

**The Islamic University of Gaza- Civil Engineering Department**

**Infrastructure planning and management**

**( ENGC 6342 )**

**Lecture 1. Introduction and Definitions**

**By**

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## Definition of the "Public Works" and " Infrastructure"



The term "Public Works" is applied to facilitates that usually require substantial capital investment; provide services or solve problems perceived to the public's responsibility; and are planned, designed, constructed, and proposed by or under the auspices رعاية of government agencies

Private companies may also construct and /or operate public works, to serve their own manufacturing or other need, or for profit

## Examples of Infrastructure projects



Communication facilities

Electric power generation and supply

Water supply, treatment, and distribution

Wastewater collection, treatment and disposal

Solid waste collection, treatment, and disposal.

Highways, streets, bridges, tunnels and transportation

Courthouses, schools, libraries and hospitals

Police station, fire houses, prisons and garages

Public residential housing

## Categories of public infrastructure projects

### 1. Development of new projects or provision of additional capacity or capability

New projects

New Highway  
New water distribution system

Additional capacity

Add additional lanes.  
Expanding a water treatment.  
Add new pumps

**Cont.**

**Categories of public infrastructure projects**

2. Rehabilitation and/or reconstruction of existing facility without changing the capacity or capability of the facility.

3. Routine maintenance (preventive) and operation of infrastructure system (e.g., the municipal systems for transportation, water supply, sewage and storm water and solid wastes).

4. Improve the system efficiency by modify the operation and management (e.g. Improve pumps efficiency by cleaning or/and lubrication).

## Typical infrastructure planning steps



1. Establishment of goals and objectives
2. Problem identification and analysis
3. Solution identification and impact assessment
4. Recommendation: including priorities and schedules for implementation
5. Decisions: including financing
6. Implementation: final design, construction planning, construction
7. Operation and management

## Programming and budgeting process of public works agencies

**Programming:** It is a process of prioritizing proposed projects and developing a single-year or multiyear program of projects, usually within a constrained monetary amount.

**Examples:**

- An annual preventive maintenance program.
- A five-year capital program (what capital improvements will be designed and constructed over the time period )

**Budgeting:** It is procedures that actually produces the funding and authority to incur **تحمل** costs and allocate funds. The budget is usually an annual legislative authorization for expenditures and may follow multiyear authorization guidelines established be by the same legislative bodies.

