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RISK MANAGEMENT HT2018
Assignment 3

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Applicability of risk management

Introduction

Risk management takes decisions after a process that identify, classify, evaluate and prioritize risks with quantitative, qualitative, or mixed methods. The choice of the approach is divergent in order to be suitable to the specific case study. In many cases it is questionable if following standards in literature risk management is the best approach or these are not appropriate for the study. However, there are some example in which it is arguable if the application in accuracy of literature models is just theoretical or there is a clear pro in the real life uses for a risk management decision.

This paper aims to present the main ideas of two articles by Cox (2009, 2011) that explain his point of view showing weakness of some risk management models and rankings. Then a discussion wants to answer to some questions:

- Are the results valid?
- Are the methods realistic and applicable?
- What does it mean for the solutions in Assignments 1 and 2?

Literature review

This section wants to introduce the main ideas of the two article written by Cox (2009, 2011).

Article One - What's Wrong with Hazard-Ranking Systems? An Expository Note. Cox. 2009.

Very often it is usual to do a research on the most important risks that could prevent the success of a company. The common principle of risk management is to select a set of risk-reductions in order to maximize the benefit, prioritize them by ranking and choose the activities from the top of the priority list.
However, this method becomes inconsistent when the different activities are dependent on each other. The same applies from the potential correlations resulting from risks and events. Cox underline this point with some real-world examples of risk priority scores systems in different areas that do not exploit correlations among risks-reductions.

In the third section of the article, Cox gives a general framework for a priority-setting process that consisting in three elements: (1) a set of items to be ranked or scored; (2) an ordered set of priority scores; (3) a priority-scoring rule as a mathematical function.
However, it is not possible to choose the best set of risk-reductions when these hazards are subject to uncertainties related to their risks and events. It is emphasized that no priority rule can recommend a set of risk-reducing measures when these are correlated with each other.
Finally, five concrete examples are presented. These are consistent for the problem described above. Cox concludes his article with a clear thesis: it is time to stop using risk priority scores to manage correlated risks because they often produce simple but wrong answers. In the other hand he recommends starting to consider optimization techniques that treat dependencies.

Article Two - Clarifying Types of Uncertainty: When Are Models Accurate, and Uncertainties Small? Cox. 2011.

The article is a commentary on a text by Professor Aven on the importance of defining "scientific uncertainty" for use in risk management and policy decisions in the context of precautionary principle. Cox wonders about what is meant by an “accurate” prediction model and by “small” uncertainty in its imputs. Then, the author covers his question by analyzing three examples.
The first example explains how large input uncertainties may reduce uncertanty in model output. In the second example, Cox shows that even correct models with “small” input uncertainties need not yield accurate or useful predictions for quantities of interest in risk management (such as the duration of an epidemic). Finally, the third example makes the point that causation is not necessarily needed for risk prediction.

Cox concludes his commentary with some general opinions: there is no general comparative relation of “smaller than,” or absolute definition of “small,” that can or should be used to compare or classify uncertainties. In the same way for the “accuracy” of predictive models and for the size of uncertainty about inputs to models. Moreover, models and uncertainties in risk management are usually too complex to permit unambiguous classification in small or large, accurate or inaccurate.

Discussion

This section wants to conclude and answer to the questions presented before in two point: first commenting on the articles and theses in their validity and applicability and then arguing on the assignments 1 and 2.

Are the results valid? Are the methods realistic and applicable?

The first article discusses an argument that is not new. Cox himself presents his text as a rundown when in the last section he writes "nothing in this note is meant to be new or

surprising to experts in decision and risk analysis" (Cox, 2009). In fact, what the reader takes most is the criticism to scoring methods with examples that show only bad performance. It is clear that just ranking or scoring risks isn't enough for a proper risk management, but also this point is a generally state and a quite common known fact. All the examples are good for support the author thesis and show a logic approach but they are not generalizable. The text is coherent but it doesn't bring a clear way to improve the work. Cox suggests that it is time to stop using risk priority scores to manage correlated risks because they often produce simple but wrong answers. But that's not always a bad solution: it depends by the case because scoring methods are practical and simple. In a real application, risk assessments are quite often executed in specific departments with workers not necessarily trained in statistics or decision models. There is a trade-off between high profit and costs in money and time. A too complex risk process which considers all correlations and dependencies between hazards and possible measures would be time-consuming and very expensive. Obviously, it depends by the organization, his analysis in risk management and his use.
Cox recommends starting to consider optimization techniques that treat dependencies, that it is a good point but the theory sometimes is distant from the real approach. Moreover, the author presents just examples: methods are very appropriates with the specific case-studies but it is difficult to expand the content to other problems.

The second article is a commentary of another article by Professor Aven: it would be useful to read this text a priori to be able to follow the thought process. This advice is also given by the fact that Aven's point of view is not well presented in this article; it is assumed that the reader is aware of the previous content and ideas.
Starting from the definitions of Aven, Cox questions the classification of accuracy and small or large uncertainty. But in the end, according to Aven, there is not an exact answer: the point of a precise definition of a "large" or "small" uncertainty is open to make this system adaptable to different situations, also because risk management cases are usually too complex. In this way, the author presents some examples to demonstrate some clear facts but the thesis is still that of Aven.

In order to answer the question whether Cox's results are valid, my answer to that would be yes, they are. Infact he explains the thesis that he wants to bring with examples that consistently emphasize the point with specific validity in that context. Answering if methods are realistic and applicable, no, they are not since he supports his thesis only with specific examples, it is difficult to generalize it and finally he leaves some open questions.

What does it mean for the solutions in Assignments 1 and 2?

Previous assignments presented a limited example of risk management applied to Healthcare. In particular, they showed an example of a process with risk identification, classification, assessment and evaluation.
Healthcare is a very large area and after presenting the salient aspects, however, specific cases are reported in order to see the applicability in practical terms. Surely a more detailed general approach is needed, in agreement with Cox, it would be useful to analyze the risks

with their respective correlations and implications: an optimization techniques could be done. Anyway is difficult to think about such a general application, therefore a smaller approach is request.
In both assignments there is a presentation of a risk matrix assessment and evaluation that offers a visual, fast and comprehensible overview of risk priorities, this does not seem to attribute concrete numerical values of uncertainty. Cox is against a qualitative use: the risk matrix used the terminology similar to the one he quotes ("High", "Medium", "Low"), in particular it was the qualitative rating ("Frequent", "Probable","Occasional"," Remote") that should not be a preferable model of risk assessment. In reality these labels were inserted on the basis of the recorded data and time analysis models quantitatively, studying the probability of occurrence of such an event. Therefore the passage to the quantitative scale is easily reportable. Anyway the choice of the three methods in the second assignments are still admissible and questionable.

In conclusion it is interesting to note that the choice of different case studies can emphasize and demonstrate a certain thesis. Likewise it is surprising to show how the different applications can lead to different results.

References

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