IIT ROORKEE

NPTEL ONLINE CERTIFICATION COURSE

Project Management for Managers

Lec – 09

Methods of Project Selection - II

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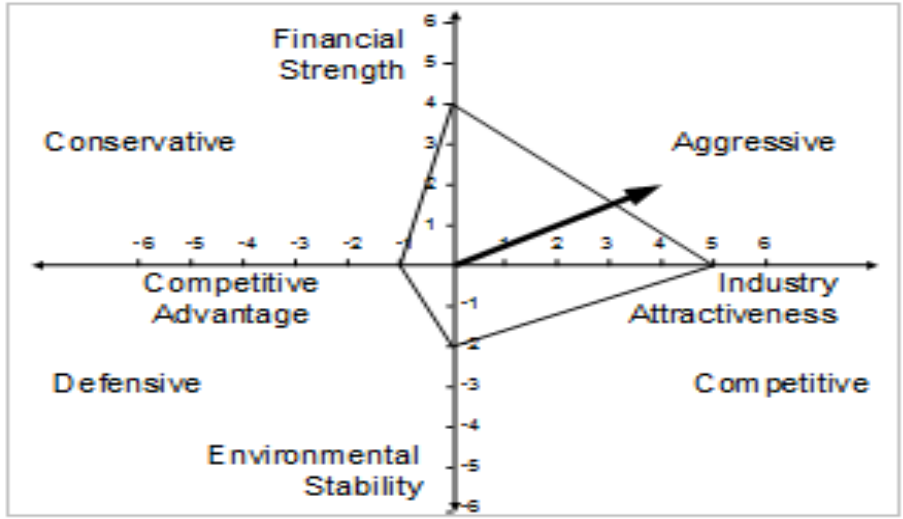
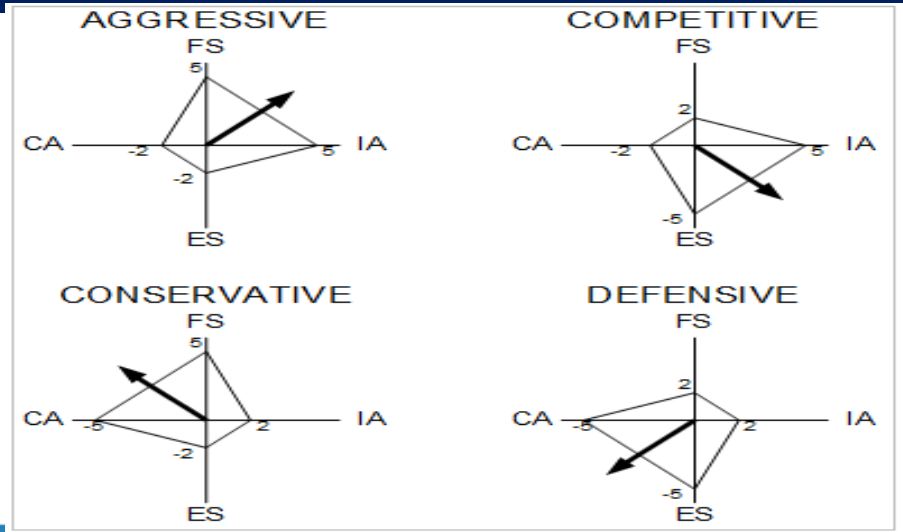
SPACE : (Strategic Position and Action Evaluation diagram: A management tool to **analyse a company and decide its future strategy**.

A set of variables should be selected to define:

- **Financial strength,**
- **Competitive advantage,**
- **Environmental stability, and**
- **Industry attractiveness.**

Internal and External???





