



DECISION MAKING FOR RISKY TASKS UNDER UNCERTAINTY

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Abstract: *This paper discusses the decision-making process for risky problems under uncertainty. Further the steps of decision making, using of mathematical model and statistical methods, also standard formula of expected value are given.*

Keywords: *Decision making, risky problems, uncertainty, risk analysis, mathematical model and statistical methods, standard formula of expected value.*

In today's world of economics, decision-making is an important task for many areas of life, including business, economics, politics, and personal life. However, making decisions in the face of uncertainty can be a complex and risky process.

The first step in making decisions under uncertainty is to identify possible scenarios and their probabilities. However, under uncertainty, the probabilities may be unclear or impossible to estimate. This may occur, for example, when information is unavailable or incomplete, when possible scenarios are unknown, or when emotional factors may distort the estimate of probabilities [1].

The first approach, the use of expert evaluations. This means that experts estimate the probabilities of possible scenarios based on their experience and knowledge. However, this approach has its limitations, as experts may be subject to subjective errors and biases.

The second approach, the use of mathematical models and statistical methods. This can include the use of risk analysis techniques, simulation modeling, or Bayesian statistics. These methods can help in determining the probabilities of possible scenarios, even if the information is incomplete or unavailable. However, these methods can also have their limitations and require a certain level of mathematical and statistical training [4].

A third approach is the use of intuition and emotion. While this approach can be useful in certain situations, it can also lead to subjective errors and biases. For example, people can be emotionally influenced when making decisions under uncertainty, which can lead to risky or suboptimal decisions.

One of the major challenges of making decisions under uncertainty is balancing risk and possible benefit. Depending on the situation and personal values, some people may be more inclined to take risks, while others may prefer a more conservative approach. At the same time, some risks may be unknown or unpredictable, which can lead to unexpected



consequences. To choose the best risk decision, the option associated with the best possible outcome is chosen when the probabilities of all scenarios are known. At that, standard formulas of expected value are used [1]:

$$\begin{aligned} \text{Anticipated result (action)} &= \\ &= \sum_{\text{script}} \text{result (action, script)} \cdot \text{probability (script)} \end{aligned}$$

and the option with the highest expected positive result or the lowest expected negative result is chosen as the optimal solution (the optimality criterion for decision making under conditions of risk). An important aspect of decision making under uncertainty is the consideration of time. Decisions made under uncertainty can have long-term consequences, so it is necessary to consider possible scenarios and probabilities of their occurrence on a long-term basis.

In conclusion, decision-making under uncertainty is a complex process that may involve expert judgment, mathematical models and statistical methods, as well as intuition and emotion. It is important to consider its risks and possible benefits when making decisions, and to consider its long-term consequences. Further research in this area can help improve decision-making under uncertainty and reduce the risks associated with it.

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