investment portfolio, resources should be assigned to projects that promise the greatest “return” or benefit
 - Less important projects should not siphon resources away from more important projects
-

Project Portfolio and Strategy

- Common Problems in Project Portfolios
 - No link between business strategy and project selection
 - Poor quality portfolio (weak, mediocre projects)
 - Lack of focus (weak projects get resources; best projects starved for resources)
 - Project trivialization (projects selection based on “low hanging fruit” – modifications, extensions, updates; nothing breakthrough or innovative)
-

Project Portfolio Management

Project Portfolio Management

- Project proposals are assessed for costs, risks, benefits, and contributions to objectives
 - Decisions are made to authorize some projects, retain some on the “back burner,” and dispose of others
 - Scarce resources are allocated effectively to insure that priority projects get adequate funding and support
 - Projects are "balanced" in terms of high vs. low risk, large vs. small size, long-term vs. short term focus, etc.
 - Projects are continually tracked, compared, and managed collectively
-

Process for Selection and Management of Projects

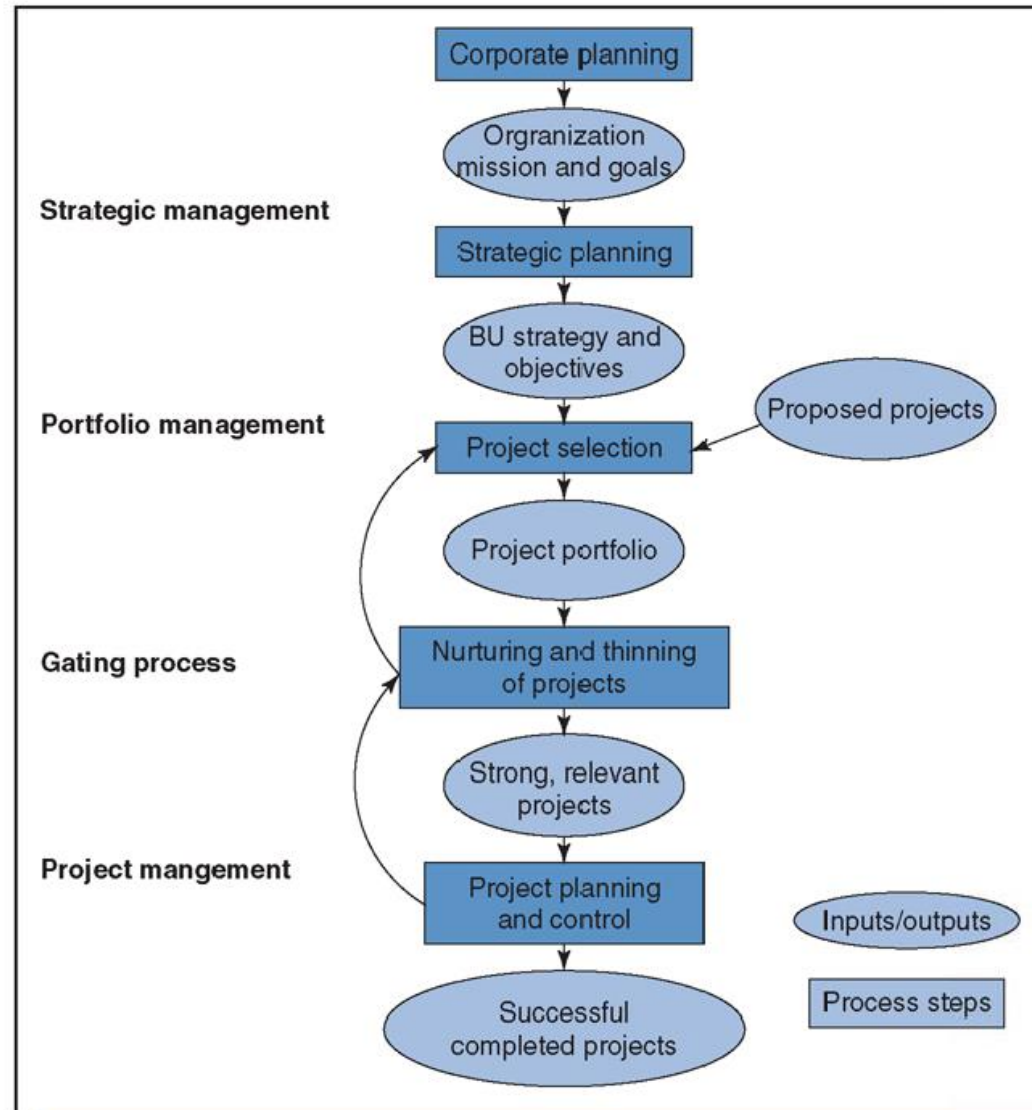


Figure 17-1
The management of projects.

Process for Selection and Management of Projects

Strategic management: focus the organization.

- Top management articulates organization vision and mission, defines objectives and initiatives, decides on budget, allocates resources to business units.

Portfolio management: select the right projects.

- Business unit managers develop goals, strategies, and initiatives consistent with corporate objectives and initiatives. These become criteria for selecting projects.

Gating methodology: nurture or get rid of projects.

- Managers assess performance of projects: important, struggling projects are allocated more resources; poorly performing projects are put on hold or cancelled.

Project management: manage the projects right.

