

Using Root Cause Analysis to Improve Risk Management

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The spotlight is on risk management these days, due to several recent catastrophic failures in the US and Canada, including multiple crane accidents, a massive propane explosion in the metropolitan area of a large city, and a nation-wide food-borne illness outbreak in packaged food products. Why have so many failures occurred when risk programs were likely in place? More importantly, how can the risks and failures be avoided?

Often risk management and root cause analysis (RCA) are viewed as separate programs or separate tools overseen by separate individuals with varying backgrounds from different departments. After all, risk management focuses on anticipating events and RCA focuses on reacting to them, right?

When you get right down to it, the RCA process should be considered part of the overall risk management process. RCA is designed to minimize or eliminate risk by reactively and proactively solving problems and removing causes that contribute to risk.

When done well, risk analysis, risk management and RCA are directly tied to an organization's business goals, which in turn define the reasons an organization is in business (i.e., profits, customer satisfaction, product quality, environmental protection and worker safety, etc.). Even in a tense economic climate, world-class organizations effectively use their RCA programs to help achieve business goals and remain strong. By integrating their programs and investing in people, these organizations are better positioned to prioritize risk management decisions and remain competitive in an unforgiving economy.

Before we explore the RCA best practices that improve risk management, we need to establish a baseline definition of risk and root cause analysis. Risk, at a minimum, is a two-dimensional concept involving:

- 1) The possibility of an adverse outcome
- 2) Uncertainty about the occurrence, timing or magnitude of that adverse outcome

If either of these factors is absent, then there is no risk¹.

Root cause analysis is a structured process designed to help an organization to define problems that caused past events, understand the causes, and most importantly prevent recurrence.

Root cause analysis has four steps:

- 1) Defining the problem
- 2) Developing a causal understanding of why the problem occurred (cause and effect chart)
- 3) Identifying solutions
- 4) Implementing and monitoring effectiveness of the best solutions²

A deviation from one, or more, business goals normally defines the problem that needs to be prevented, while effective solutions control or eliminate known causes of that problem. Additional business goals and cost-benefit criteria help identify the best solutions. Solutions are implemented to control or eliminate a suite of known causes, which become known as “root causes” once solutions are applied. The more root causes we identify, the more certainty there is that the problem cannot occur the same way again.

A root cause analysis program has the most positive impact on reducing or eliminating risk when it is directly integrated with the phases of risk analysis and risk management.

¹ Colvello, V.T., and Merkhofer, M.W. 1993. Risk Assessment Methods. Approaches for Assessing Health and Environmental Risks. Plenum Press, New York.

² Gano, D.L. 2007. Apollo Root Cause Analysis – A New Way of Thinking, 3rd Ed. Apollonian Publications.

Starting with the three main elements of **risk analysis (RA)**, let's look at how the RCA program integrates:

1. RA phases:

Hazard identification -- identify risk agents, and the conditions under which they potentially produce adverse impacts.

Risk assessment -- describe and quantify risks.

RCA steps:

Defining the problem – define the type and scope of risk that needs to be mitigated, including: a formal statement of what the problem is, when it occurred (including frequency), where it occurred, and the significance of it (i.e., actual and potential severity of the consequences). Because the best teams include people with diverse experiences, perspectives will be different. Disagreements about problem definitions and causes can waste valuable time. Solid RCA practices will help teams create problem definitions on which everyone agrees.

Evaluate the impact that the problem had on business goals, and uncover the potential consequences of recurrence. The “what” statement, referred to as the “primary effect” in an RCA, helps us define the hazard.

Creating a cause and effect chart – understand why a problem happened, and the evidence proving it. What are the causal relationships among all the inter-dependent sets of action and conditional causes? The cause and effect chart will define the lower-level details of the hazards in the risk analysis, thus making it easier to find proactive solutions.

2. RA phase:

Evaluation -- compare and judge the significance of risks. What are all the risk agents? What are all the conditions under which the risk agents could occur and cause an adverse outcome?

RCA step:

Cause and effect analysis (with dynamic analysis) -- analyze the major cause paths on the cause and effect chart, along with those from other problems, in order to identify common causes (i.e., similar causes that contributed to more than one organizational problem). Identify systemic causes³ to highlight ways in which an organization is conducting its business that pose risks to multiple business goals. Implementing solutions for systemic causes may seem expensive when compared with the significance of any individual problem. But this logic is flawed. In calculating return on investment, the cost of controlling a systemic cause must be contrasted with the combined significance of all problems to which it contributed.

The **risk management (RM)** phase also is more powerful when the RCA steps are incorporated.