The set of variables could be as follows:Internal Dimensions

Financial Strength

- Return of investment
- Ability to raise funds
- Liquidity
- **Working capital**
- Cash flows

Competitive Advantage

- Market share
- Capacity utilization
- **Location advantage**
- Brand image
- Product **Quality**
- Product life cycle
- Customer preference
- Technological **innovation**
- **Sound** supply chain

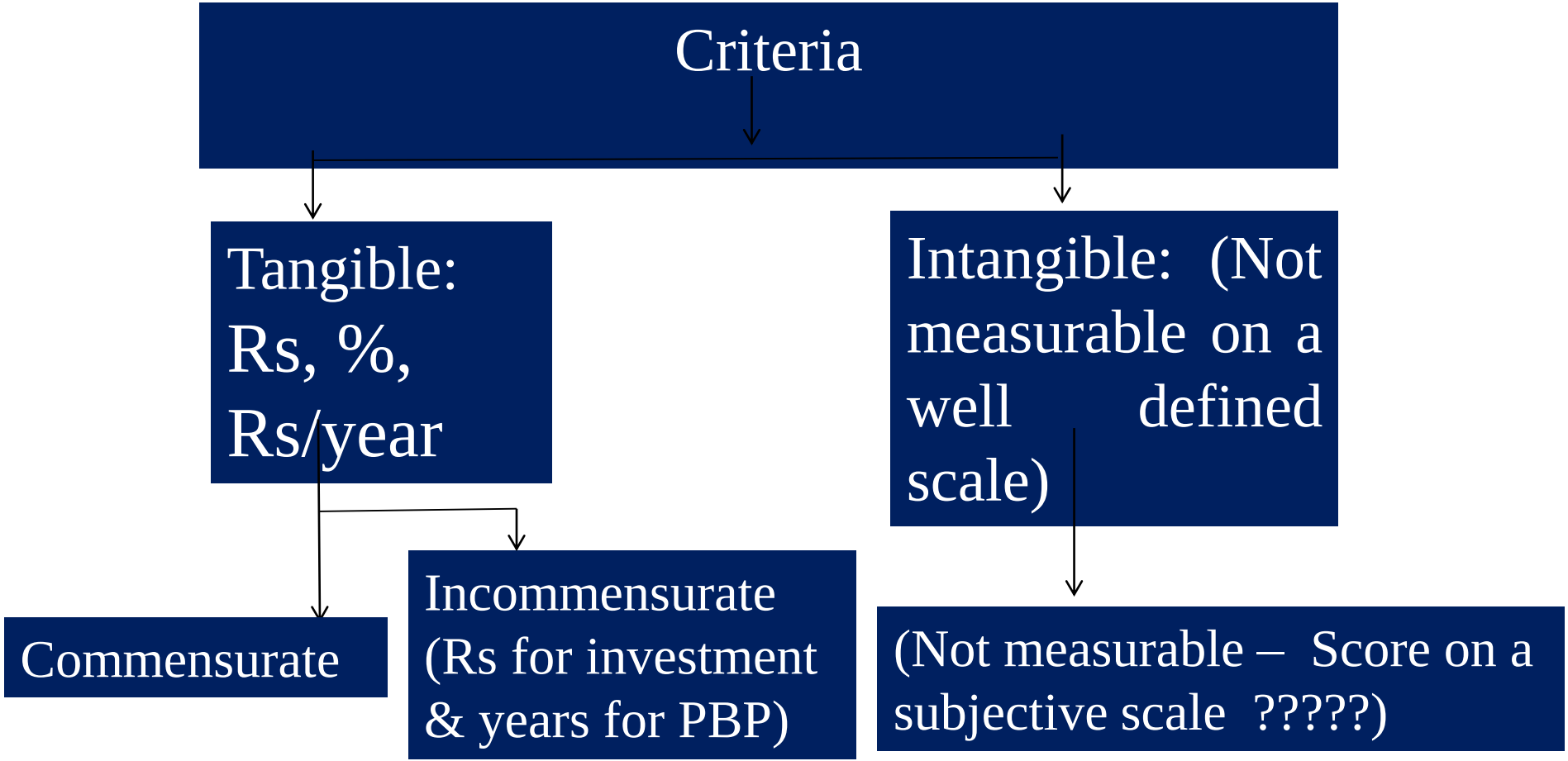
The set of variables could be as follows:**External Dimensions**