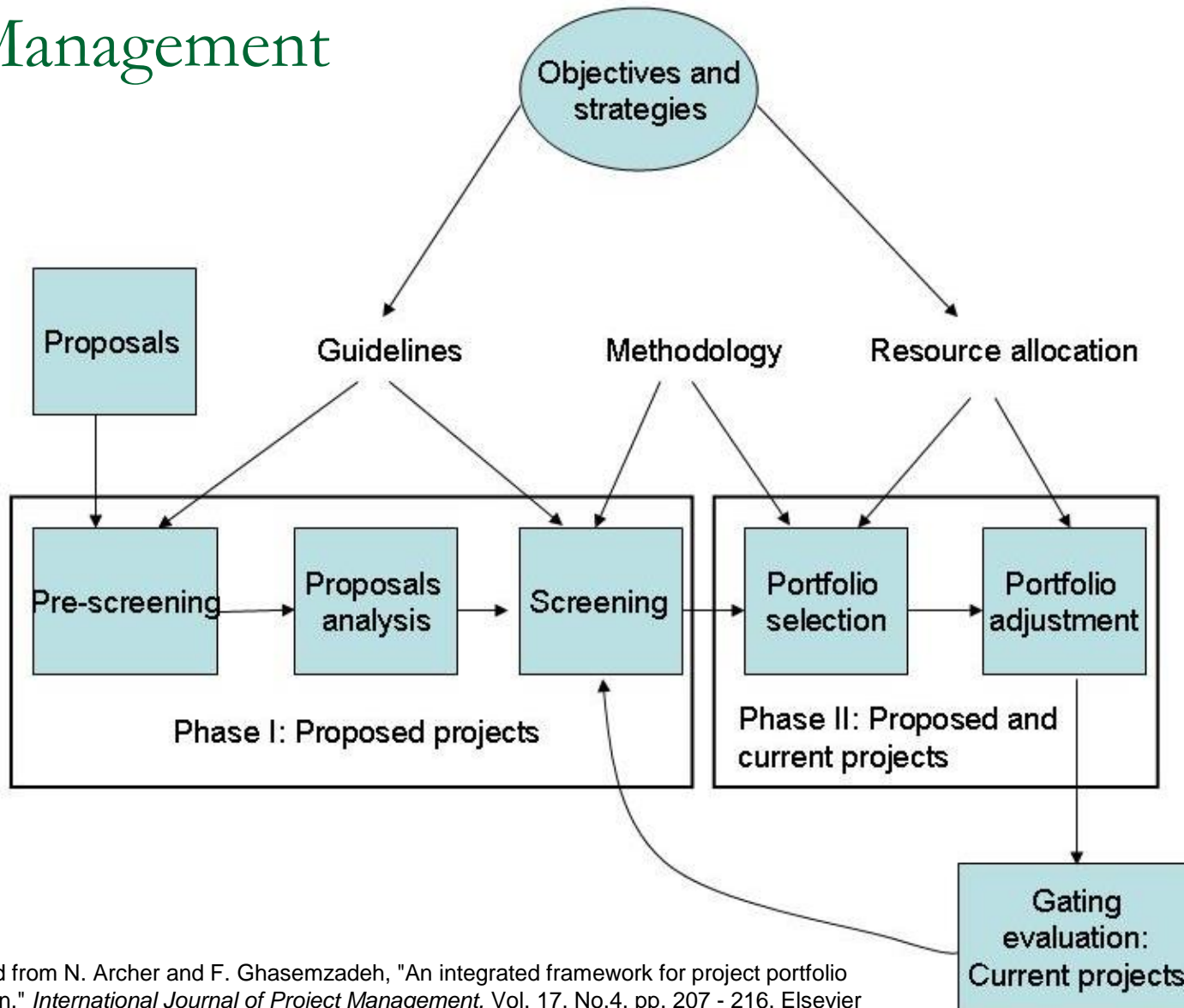
- Projects are managed using principles and practices of project management.

Projects Review Board

Project Review Board (aka Portfolio Management Team, Project Governance Board, Project Steering Committee, Project Council)

- *Responsible for project selection and portfolio management*
- *Membership includes*
 - *portfolio manager (PRB chairperson)*
 - *chief financial officer (CFO)*
 - *chief risk manager (CRO)*
 - *chief human resource officer (CHRO)*
 - *project management office (PMO) director*
 - *chief technical officer (CTO) (from IT, engineering, or product development)*
- *For research and engineering projects PRB includes group of technically competent "peer reviewers"*

Framework for Project Selection, and Portfolio Management



Adapted from N. Archer and F. Ghasemzadeh, "An integrated framework for project portfolio selection." *International Journal of Project Management*, Vol. 17, No.4, pp. 207 - 216, Elsevier Science.

Framework for Project Selection, and Portfolio Management

Phase I

Pre-screening stage: to “pass”

- Projects must be justified in terms of either organizational survival or growth.
 - Survival projects: necessary for health and viability of the organization
 - Growth projects: offer organization opportunity for prosperity and expansion
- Projects might require:
 - feasibility study
 - champion and sponsor
 - *documented* expected benefits
- Sometimes, simple checklist is employed to rate each proposal as excellent, good, poor, etc.

Framework for Project Selection, and Portfolio Management

Phase I (cont'd)

Proposal analysis stage

- Employ a combination of quantitative and qualitative models and scoring methods.
- Rate the proposal using diverse criteria, e.g.,
 - link to strategic objectives
 - financial value
 - compliance to constraints
- Proposal must exceed minimum cutoff value or score

Proposal screening stage

- Assess and eliminate projects that do not meet requirements for expected benefits, risk, or other specific criteria.

