Risk and Decision Analysis Associated with Negative Increase of PM 2.5 level in the air in Los Angeles-Long Beach California Metro Area

**Background**

Air pollution is becoming increasingly severe. It has been identified as an environmental problem in a global scale nowadays and it is affecting people’s health and life. PM 2.5 is one of the indexes that can be used to indicate the air quality, referring to very tiny particles or droplets in the air that are two and one half microns or less in width. California has been identified as one of the states that has the worst air quality because its huge and growing population and its increasing technology and industry, especially for Los Angeles-Long Beach metro area.

**Objective**

The objective of this study aims to give the local government better guidance on dealing with the future air pollution issues. The study will start with two aspects, the first is to focus on the uncertainty of the future air quality in the Los Angeles-Long Beach metro area, the other is to evaluate each potential decision based on the known result of uncertainties. And then, the sensitivity analysis will be used to see the influence of each uncertainties and how they affect the decision. Thus, the local government will have a better idea on how to deal with the air pollution in the future within the 10 years or so.

**Risk Analysis**

Research will focus on the PM 2.5 level of Los Angeles-Long Beach metro area within 10 years in the future. The US EPA has implemented the National Ambient Air Quality Standards (NAAQS) for Fine Particulate Matter (PM 2.5) to indicate the Air Quality Standards for PM. Assuming that this standard will not change in the future, the level of PM 2.5 in the Los Angeles-Long Beach will certainly increase in an unknown degree which can be simply identified as high, medium, low degree. Then there will be a gap between the future PM 2.5 level and the standard PM 2.5 level under each circumstance that the local government wants to minimize. The research will first concentrate on each scenario and analyze the uncertainties as well as main influence factors of each scenario.

**Decision Analysis**

Decision Maker (DM) is the local government. The objective is minimizing the cost to wipe out the difference between the real level of PM 2.5 and the standard level of PM 2.5. There are 3 potential alternatives that can be carried out to fulfil the task. The key is to find the relationship between the expected cost and its effect of each scenario under each decision. After finding this relationship, we can do both the quantitative analysis as well as the qualitative analysis to rank for each alternatives. Besides, the sensitivity analysis can be used to identify the most influential uncertainty and how that would affect the ranking of the alternatives. The local government should definitely take that into their consideration.