STOCKHOLM UNIVERSITY Department of Computer and Systems Sciences

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Assignment 3: Applicability of Risk Management

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1. Introduction

In this 3rd assignment, I will talk about two of Cox's paper:

- *"What's Wrong with Hazard-Ranking Systems? An Expository Note"* (2009)

- *"Clarifying Types of Uncertainty: When Are Models Accurate, and Uncertainties Small?"* (2011).

The main questions this document will answer are:

- *"Are the results valid? Are the methods realistic and applicable?"*

- *"Why, why not?"*

- *"How can we know this, and what does it mean for the solutions in assignment 1 and 2?"*

Initially, a critique of the two papers will be presented, trying to answer the questions above. At the end, the first two assignments *"Overview and application: Risk management by FIAT in the relocation of production plants"* and *"Evaluating Methods: Risk management by FIAT in the relocation of production plants"* will and be analysed based on the Cox's idea presented in these two papers, paying great attention to the evaluation methods used in the second assignment, such as: PESTLE, BOW-TIE and SWOT.

2. Analysis of Cox's articles

2.1 "What's Wrong with Hazard-Ranking Systems? An Expository Note" (2009)

2.1.1 Introduction

In the introduction part of the first paper, Cox explains that the priority scoring and rating systems are increasingly used, above all thanks to the national and international standards and regulations. That imposes the use of risk management techniques, but criticizes them harshly, as, according to him, they cannot be used when the risks are connected to each other, correlated.
It is possible to use a quotation in order to better explain the concept: "when risk-reducing opportunities have correlated consequences, due to uncertainties about common elements (such as potencies of chemicals, effectiveness of countermeasures, etc.), then methods for optimizing selection of a portfolio (subset) of risk-reducing opportunities can often achieve significantly greater risk reductions for resources spent than can priority-scoring rules" Cox (2009).

Consequently, according to Cox, it is imperative to use techniques that consider the interdependencies between the consequences of different risk reduction activities, which would produce excellent results.

2.1.2 Motivating examples

In this section of the paper, Cox show some example of the application of priority-scoring systems. Is evident that in all these examples, these systems are not adequate because of the correlated risks.

2.1.3 Priorities for known risk reductions

In this chapter, Cox talked about the “priority-setting process”, is a general framework formed by three elements:
1) A set of items to be ranked or scored: this phase requires us to classify the items as items, hazards, prospects or opportunities.
2) An ordered set of priority scores that are used to compare hazards: i.e. for categorical grades, such as high, medium and low.
3) A priority-scoring rule: is a simple mathematical function that assigns to each hazard a unique corresponding priority score.

Thanks to the "priority-scoring rule", ranking is drawn up, that show the order of resolution of the hazards.

2.1.4 Priorities for independent, normally distributed risk reduction

Cox in this section explains how to manage the uncertain value j obtained by facing the hazard. In this case, to use the "priority-based risk management” we assume that their values are random variables and that the decisionmaker is risk-averse.

2.1.5 Priority ratings yield poor risk management strategies for correlated risks

According to Cox, this is the main part of the paragraph that better explain that: “No priority rule can recommend the best portfolio (subset) of risk reducing opportunities when the optimal strategy requires diversifying risk-reducing investments across two or more types of opportunities or when it requires coordinating correlated risk reductions from opportunities of different types (having different priority scores).”

2.1.6 Discussion and conclusion

The conclusion of the paper is that, as told before, that the priority scoring and rating systems are increasingly used and is important to know how to use it. In some situation like correlated risks, is better to use other methods.

2.2 “Clarifying Types of Uncertainty: When Are Models Accurate, and Uncertainties Small?” (2011)

In this paper, Professor Aven try to explain what the word “scientific uncertainty” does it

Means. He proposes a concept: “should be considered greatest when no accurate prediction model can be established, and least when one can be, and when uncertainties about its inputs are “small” in some relevant sense”.

In the examples, he explained how larger uncertainty of input could create a smaller uncertainty output. Also, he talks about the accuracy: he thinks that is not necessarily possible to impute accuracy to a prediction model. The last example focuses on the importance of causality: is important to know is the causality of the risks to can predict the consequence. It is also possible to predict risks accurately by techniques. Furthermore, he upholds that there isn’t reason to think that “an accurate prediction model should also be an accurate causal model.”

Finally, Professor Aven explain that we need a clearer definition of scientific uncertainty, and that doesn’t make sense to compare, classify or label them in terms of their relative sizes, and says a very interesting metaphor: compare scientific uncertainty to the vectors, saying that “to compare vectors of multiple criteria or attributes, one might define one vector as being “smaller than” another if every component of the first is smaller than every component of the second. The same might be valid for the "accuracy" of predictive models and for the size of uncertainty about inputs to models.”

In according to Aven, the complexity and the uncertainties of the models are too big to can classify as “big/small”, or “accurate/inaccurate”.

Furthermore, with the updating of risk management, new quantitative approaches based on uncertainty are being created.

3. Application of the Cox idea to the first two assignments

As previously anticipated, the first two assignments were based on the case study: "Risk management by FIAT in the relocation of production plants".
Different techniques were used in order to better manage the risk posed by the problem: Bow-tie, Pestle, swot.

In according to Cox, the solutions that I used to solve the problem are premature, need more details. In according to Cox, is important to explore the risks with a different lens, considering the correlations of them.

In the first assignment, the risk matrix considered values like “Low”, “Medium”, “High”. In according to Cox, this qualitative approach shouldn’t be a good model of risk assessment but is possible to replace this approach with a mathematical approach.

In the second assignment, is possible to use Bow-Tie and PESTLE methods to can check the correlations between risks, but them doesn’t consider the assessment of different risks, so I can’t consider it with the Cox lens.

4. Conclusion

I agree with Cox's ideas, it's important to face some risk management problem based on a new clearer definition of scientific uncertainty, and the complexity and the uncertainties of the models are too big to can classify as "big/small", or "accurate/inaccurate".I also think that it is also possible to use this classification to be able to have an overview of the problem.Moreover, it is important to face risk management problem with techniques that allow to consider correlation factors.

References

- Cox, L.A., 2009. What's wrong with hazard-ranking systems? An expository note. Risk Analysis: An International Journal
- Cox, L.A., 2011. Clarifying types of uncertainty: when are models accurate, and uncertainties small? Risk Analysis: An International Journal