Framework for Project Selection, and Portfolio Management

Phase I restricts the pool of projects entering Phase II to those that are the *right* projects.

Phase II

Portfolio selection stage

- Review proposed projects and existing projects together
 - Compare projects in terms of analysis scores or current performance
 - Rank-order projects
 - Rank-ordering: to ensure that resources and funding are allocated to higher-priority projects.
-

Framework for Project Selection, and Portfolio Management

Phase II (cont'd)

Portfolio adjustment stage

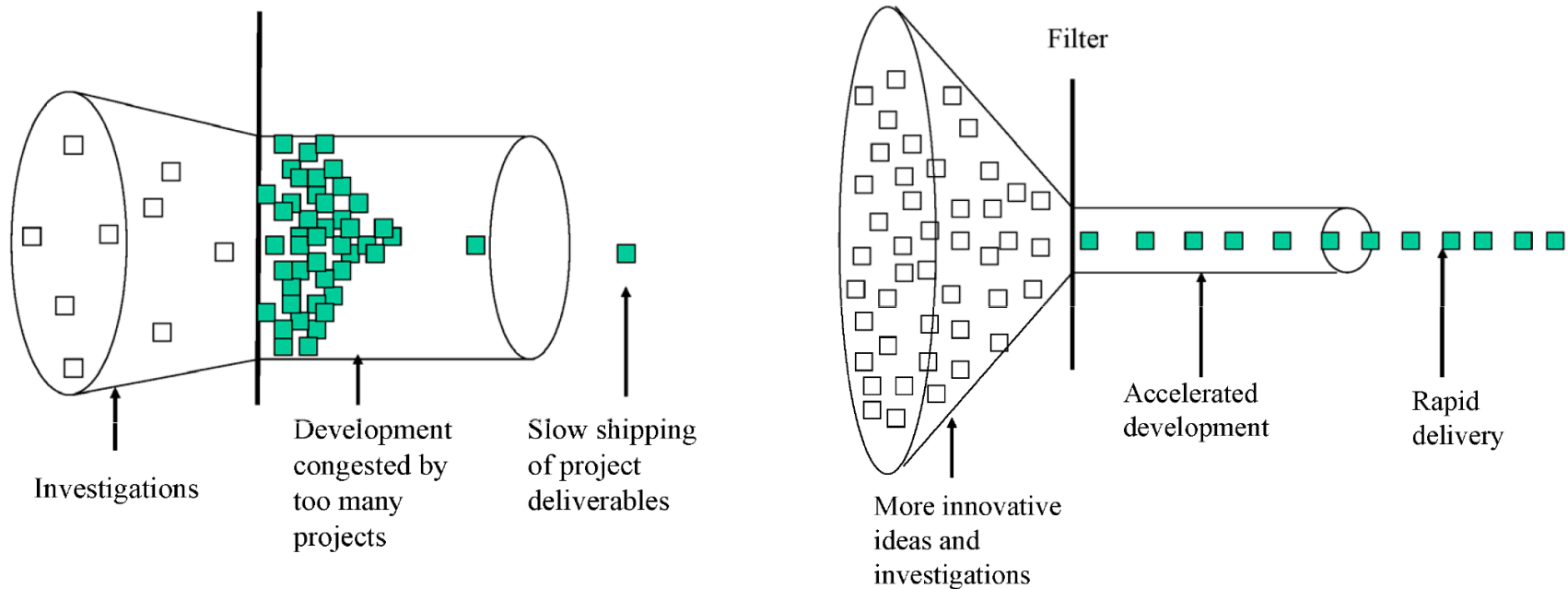
- Decide which projects to accelerate, delay, or cancel
 - to satisfy changing objectives, opportunities (new strategies develop, new RFP's or proposals arrive), and resources,

Gating process: evaluate current projects

- Reassess projects underway for expected benefits, performance, and costs
- Terminate projects in trouble and not meeting minimal requirements
- Pool remainder with new projects, rank-order, and reconsider which projects for portfolio (i.e., perform screening and selection stages).

Framework for Project Selection, and Portfolio Management

- Selection process: analogous to a *funnel* and a *filter*:
 - funnel takes in project ideas, proposals, and concepts
 - filter precludes all but the best from proceeding.
- Goal: design the process so funnel takes in lots of ideas; filter screens poor projects yet allows constant flow of quality projects



