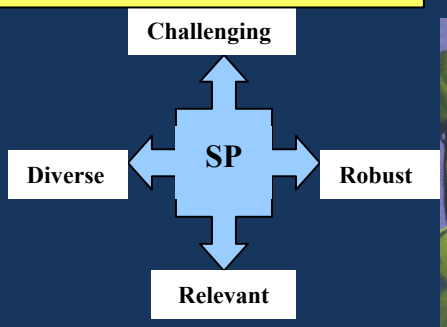
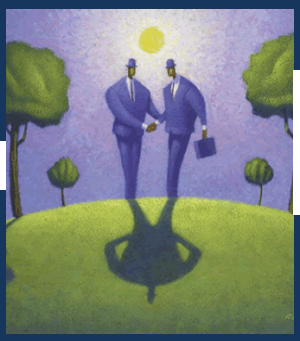
Scenarios and Multi-Criteria Decision Analysis (MCDA) as a Framework for Evaluating Strategic Options under Uncertainty

Camelia Ram, Department Of Management (c.ram@lse.ac.uk)

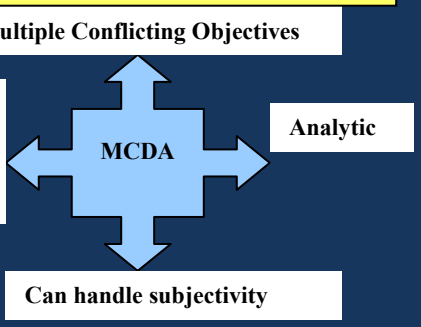
INTRODUCTION

Explore Future Possibilities





Evaluate a Range of Options



SP provides a framework for platform for creating, testing, and refining strategic options which MCDA lacks. MCDA provides a systematic evaluation tool which SP often lacks. However, the integrated use of SP and MCDA thus far can be criticised on two dimensions. Firstly, optimistic, pessimistic and most-likely scenarios have been used goes against the generally accepted view in the SP literature. These are also limited in their capacity to provide a representative range of variation that could occur. In addition, weights or probabilities have been used to aggregate MCDA measures across scenarios, which dilute exploration of results and also go against SP convention.

RESEARCH AIMS

A. To propose a method for developing a diverse set of scenarios quickly, and to investigate the use of regret to inform within and across scenario comparison of options in SP and MCDA.
B. To test the effects of its application in the context of making decisions relating to long-term development with respect to:
1. Clarity/ease of use (problem structuring, elicitation and result displays)
2. Time efficiency
3. Extent to which relevant aspects of the strategic concern challenge conventional thinking about choices.

The proposed method has been applied to help a regional corporation to determine which physical infrastructure project(s) is/are a robust in a particular geographic area given resource constraints and a range of possible changes in the economic and social environment in the next 15 years. This issue reflects characteristics of a problem to which the proposed method would be suited, namely:

- The issue implies the existence of long-term consequences that are not known deterministically, but for which provisions must be made in the present to achieve core objectives or mitigate adverse effects.
- The cost criterion is an important consideration in the decision-making process.
- Factors affecting the decision are difficult to quantify, and involve conflicting objectives.

PRACTICAL APPLICATION

SCENARIO CREATION

1. Identify and define the most important dimensions of uncertainty.

2. Define values or conditions that cover the range of possibilities for each uncertainty dimension.
Green denotes Best-Case. Red denotes Worst-Case.

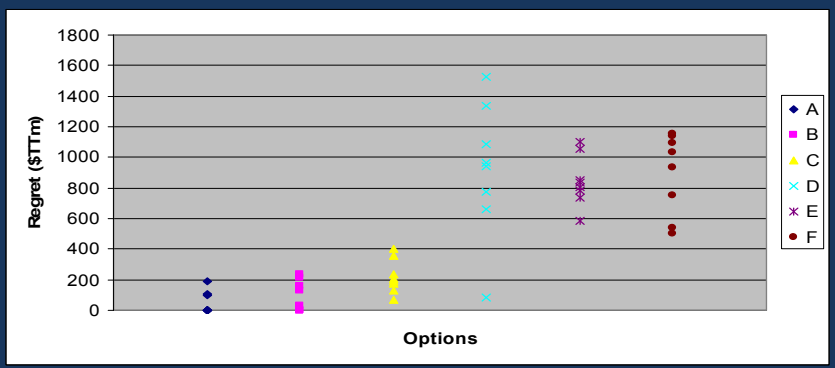
3. A scenario is defined as a combination of conditions comprising of one condition from each dimension, as well as any foreseeable trends.
Eg. BWB- There has been decline in the energy sector (trend). However, property tax is affordable, the detection and response rates to crime are low, and job security is high.

Affordability of Property Tax	Detection and Response Rate to Crime	Job Security
Easily affordable	High	High
Unaffordable	Low	Low

Affordability of Property Tax	Detection and Response Rate to Crime	Job Security
B		B
	W	

MCDA PROCESS

MCDA BUILDING BLOCKS			
OPTIONS		CRITERIA	
A	Agriculture and related small business	Quality of Life	Environmental
B	Family Initiated Small Service Enterprise		Physical Accessibility
C	Leisure/Tourism		Economic
D	Industrial		Cost
E	Facilities for vulnerable citizens		
F	Retail and Entertainment Complex		



CONCLUSIONS & FURTHER RESEARCH

Overall Performance of an option under a given scenario= ∑all criteria (Value x Normalised Weight)
where Value = Extent to which each option helps to achieve a desired level of a criterion in a particular scenario on a 0-100 scale.
Normalised Weight = Perceived importance of each criterion on 0-100 interval scale.
Cost-Equivalent Regret of an Option- Loss in value relative to the best option. This is calculated for each scenario and shown in the figure above.

1. Further analysis of options A and B (lowest regret from figure above) indicates that they are robust across changes in weights and values for economic and environmental criteria, which are the most important measures of success in the model.
2. The level of detail in the scenarios was deemed sufficient by the decision-maker. Although the time taken for elicitation was substantial, he was engaged with the process as he perceived it was necessary for 'challenging the status quo and making choices based on one's long-term vision'. The main shortcoming was the inability of the method to take into account political pressures. Positive responses were also found in 3 of 4 additional applications of the proposed method.
3. Further development is required with respect to (i) how to systematically reduce combinations; (ii) managing multiple stakeholder perspectives; (iii) greater facilitative support for generation of new options that are more robust; (iii) enhancement of visual displays and interactivity of model and results.