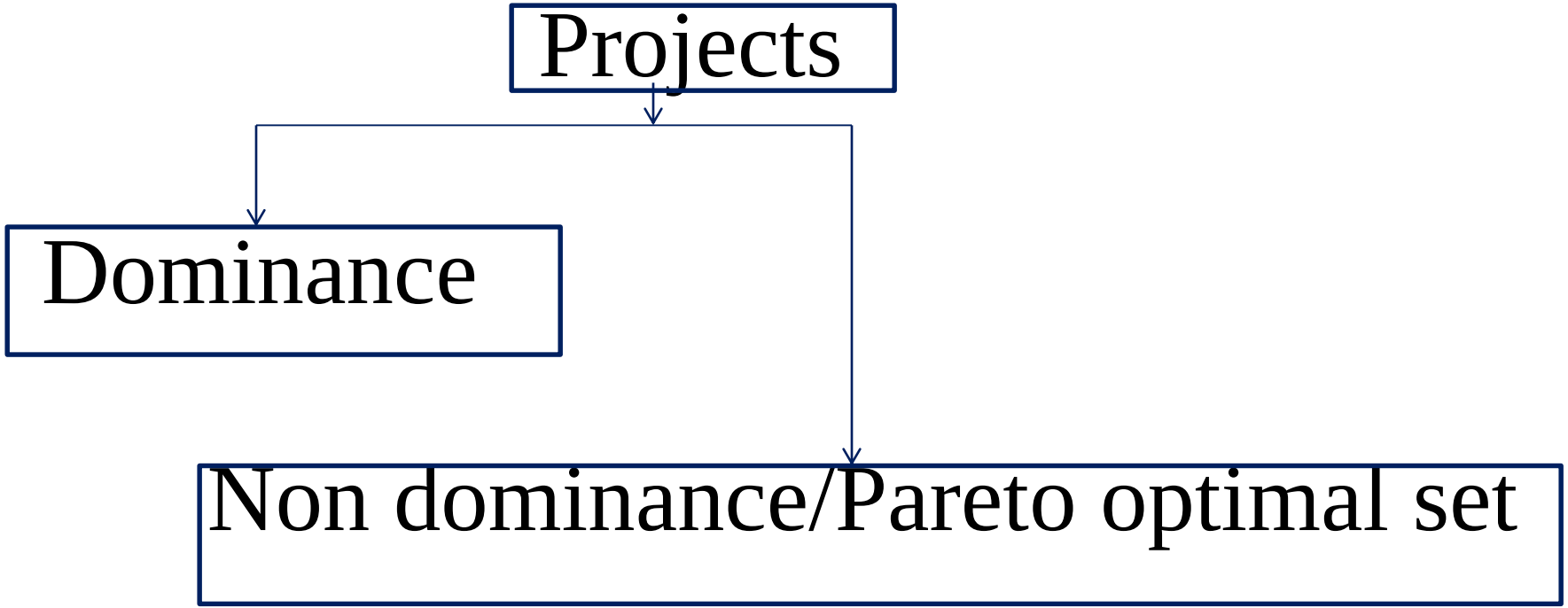
Environmental Stability

- Technological changes
- Inflation
- **Demand elasticity**
- Competitor's price ranges
- Barriers to entry
- Competitive pressure
- **Ease of exit**
- Price elasticity of demand
- Risk exposure