(a) Constrained flow of projects typical of many companies

(b) Improved flow of projects

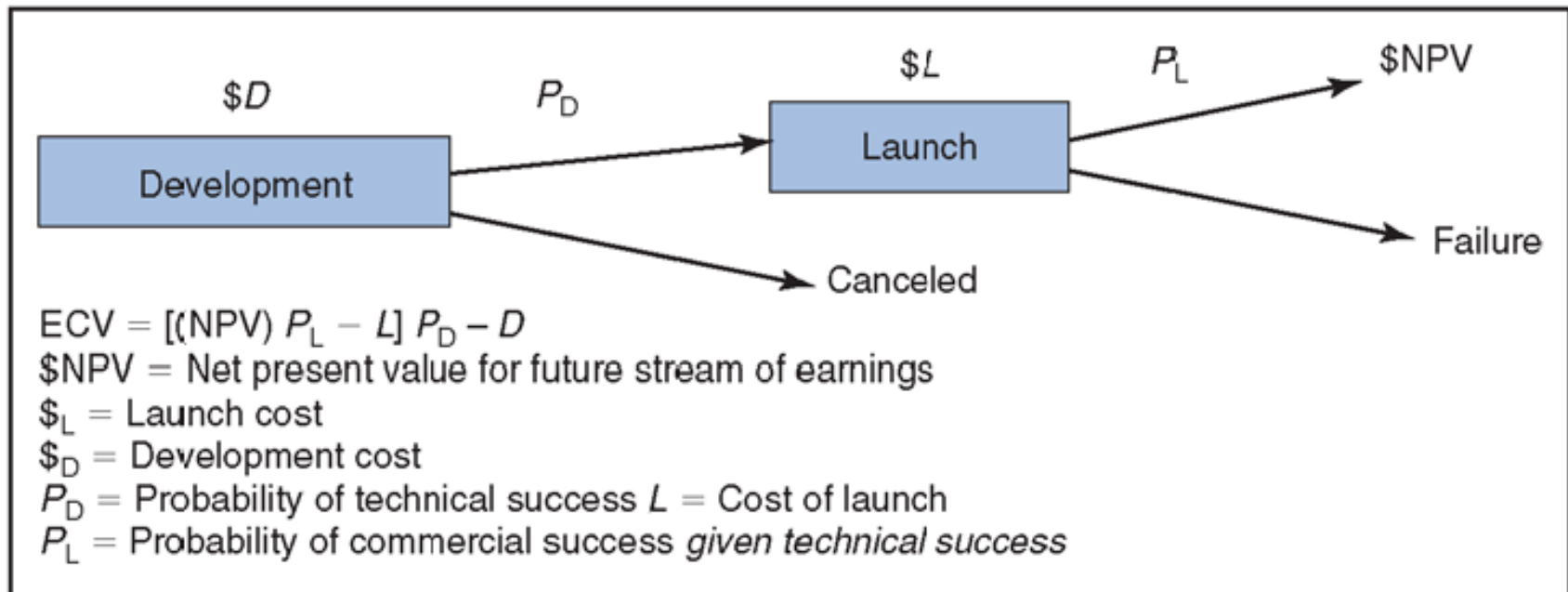
Methods for Project Analysis

Page 626

Financial models

□ ECV (expected commercial value)

- Estimates commercial worth of a project. Often used to justify project at initiation stage.
- Weakness: Probabilities and costs are all estimated (informed guesses?)



Methods for Project Analysis

Financial models (cont'd)

- ❑ B/C ratio (benefit/cost analysis)
 - ❑ Simple measure of return vs. required resources.
 - ❑ Weakness: requires accurate estimates of *all* relevant costs and benefits, including "hidden" or external ones;
 - ❑ all the numbers are estimates.
- ❑ Examples

$$B/C = \frac{\text{Estimated revenues x probability of success}}{\text{Estimated cost}}$$

$$B/C = \frac{\text{Worth of benefits}}{\text{Capital recovery cost} + (\text{Operating cost} + \text{Maintenance cost})}$$

Methods for Project Analysis

Scoring Models

- ❑ Use a list of criteria with weightings.
- ❑ Rating Criteria examples
 - ❑ Strategic Fit
 - ❑ Strategic Leverage
 - ❑ Probability of Commercial Success
 - ❑ Probability of Technical Success
- ❑ Rate each Criteria, i , with score R_i
 - ❑ $i=1$, poor
 - ❑ $i=4$, below average
 - ❑ $i=7$, good
 - ❑ $i=10$, excellent
- ❑ w_i : weighting of criterion i , $\sum w_i=1.0$
 - ❑ $\text{Score}_{\text{project}} = \sum w_i R_i$
- ❑ Example:

Weighted Scoring Model

| Criteria | | Very Good | Good | Fair | Poor | Very Poor | Expected Rating | Weight | Weighted Expected Score |
|----------------------------------|------------|-----------|------|------|------|-----------|-----------------|--------|-------------------------|
| | | 4 | 3 | 2 | 1 | 0 | | | |
| Long-range outlook | 1. Product | 0.8 | 0.2 | | | | 3.8 | 10 | 38 |
| | 2. Market | 1.0 | | | | | 4.0 | 10 | 40 |
| Meets objectives | 1. ECV | 0.8 | 0.2 | | | | 3.8 | 5 | 19 |
| | 2. ROI | | 1.0 | | | | 3.0 | 6 | 18.0 |
| | 3. Image | | 0.6 | 0.4 | | | 2.6 | 4 | 10.4 |
| Fits strategy | Phase 1 | 0.8 | 0.2 | | | | 3.8 | 10 | 38 |
| | Phase 2 | 1.0 | | | | | 1.0 | 5 | 5 |
| | Phase 3 | 0.6 | 0.2 | 0.2 | | | 3.4 | 5 | 17 |
| Goal contribution | Goal A | 0.2 | 0.8 | | | | 3.2 | 10 | 32 |
| | Goal B | 1.0 | | | | | 4.0 | 5 | 20 |
| | Goal C | | 0.2 | 0.2 | 0.6 | | 1.6 | 4 | 6.4 |
| Risk level acceptability | | 0.7 | 0.3 | | | | 3.7 | 10 | 37 |
| Competitive advantage | | 0.9 | 0.1 | | | | 3.9 | 8 | 31.2 |
| Compatibility with other systems | | 0.2 | 0.7 | 0.1 | | | 3.1 | 8 | 24.8 |
| Total | | | | | | | | 100 | 336.8/400 |

