Abstract

Risk analysts spend a great deal of effort quantifying risk, both in terms of consequence and likelihood. But until risk is compared against risk tolerance criteria (RTC), it impossible to know whether that risk is too high or not, and if it is too high, by how much it must be reduced to become tolerable. RTC drive the allocation of finite resources for risk reduction. Rational RTC lead to rational allocation of resources while irrational RTC lead to misallocation of resources and ultimately, poorer safety. Most practitioners acknowledge the need for RTC but do not discuss how they are developed.

While a few countries dictate RTC, most governments, including that of the United States, leave it to organizations to establish and justify their own RTC.

Traditional PHA risk matrices are flawed in that they frequently employ consequence severity, or impact, categories for a variety of impact vectors (safety, community, environment, etc.) that are neither internally consistent nor consistent in relationship to each other. They are also flawed in that they use likelihood categories that are not logarithmic, and have risk categories that consider risk in terms of the urgency to do something—anything—rather than have risk categories that consider risk in terms of risk reduction.

This work reviews a methodology based on impact equivalency to evaluate whether RTC are structurally sound, and goes to on to explore a variety of risk benchmarks and shows how to infer RTC from them. Finally, the work proposes a methodology for addressing the historically poor equivalency between safety and environmental RTC.

Keywords

Risk tolerance criteria, consequence severity, impact vectors, impact equivalency, environmental impact