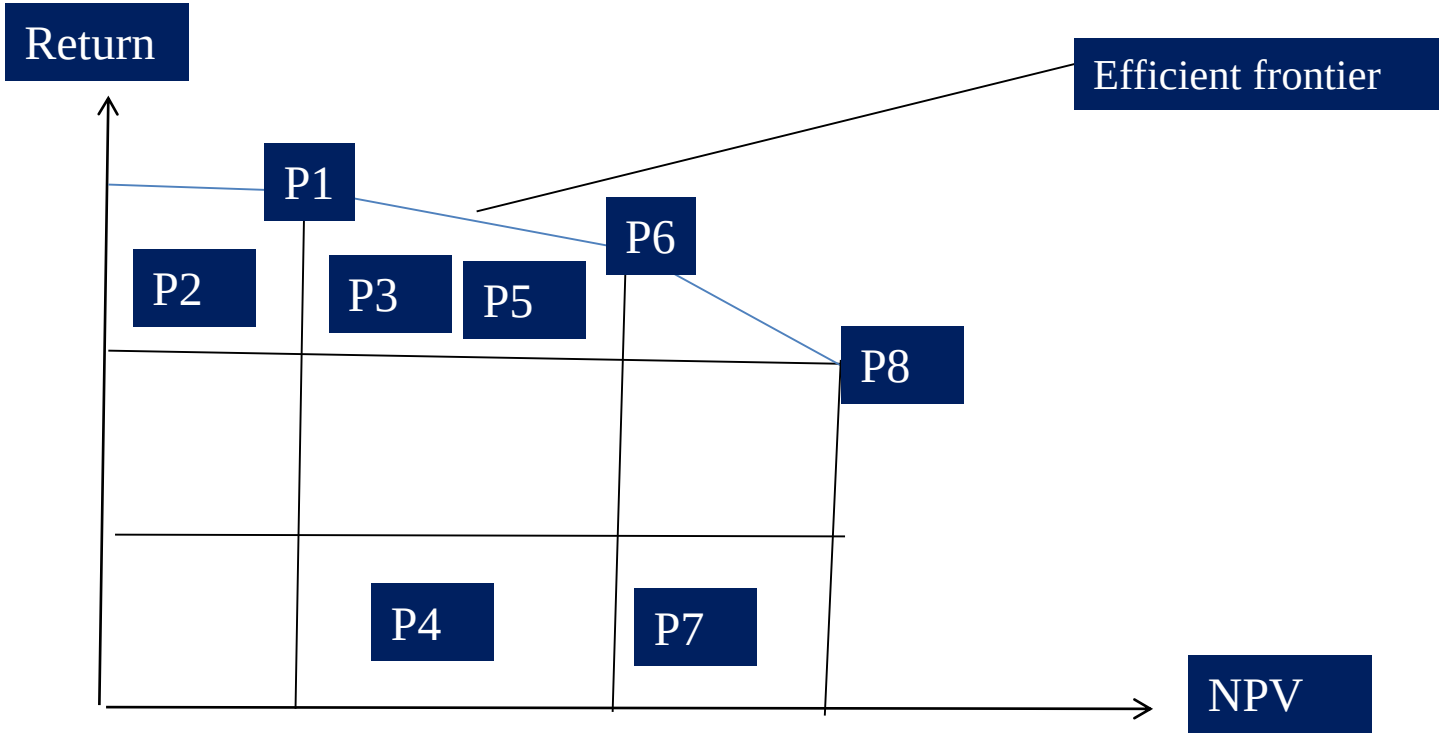
Industry attractiveness

- Growth potential
- Profit potential
- Financial stability
- Resource availability
- **Ease of entry**
- Capacity utilization


Criteria
Tangible: Rs, %, Rs/year
Intangible: (Not measurable on a well defined scale)
Commensurate
Incommensurate (Rs for investment & years for PBP)
(Not measurable – Score on a subjective scale ?????)


Projects
Dominance
Non dominance/Pareto optimal set

Non dominance/Pareto optimal set



Selection method: (un-weighted)/ Dominance

Project	Criteria	Performance on criteria		
		High	Medium	Low
Alpha	Cost	x		
	Profit potential			x
	Time to market		x	
	Development risk			x
Beta	Cost		x	
	Profit potential		x	
	Time to market	x		
	Development risk		x	
Gamma	Cost	x		
	Profit potential	x		
	Time to market			x
	Development risk	x		
Delta	Cost			x
	Profit potential			x
	Time to market	x		
	Development risk		x	

Maximize : which is the best project based on maximizing all the criteria?

SIMPLIFIED SCORING MODEL (WEIGHTED)

Project	Criteria	Performance on criteria		
		High	Medium	Low
Alpha	Cost	x		
	Profit potential			x
	Time to market		x	
	Development risk			x
Beta	Cost		x	
	Profit potential		x	
	Time to market	x		
	Development risk		X	
Gamma	Cost	X		
	Profit potential	x		
	Time to market			x
	Development risk	x		
Delta	Cost			x
	Profit potential			x
	Time to market	x		
	Development risk		x	

	Weight
Cost	1
Profit potential	2
Time to market	3
Development risk	2

Low-1 Medium-2 High-3

SIMPLIFIED SCORING MODEL (WEIGHTED)