**key elements for analysis the programming and budgeting**

**Setting program goals and objective**

**Establishing program performance measures**

Monitoring the program progress

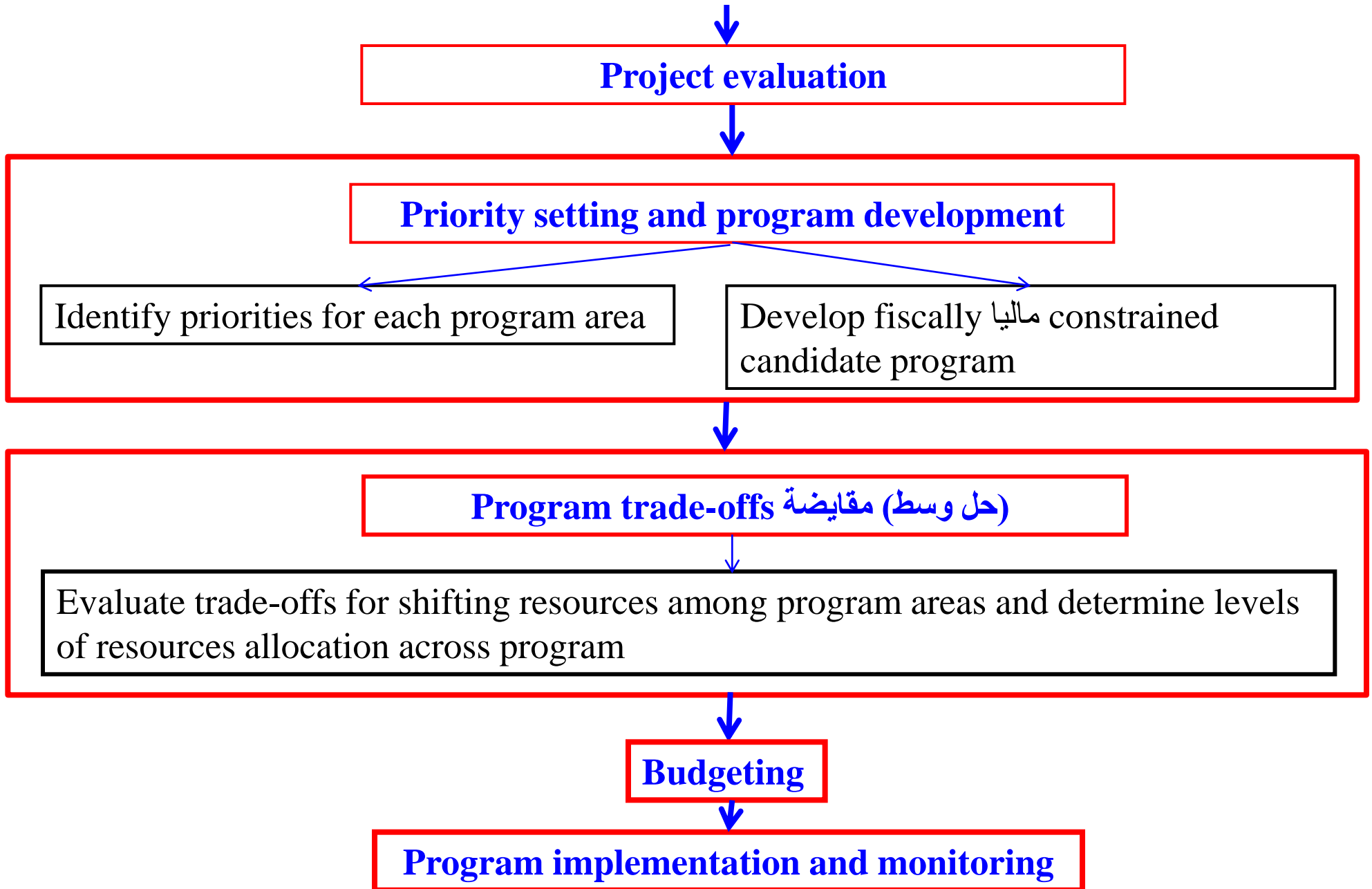
Evaluate the results

**Assessing needs and identifying project**

Identify and measure problems and needs

Identify alternatives solutions