Methods for Project Analysis

Scoring Models

□ Usage

- Gates: e.g., average score of 5 required for “go” decision on a project
- Prioritization: rank “go” projects, both proposed and active, according to scores

□ Scoring Models Weaknesses

- Imaginary precision in score
 - Halo effect of new projects
-

Methods for Comparing and Selecting Projects

Project Selection Approaches aim at

- *Maximizing the value or utility of the portfolio*
 - *Achieving balance in the portfolio*
 - *Fitting the portfolio with organization objectives and strategic initiatives.*
-

Methods for Comparing and Selecting Projects

Value or Utility of the Portfolio

- *Single-criterion methods*
 - *ECV, B/C, NPV, etc.*
 - *Multiple-criteria methods*
 - *Example, next slide*
-

Methods for Comparing and Selecting Projects

Multiple criteria, combination of quantitative and subjective
(numbers in parentheses are rankings; last column is average rankings)

| <i>Project.</i> | <i>Strategic Fit</i> | <i>Reward (ECV)</i> | <i>Risk</i> | <i>Ranking Score</i> |
|-----------------|----------------------|-------------------------|-------------|----------------------|
| Project Metis | 4 (1) | 2.3 (7) | 3 (3) | 3.67 (5) |
| ProjectAdrastea | 0 (5) | 3.5 (4) | 4 (4) | 4.33 (7) |
| ProjectThebe | 2 (3) | 3.1 (5) | 4 (4) | 4.0 (6) |
| Project10 | 3 (2) | 2.6 (6) | 2 (2) | 3.33 (4) |
| ProjectEuropa | 1 (4) | 6.4 (1) | 4 (4) | 3.0 (3) |
| ProjectGanymede | 3 (2) | 4.6 (3) | 3 (3) | 2.67 (2) |
| ProjectCallisto | 4 (1) | 5.3 (2) | 2 (2) | 1.67(1) |

Methods for Comparing and Selecting Projects

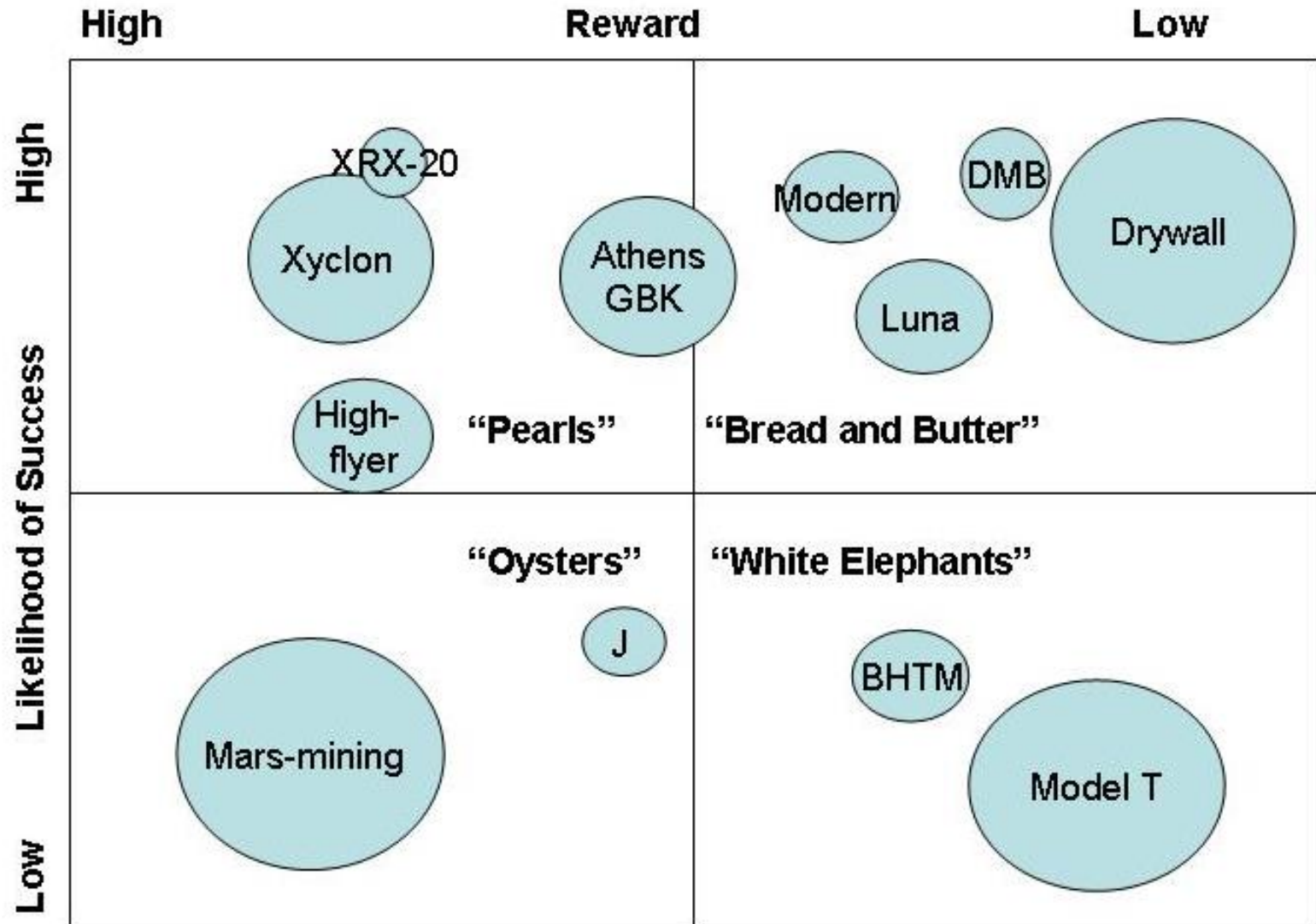
- Weaknesses of all value or utility maximization approaches
 - ❑ Ignore resource requirements and “bang for buck.” Big projects tend to score higher than little ones, hence resource-heavy projects tend to get higher priority.
 - ❑ Imaginary precision
 - ❑ No explicit link between selection method and business strategy
 - ❑ Ignores balance in project-mix
-