Project	Criteria	Performance on criteria		
		High	Medium	Low
Alpha	Cost	3		
	Profit potential			1
	Time to market		2	
	Development risk			1
Beta	Cost		2	
	Profit potential		2	
	Time to market	3		
	Development risk		2	
Gamma	Cost	3		
	Profit potential	3		
	Time to market			1
	Development risk	3		
Delta	Cost			1
	Profit potential			1
	Time to market	3		
	Development risk		2	

	Weight
Cost	1
Profit potential	2
Time to market	3
Development risk	2

Low-1 Medium-2 High-3

Alpha:3*1+1*2+2*3+1*2=13

Beta:2*1+2*2+3*3+2*2=19

Gamma:3*1+3*2+1*3+3*2=18

Delta:1*1+1*2+3*3+2*2=16

Optimization Techniques

Linear Programming: ????????????

Optimization Techniques

Linear Programming: Optimization of a function of variables know as objective function, subject to a set of linear equations and/or inequalities known as constraints.

Ex:

	Mobile	Laptop	
Assembly	6	3	90hrs
Finishing	3	6	72hrs
Profit	120	90	

Determine the best combination of mobile and laptops to realize maximum profit.

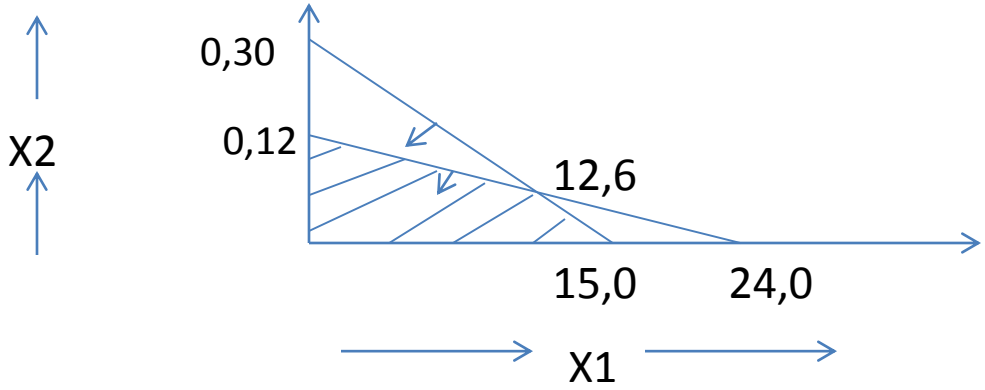
Maximize Z = 120x1 +90x2

ST 6x1+ 3x2<=90

3x1+ 6x2<=72

x1,x2, <=0

Answer: x1= 12 and x2= 6. Total profit = 1980



Integer programming

A company is planning its capital spending for the **next T periods**.

There are **N projects** that compete for the limited **capital Bi,** available for investment in **period "i".**

Each project requires a certain investment in each period once it is selected.

Let “aij” be the required investment in project j for period i.

The value of the project is **measured in terms of NPV**. Let, Vj is NPV of project j.

The problem is to select the **proper project** for investment that will **maximize total NPV.**

Integer programming : A company is planning its capital spending for the next T periods,. There are N projects that compete for the limited capital Bi, available for investment in period "i". Each project requires a certain investment in each period once it is selected. Let “aij” be the required investment in project j for period i. The value of the project is measured in terms of NPV. Let , Vj is NPV of project j. The problem is to select the proper project for investment that will maximize total NPV.

xj= 1 if project j is selected

xj= 0 if project j is not selected

Max Z= $\sum$vjxj (j=1to N)

ST $\sum$aij xj <=Bi, for i=1 to T

0<=xj<=1, xj a binary and for all j= 1 to N

	Project 1	Project 2	Project 3	Project 4
Profit	105	140	80	100
Cash flow (first year)	60	108	200	90
Cash flow (second year)	160	40	150	70
Cash flows in first and second year should not exceed 600 and 700.				
Project 1 and 3 are mutually exclusive.				
Company wants to maximize profit.				

$$\text{Max } Z = 105x_1+140x_2+80x_3+100x_4$$

$$\text{ST} \quad 60x_1+108x_2+200x_3+90x_4 \leq 600$$

$$160x_1+40x_2+150x_3+70x_4 \leq 700$$

$$x_1+x_3=1,$$

$$\text{All } 0 \leq x_i \leq 1$$