## Trade-off Analysis

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graph TD; A[Trade-off Analysis] --> B[Basic questions]; B --> C[Are the solutions that are being suggested as good as possible, i.e., are they on the frontier?]; B --> D[How much must I give up to get a little more of what I want most?]; B --> E[Pareto Optimality];
```

### Basic questions

Are the solutions that are being suggested as good as possible, i.e., are they on the frontier?

How much must I give up to get a little more of what I want most?

Pareto Optimality

## Trade-off Analysis (Example: power supply)

### Scenarios

Combining the options into a set of rational plans that can be analyzed

- Close the dirtiest power plant, added one new, clean unit and invest \$100 million in demand side management.
- Invest in scrubbers for all old plants and build one new, high efficiency.

### Options

Actions that could / can be taken

- Build a new power plant
- Invest in energy conservation
- Purchase scrubbers for old power plants
- Close the power plants and build new clean plants
- Move all power generation “off shore”

### Uncertainties

Events over which the analyst has no control

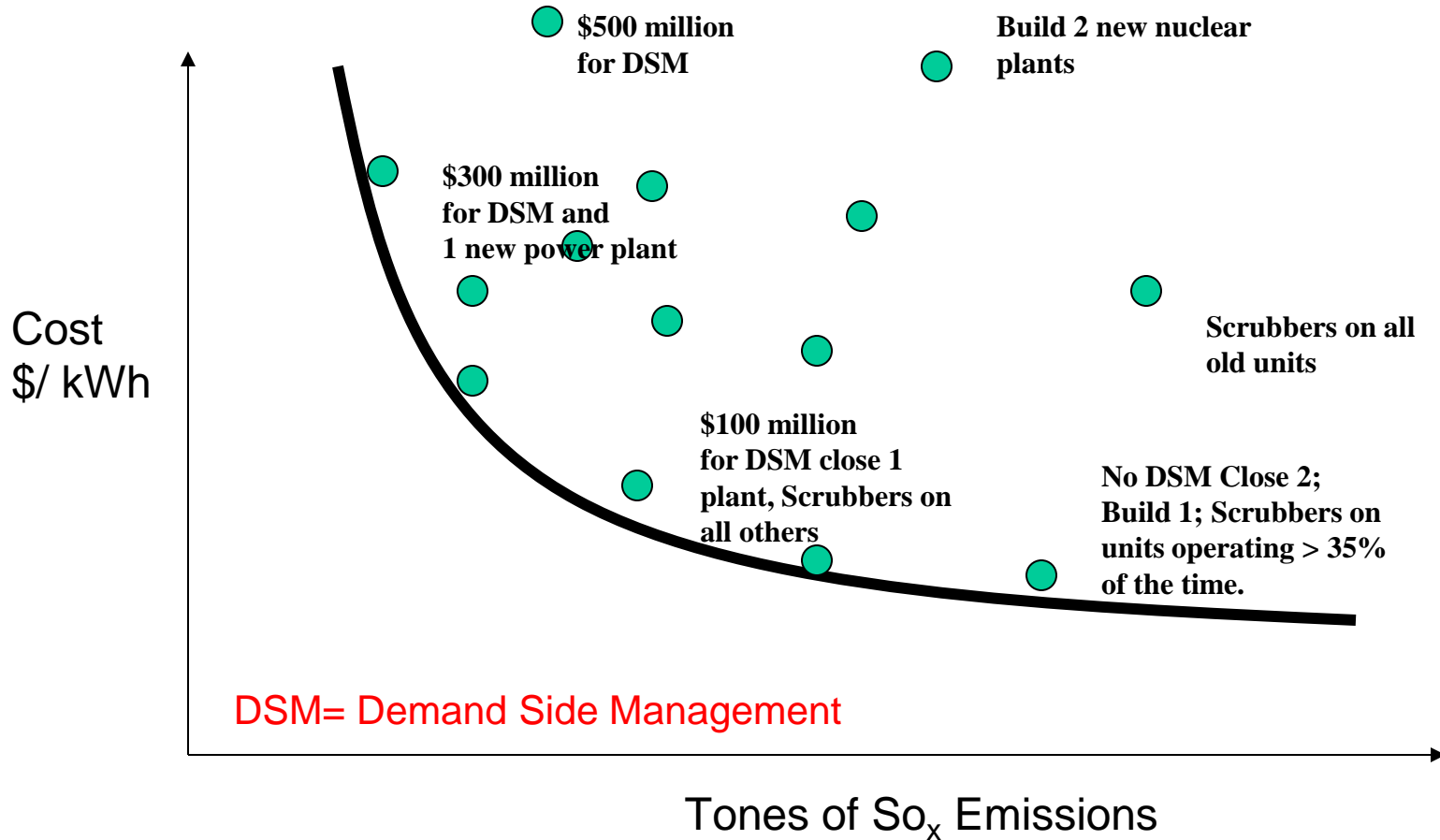
- International economic conditions
- International oil prices
- Regulatory change