Methods for Comparing and Selecting Projects

Balance of Projects

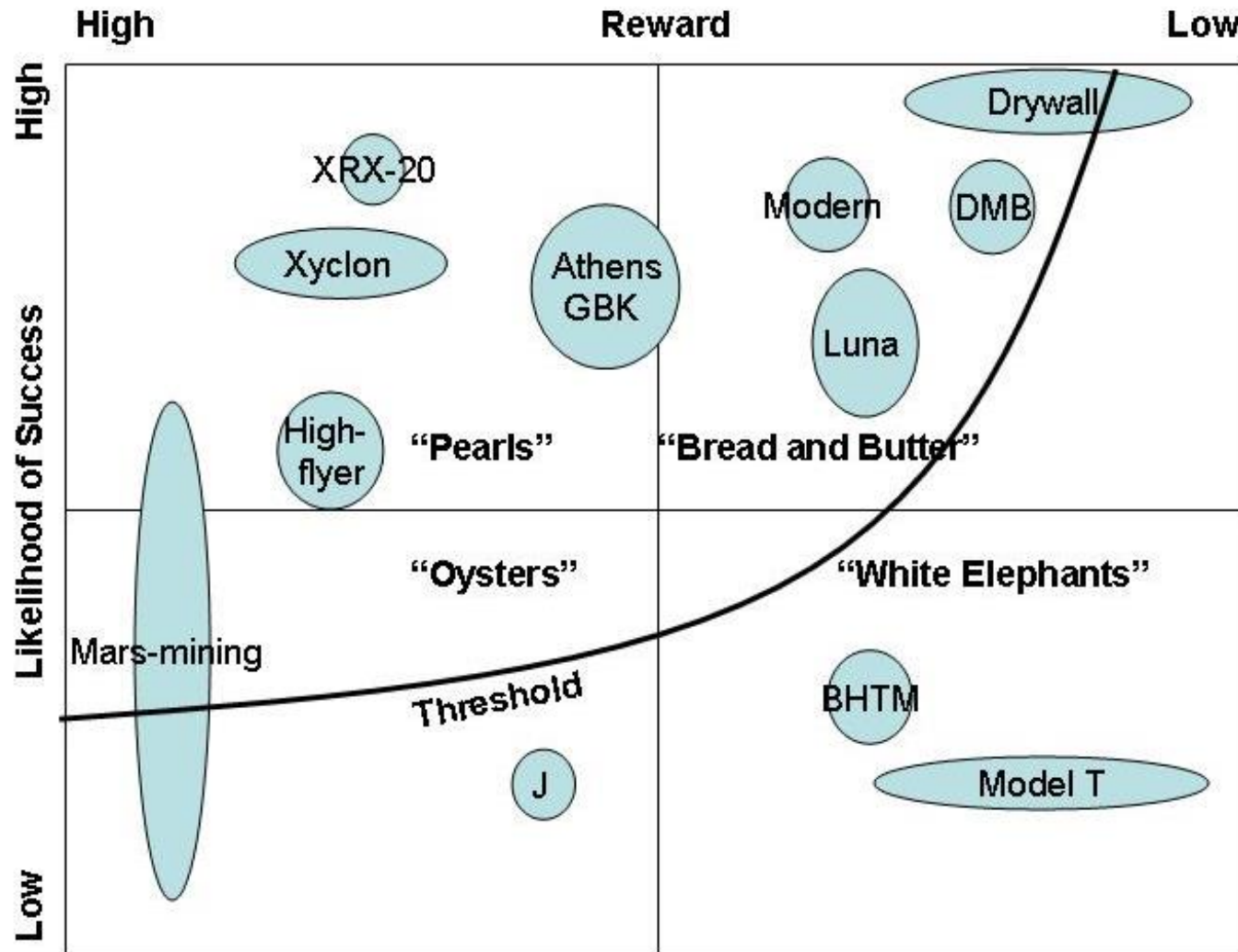
- Balance between, e.g.,
 - High-risk and low-risk
 - High-return vs. low-return
 - Balance displayed on a “bubble diagram”
 - Example, next slides
-

Bubble Diagram



Bubble sizes represent project sizes.

Bubble Diagram



Bubble shapes span potential risks and rewards. Projects below threshold line are dropped.