3. RM phase:

Option generation -- identify alternatives for managing risk.

RCA step:

Solution development – challenge each and every cause by generating solution ideas, knowing that each cause could play a role in future incidents. Don't focus on a few causes at the expense of others, because something less obvious -- but important -- might be overlooked. Favor solutions that will eliminate causes most likely to contribute to a future problem – especially those with more severe potential consequences.

4. RM phase:

Option evaluation -- appraise and compare available options.

³ Systemic causes are individual causes or groups of causes that identify where the system itself (i.e., the way the organization conducts its business) contributed to a problem. Systemic causes can manifest at the organizational level and include causes such as policies, procedures and work practices (i.e., management systems) as well as at the work force-level including work practices and culture and at the individual-level including work practices, behavior, decisions and belief systems.

RCA step:

Solution evaluation – evaluate the potential effectiveness of various solutions relative to the cost of the problem and the solution’s probability for success. Focus more on identifying the risk of specific individual causes rather than generic categories of causes. Do the solutions that control conditional causes have a greater certainty of controlling risk because conditional causes are predictable and stable? On the other hand, are solutions aimed at controlling action causes less likely to be successful because unexpected actions are usually unpredictable? For instance, if a worker moves to the wrong place at the wrong time, will you be more successful trying to control the action cause “worker moving” or the specific conditions that allowed him to move freely into the wrong place at the wrong time? What circumstances put the worker in that place? Was it because he was following instructions, because of unusual weather, the absence of another employee, or because no barrier existed to prevent him from moving to that location?

5. RM phase:

Option selection -- select one or more alternatives for implementation.

RCA step:

Evaluate solution effectiveness – from all solution ideas, choose the best solutions using predetermined criteria. For instance, which solutions are the most likely to be successfully implemented because there is buy-in from those responsible for performing the new solution? Which solutions will provide the best value (return on investment or cost/benefit)? Which solutions will address multiple causes, common causes (that exist in more than one problem) and systemic causes? Which causes have the highest probability of occurring again and should take priority for elimination? Which effective solutions can be implemented quickly, immediately reducing the organization’s vulnerability? Which long-term solutions will increase the certainty of preventing recurrence?

6. RA phase:

Implementation and enforcement -- implement, monitor and enforce alternatives.

RCA step:

Solution implementation and monitoring – design metrics and track solution effectiveness. Properly prescribed solutions must take shape in the form of a specific action, accomplished by a specific person(s), within a specific time frame. Each solution must be assigned a metric and a time period by which it will be tracked to ensure that it is effective in preventing the cause(s) it is acting on. Once the success of a solution is confirmed, the solution idea should be communicated across the organization and ideally implemented where the same causes are creating risk. The more causes that are controlled (i.e., the more solutions that are implemented), the greater the probability that problem recurrence is reduced.

Leveraging RCA to proactively manage risk

When a company performs an RCA on a problem, it is essentially acknowledging that it cannot afford to experience recurrence. Although RCAs often are considered reactive to an incident or problem, they're actually proactive – working to eliminate risk and prevent the same problem from occurring again. It is wise not to “leap-frog” beyond existing problems in the quest to be proactive. Existing problems that go unaddressed allow causes to remain which can end up contributing to hazards the organization aims to avoid! Instead, clean up the fruit rotting on the ground, so to speak, before looking higher in the tree!

Taking pro-activity a step further, it can be valuable to perform RCAs on hypothetical problems or scenarios your organization is likely to encounter. When one company encounters a problem, how can others – from within the same industry and beyond -- learn from it and avoid it? What incidents would be helpful to analyze? What circumstances would cause that to happen? What solutions can be proactively implemented to eliminate those circumstances?

Utilizing RCA to strengthen due diligence

Preparing for potential investigations or litigation is something that many companies don't want to think about, and don't think they have the bandwidth for. Risk analysis, risk management and RCA can do more for due diligence than many people realize. Consistent and rigorous application of these analytical decision-making tools help prove that a company is making a genuine effort toward achieving safety goals by reducing risks and preventing problems. RCAs are proven to provide excellent due diligence support when they are performed in a thorough manner and well documented, and when effective solutions are carried through the implementation and monitoring steps.

Risk typically exists because of: consequences resulting from the interactions of a risk source; a release process; an exposure process (i.e., pathway); and existence of receptors (i.e., people). Causation is required to understand how a risk agent was released or created, why people were exposed to the agent, and why the consequences occurred as they did. Root cause analysis -- when combined with the overall risk management process -- helps define and quantify risk, understand the risk causation, and identify effective risk management actions.