- Resource (\$; land; human skills ...)  
Availability

### Attributes

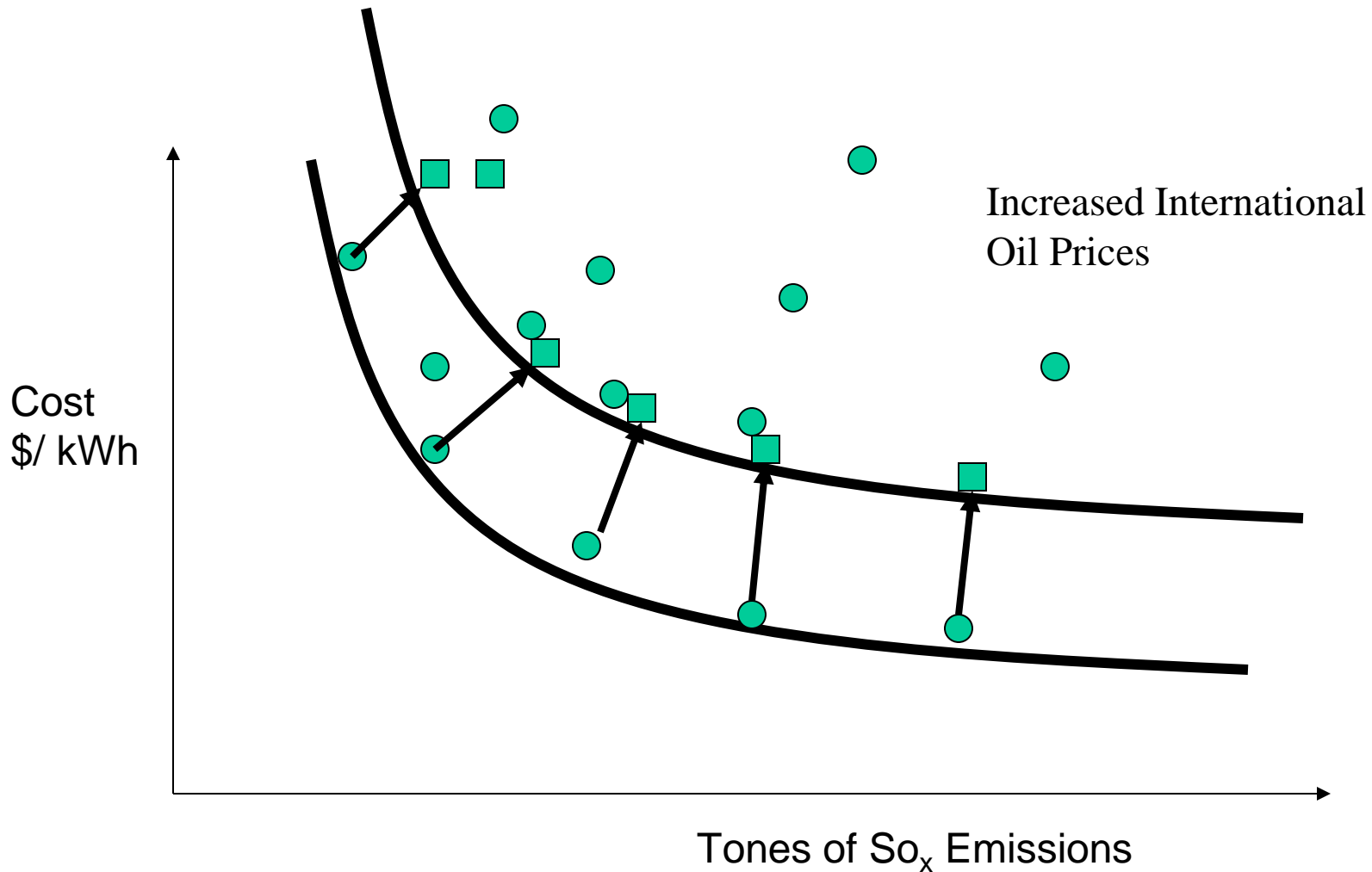
Quantifiable characteristics of the problem

- Reduced cost of service
- Improved reliability in delivery
- Reduced air emission
- Less use of land

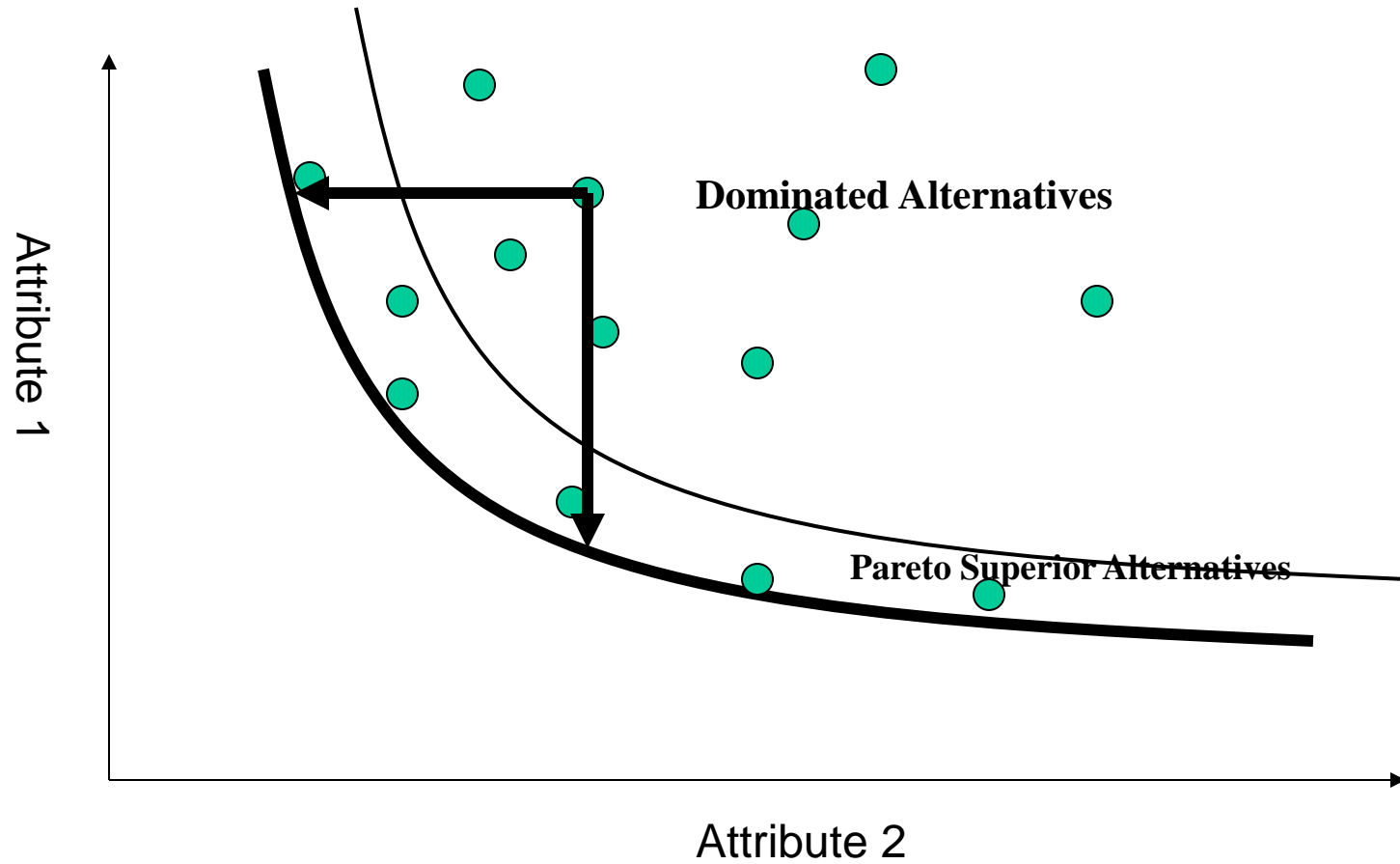
# Trade-Off Analysis: Example



## Trade-Off Analysis: Example of Uncertainty

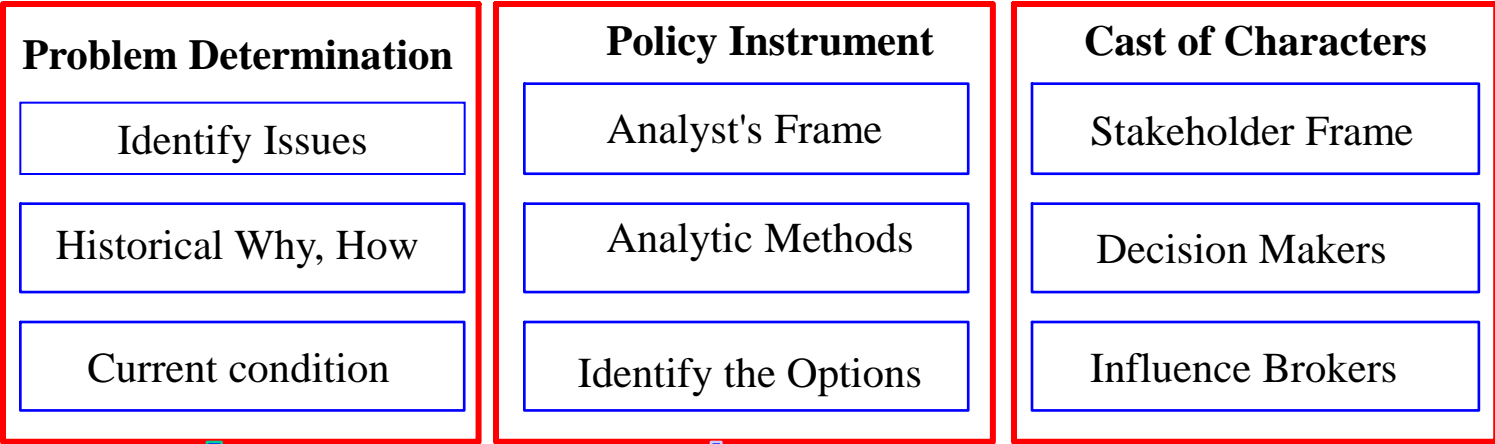