Methods for Comparing and Selecting Projects

Strategic Fit

- Management decides relevant ways to divide up projects
 - These become “buckets.”
- Management decides on desired spending (resource allocation) to each bucket
- Projects are categorized into buckets, then prioritized within each bucket
 - Priority criteria can be different for each bucket.
- Projects in each bucket are tallied to compare actual spending to desired spending
- If actual spending > desired spending, projects with low priority are killed or put on hold

Methods for Comparing and Selecting Projects

Strategic Fit

- Bucket categories, e.g.,
 - Strategic goals
 - Defending product base, expanding base, ...
 - Product lines
 - A, B, C, ...
 - Project types
 - NPD, maintenance, process improvement, R&D
 - Geography
 - NA, SA, Europe, Asia, ...
-

Strategic Fit

Example

- Values on table are \$M.

Process Improvement
Target: \$12.2 M

| | |
|---|------------|
| G | 2.1 |
| A | 3.4 |
| D | 1.9 |
| H | 0.5 |
| L | <u>1.3</u> |
| | 9.2 |

Upgrade
Target: \$9.8 M

| | |
|--------|------------|
| B | 2.9 |
| E | 6.4 |
| I | <u>2.4</u> |
| | 11.7 |
| Excess | = 1.9 |

NPD
Target: \$20.5 M

| | |
|---|------------|
| F | 6.8 |
| C | 2.9 |
| J | 5.8 |
| K | <u>4.2</u> |
| | 19.7 |

- Second bucket exceeds target; projects I will be killed, scaled back, or put on hold.
- Assumes projects rank ordered by ECV, scoring, or other method
- Drawback of approach: time-consuming; requires forced choices

Methods for Comparing and Selecting Projects

Cost-Benefit Grids

- Rate each project's financial benefits as high, medium, or low
 - Rate its cost as high, medium, or low.
 - The outcome is displayed on a three-by-three grid.
 - Example, next slide, shows the ratings for 12 projects.
 - Rating team should be able to justify why it rated one project high and another medium or low.
-

Grid A

| | | | | |
|------|------|--------------------|------|--------|
| Cost | Low | 2,12 | 7 | |
| | Med. | 9 | 5 | 10 |
| | High | 4,6,8 | | 1,3,11 |
| | | Low | Med. | High |
| | | Financial benefits | | |

- ❑ Repeat process for other benefits; e.g., technical, intangible, business, strategy fit, etc.
- ❑ Example, next slide.

Grid A

| | | | | |
|------|------|-------|---|--------|
| Cost | Low | 2,12 | 7 | |
| | Med. | 9 | 5 | 10 |
| | High | 4,6,8 | | 1,3,11 |

Low Med. High
Financial benefits

Grid B

| | | | | |
|------|------|---|------|----------|
| Cost | Low | 7 | 2,12 | |
| | Med. | 9 | 5 | 10 |
| | High | | 1,4 | 3,6,8,11 |

Low Med. High
Technical benefits

Grid C

| | | | | |
|------|------|-----|---|--------|
| Cost | Low | 12 | 2 | 7 |
| | Med. | | 9 | 5,10 |
| | High | 4,6 | 3 | 1,8,11 |

Low Med. High
Intangible benefits

Grid D

| | | | | |
|------|------|-----|------|-------|
| Cost | Low | 2 | 7,12 | |
| | Med. | | 9 | 5,10 |
| | High | 4,6 | 11 | 1,3,8 |

Low Med. High
Fit with business
strategy

Methods for Comparing and Selecting Projects

Cost-Effectiveness Analysis

- “Effectiveness:”
 - degree to which a project is expected to fulfill project requirements (value, utility, efficiency, and performance)
 - Involves consideration of multiple factors
 - Rate factors subjectively (based on quantitative analysis and advice of technical experts)
 - Weigh the ratings
 - Sum them up
 - Example
-

Cost-Effectiveness Analysis

Table 17-4 Cost-Effectiveness Data Analysis.

| FACTORS | W (WEIGHT %) | PROJECT A | | PROJECT B | | PROJECT C | |
|-----------------|--------------|-----------|--------|-----------|--------|-----------|--------|
| | | <i>E</i> | WE | <i>E</i> | WE | <i>E</i> | WE |
| Speed | 10 | 95 | 9.5 | 80 | 8 | 85 | 8.5 |
| Range | 15 | 70 | 10.5 | 80 | 12 | 75 | 11.25 |
| Efficiency | 20 | 75 | 15 | 75 | 15 | 85 | 17 |
| Comfort | 15 | 70 | 10.5 | 85 | 12.75 | 85 | 12.75 |
| Capacity | 20 | 70 | 14 | 90 | 18 | 95 | 19 |
| Loaded mass | 15 | 90 | 13.5 | 60 | 9 | 70 | 10.5 |
| Maintainability | 5 | 75 | 3.75 | 85 | 4.25 | 80 | 4 |
| Total WE | | | 76.75 | | 79 | | 83 |
| Cost | | | \$1.9B | | \$2.0B | | \$3.0B |

