Levels of Root Causes

Safety professionals agree that it is important to uncover the root causes of an accident, but everyone in the safety profession seems to have a different view about what constitutes a root cause and at what levels root causes exist. Suppose, for example, that while a worker is hammering, the hammer head comes loose, flies off the handle, and hits another worker. One investigator might say that the root cause of this accident was at the worker level. Another might examine the same accident and find that the hammer broke because proper tool maintenance procedures were not followed, so the root cause was at the management level. There are many levels of accountability, from the worker level to supervisory, management, and even corporate or program development levels. The philosophy of this book is that accident investigators must analyze events at all levels to determine the causes of the accident as well as recommend corrective actions.

Some safety professionals distinguish between “root causes” and “direct causes.” In the hammer example above, the direct cause is an engineering failure—the hammer came apart. The root cause is what allowed the engineering failure to take place—in this case, management’s failure to make sure tool inspections were being carried out. In the same example, an investigator might have identified another direct cause—worker failure—if the worker was using the hammer to do something it was not intended to do. In this case the root cause would be supervisory failure if the supervisor failed to notice that the worker was using the hammer improperly. This book discusses all of an accident’s causal factors and corrective actions that may be taken at every level.

The Many Meanings of “Root Cause”

One problem with using the root cause concept is that the term “root cause” has many meanings among safety professionals. It may be defined as the first cause of an accident, the last cause of an accident, the cause that if corrected would have prevented an accident, the cause that involves management systems, the cause that started the accident sequence, or the cause that would have prevented the accident if it had not happened. These various definitions reduce the effectiveness of the term “root cause.”
Some companies even have a list of possible root causes and designate one of them as the root cause of each accident. Some people call this “dial-a-cause.” It allows safety professionals to make excellent charts and graphs for studying trends, but the accident itself tends to disappear while the root cause becomes the emphasis of the investigation. Many of the root causes in such a system boil down to either human error or management system failure, and it is difficult to recommend corrective actions based on such broad categories. This superficial approach obviously prevents a systematic and exhaustive process of discovering the causes of an accident. Our employees are worth more effort than this.

**Ranking Root Causes**

Some companies rank the root causes identified during an investigation in order of importance. This writer believes that corrective actions can be prioritized, but that causes should not be ranked.

**Layered Investigations**

In *Learning from Accidents in Industry*, Trevor Kletz describes an approach to accident analysis that uses *layered investigation*, which is helpful when it is important to keep types of causes separate (Kletz 1988). Kletz would say, in the hammer example, that if the accident happened because of a systemic management problem (management did not require periodic tool inspections), then an engineering failure (the hammer breaking) is the *cause* of the accident, not the *causal factor*. The causal factor is management’s lack of supervision of the safety program. Even if the engineering failure is corrected, another failure will occur unless the management problem is resolved.

In layered investigations, the investigator tries to identify all of the causal factors instead of just the obvious ones. This method, if used with analytical techniques, will create a deeper analysis of the facts and allow the investigator to determine additional levels or “layers” of recommendations or corrective actions—a multilayered solution to the problem (Kletz 1988)(Crowl and Louvar 1990).