# Pareto

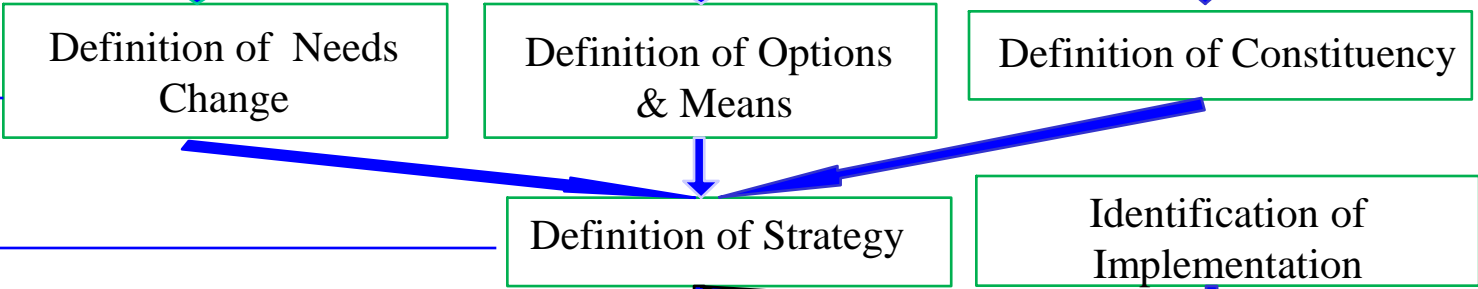


# The Policy-Making Process

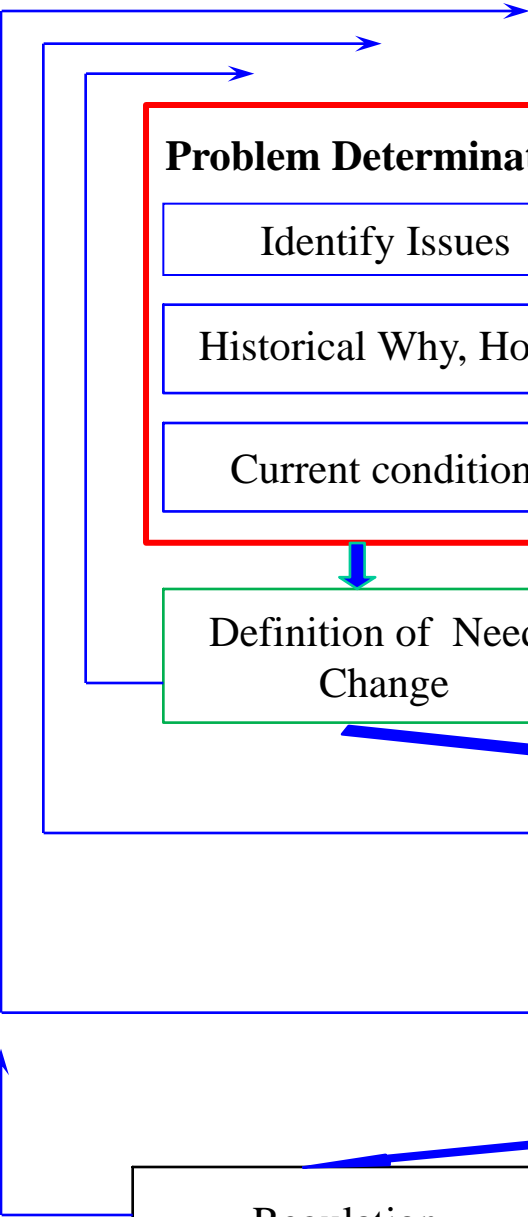
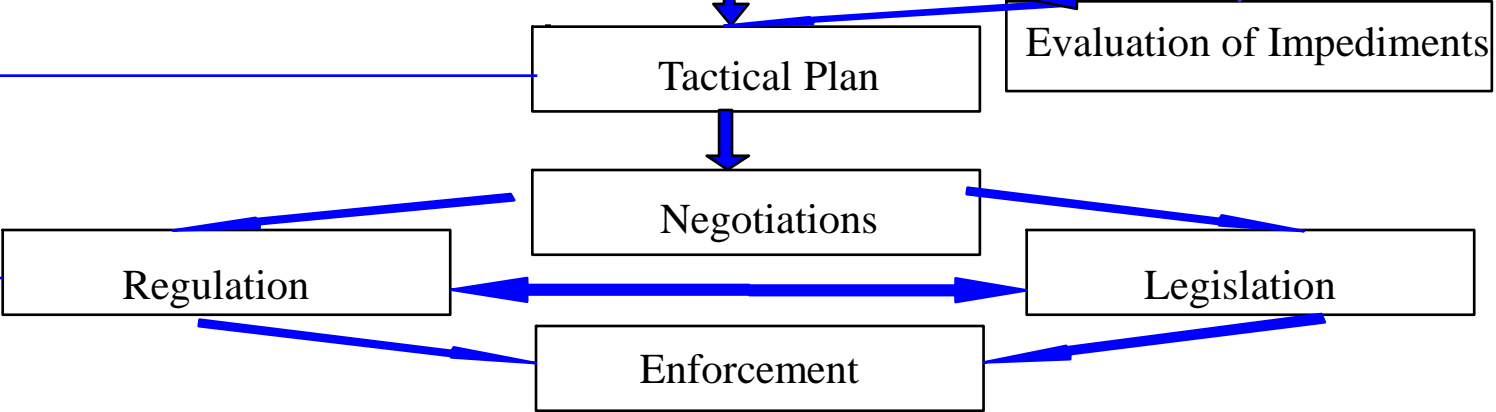
**Analysis**



**Formulation**



**Implementation**

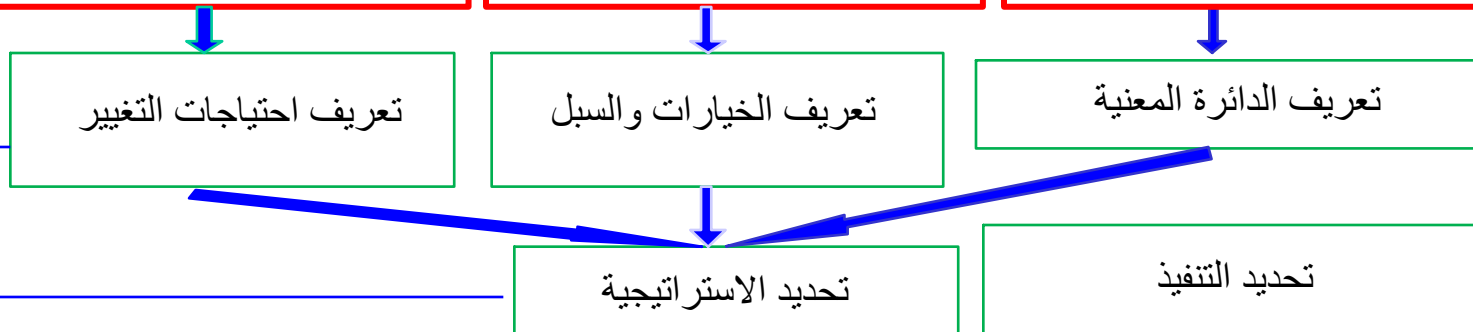


# عملية صنع السياسات

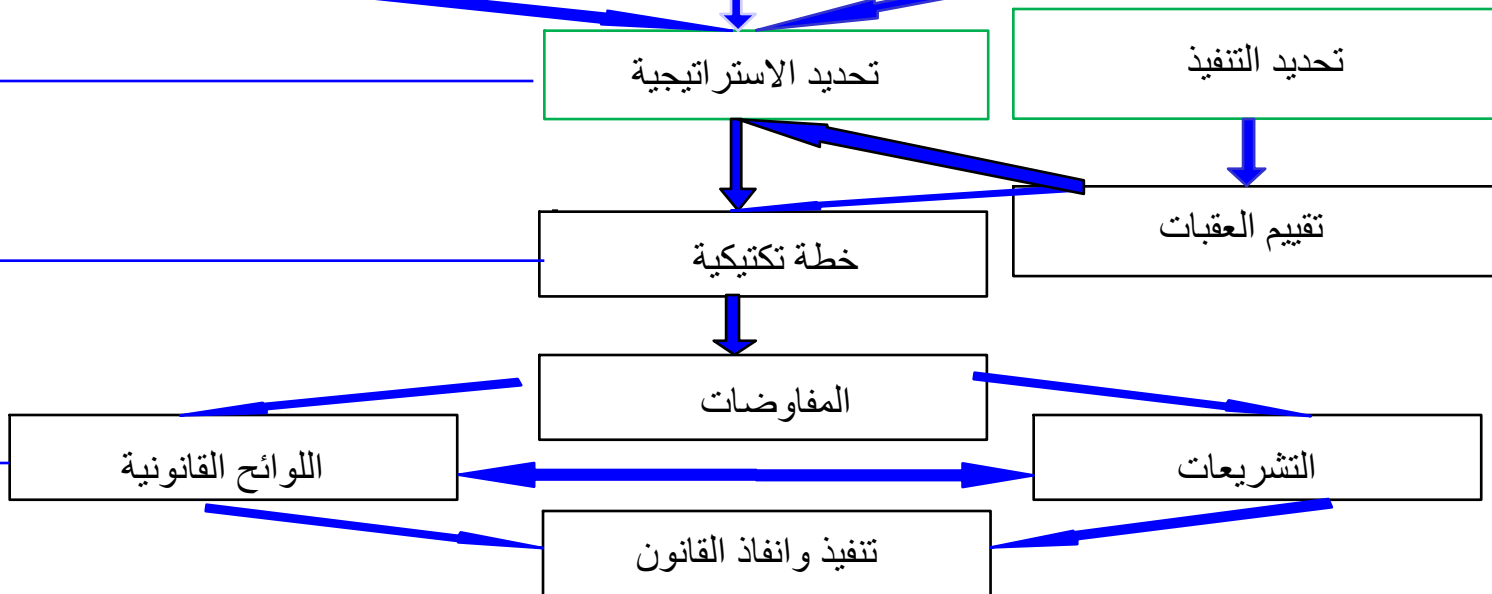
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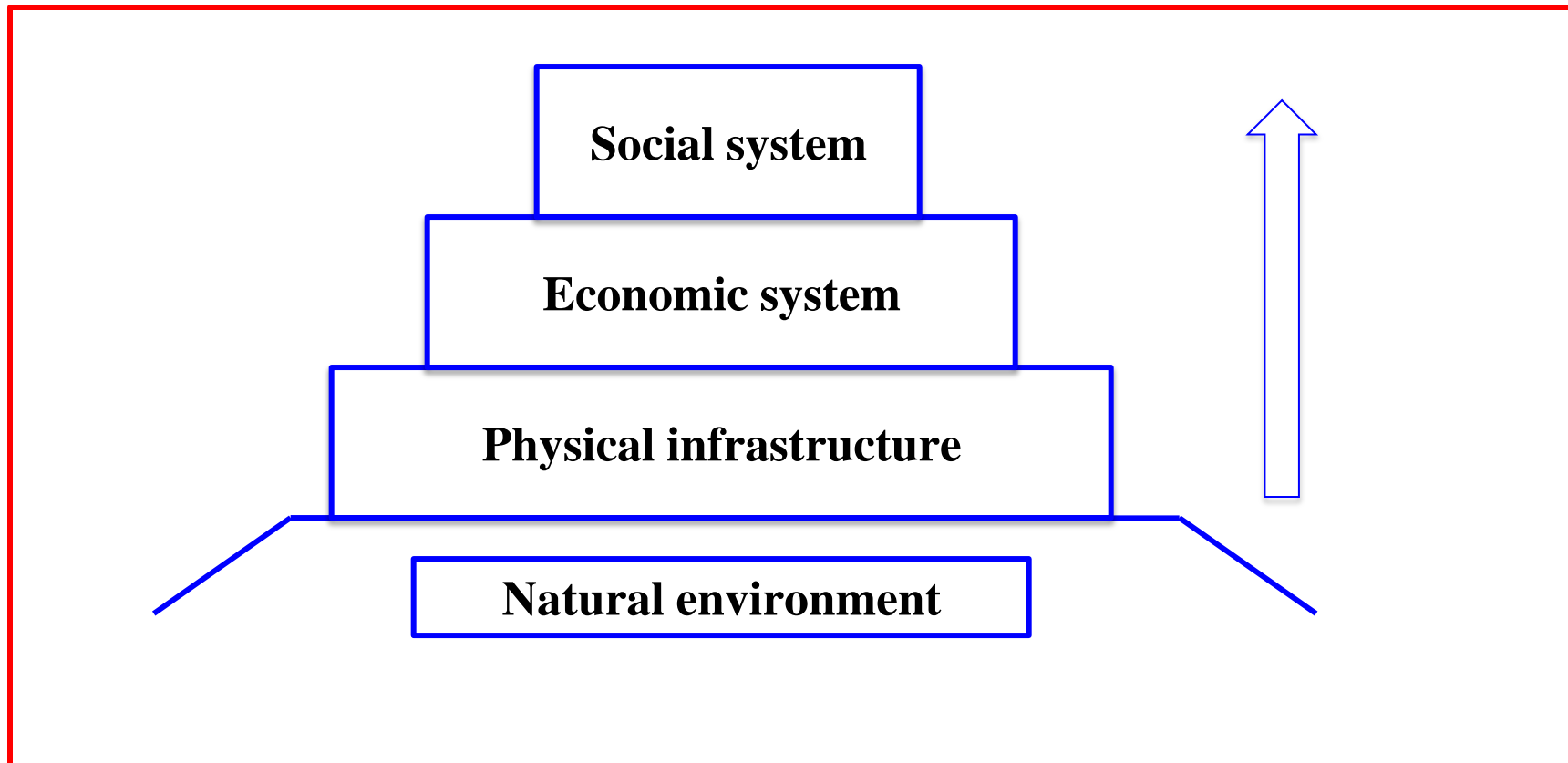
التنفيذ





## Relationship between infrastructure and development

A healthy infrastructure is a necessary ingredient of a robust قوي economy. Infrastructure systems are a part of the nation's economy (through expenditures), and infrastructure systems are also necessary to accommodate economic expansion and productivity.



**Cont.**  
**Relationship between infrastructure and development**