Cost-Effectiveness Analysis

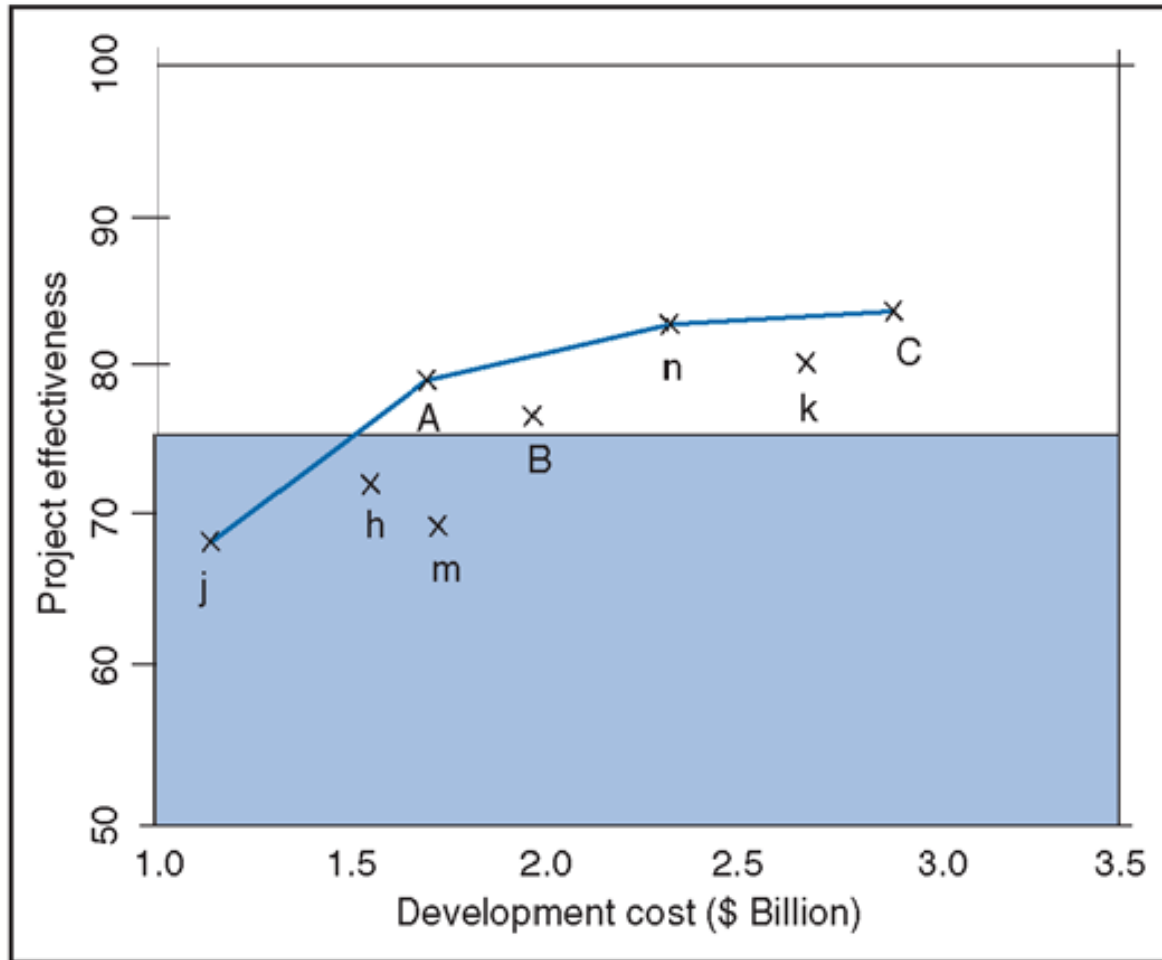


Figure 17-8
Effectiveness versus development cost for eight projects.

- ❑ Projects in blue area are automatically rejected.
- ❑ Projects below line j-A-n-C (“efficient frontier”) are rejected too.

Periodically Review and Assess Projects During Gating Process

New Product development project example:
Review project at each gate (G1...G6)

| | | | | | | | | | | | |
|--------------------|---------------------|------------------|---------------------------|-----------------|-------------------|-------------------------|------------|----------------------|-------------------|--------------------|----------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | | | G1 | G2 | | G3 | | G4 | G5 | | G6 |
| Project initiation | Strategy definition | Scope definition | Definition phase planning | Final estimates | Project lock-down | Detailed plans complete | Validation | System certification | First application | Controlled rollout | General availability |

Integrate Portfolio Management with Gating Process

1. Gating Process

- Set up process that:

- Requires serious market and technical analysis at front-end of process
 - Requires at each gate pre-defined deliverables and information necessary to make go/kill decisions
 - Employs criteria that senior management has set to evaluate each project: strategic fit, feasibility, market attractiveness, competitive advantage, etc.
-

Integrate Portfolio Management with Gating Process

2. Resource capacity analysis

- ❑ Quantify all projects' demand for resources versus resource availability
 - ❑ Ask: are available resources sufficient for current projects?
 - ❑ If no, must reduce project goals or acquire more resources
-

Integrate Portfolio Management with Gating Process

3. Integrate Portfolio Management with Gating Process

- ❑ Stage-and-Gate process addresses individual projects at life-cycle stages
 - ❑ Portfolio management process addresses (compares) all projects at same time
 - ❑ Must integrate the Gating and Portfolio processes
-

Function of PMO in Portfolio Management

- Assist Project Review Board (PRB) (or Project Governance Board or Steering Committee)
 - Provide overview information about project portfolio
 - Assist with portfolio decisions: project prioritization, approval, cancellation
- Specific Responsibilities
 - Gate requirements/deliverables
 - Ensure project has met requirements for each gate
- Resource Allocation
 - Track resource allocation for all projects vs. requirements for current projects
 - Provide status reports showing relative performance for all projects (use bubble charts, “dashboard” reports, etc.)