Course Learning Outcomes for Unit I

Upon completion of this unit, students should be able to:

1. Identify and discuss contributions made to occupational risk management by system safety, public health, and educational psychology.
2. Identify and analyze the complexity levels of occupational workplace systems.
3. Use a Haddon Matrix to analyze factors that lead to accidents.
4. Define and discuss the terms “hazard” and “risk” as they apply to risk reduction efforts in occupational safety and health.
5. Identify and analyze methodologies to reduce risks in all phases of an incident.
6. Compare, contrast, and apply models used in safety analyses.
7. Compare and contrast charting methods used in safety analyses.

Reading Assignment

Chapter 1: Multidisciplinary Perspective

Chapter 2: Key Terms and Concepts

Chapter 3: Tools for Analysis and Synthesis

Unit Lesson

Welcome to Risk Management! In this course, we will examine ways to prevent workplace injuries and illnesses through assessment, evaluation, and control of risks. Traditional safety programs, particularly those in the United States, have focused on compliance with rules and regulations as a means to eliminate conditions that cause injuries and illnesses. Risk management does not ignore regulatory compliance, but adds techniques that can address potential system failures, such as weaknesses in human interaction with systems. Risk management goes beyond compliance and attempts to predict conditions that may result in accidents.

The forward thinking used in risk management has its roots in the financial and insurance industries. In recent years, many organizations have come to realize that reducing the risk of accidents is as important to financial success as reducing risks associated with product or service quality, production output, or environmental emissions (Fuller & Vassie, 2004). The importance of risk management in workplace safety programs received a significant boost in 2009 with the publication of ISO standard 31000:2009, Risk Management—Principles and Guidelines. In 2011, the American National Standards Institute (ANSI) adopted this standard as ANSI/ASSE Z690.2-2011, adding to the global harmonization of risk management principles.
Risk management as a formal process in safety management systems may be a fairly recent development, but many of the concepts and processes have grown out of other safety-related disciplines. Jensen (2012) discusses the contributions made by system safety, public health, and educational theory. One of the more significant contributions comes from public health—the Haddon Matrix. It provides a simple method to sort out opportunities to reduce risks and will be one of the building blocks for our ongoing discussions in the course. (Graphic below is based on Figure I.1, page 7 in the textbook)

<table>
<thead>
<tr>
<th>PHASE</th>
<th>Human</th>
<th>Vehicle and equipment</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-crash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crash</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Post-crash</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Example of a Haddon Matrix, which was developed by Dr. William Haddon Jr. in 1968 as a format for reducing risks in car crashes. The rows in the matrix above enable listing of factors involved in car crashes. When using this type of matrix, additional columns can be added if more factors are to be included. (Jensen, 2012)

As with most courses of study, an understanding of terminology used is critical. In our discussions, the two most important terms are “hazard” and “risk.” These two terms are often confused, and are often incorrectly used interchangeably. Chapter 2 presents multiple definitions of a hazard from multiple sources and synthesizes them into the following:

“A hazard is source for causing harmful energy” (Jensen, 2012).

Defining risk is not quite as simple. Jensen (2012) proposes three definitions, all with valid uses:

1. Risk is a probability.
2. Risk is the product of probability and severity.
3. Risk is the combination of probability and severity.

Definition 1 is useful when addressing public health risks, and definition 2 is typically used for monetary risks. Definition 3 is represented by the two-dimensional risk assessment matrix familiar to most safety professionals. This third definition will provide the framework for much of the discussion in the course, but the other two will also play roles. (Graphic below is based on Figure 2.1, page 18 in the textbook.)
A two-dimensional risk assessment matrix, such as the one above, is based on the third definition of risk, “Risk is the combination of probability and severity.” (Jensen, 2012)

It can also be said that risk is an expression of the probability that an event of some magnitude will occur over time (Fuller & Vassie, 2004). In safety and health, hazards create risk, and risk outcomes are always adverse events.

The final term we need to understand is “risk reduction.” Risk reduction describes the end result of all risk management efforts, regardless of the risk definition used (Jensen, 2012). Notice that we do not say, “risk elimination.” Since measuring risk involves probability, it is not possible to achieve zero risk in most situations. Each organization must determine what levels of risk are acceptable. Risks are present before an incident, during an incident, and after an incident. A goal of our study will be to learn how to reduce risks at all of these points of the cycle, minimizing adverse outcomes.

Most people have had some experience with models, even if they do not know what a model is. Organizational charts, flow diagrams, and decision trees are all examples of models. Models are simply representations of systems (Jensen, 2012). Their graphic nature helps us visualize interactions among system components, and when used in risk management, help us identify hazards, weaknesses, and potential errors. We will be using models extensively in the course.

In subsequent units, we will be examining the analysis methods used in risk identification and assessment in depth, as well as programmatic methods used to control and manage risks. In the final units of the course, we will create risk management plans and apply the concepts and methods in the course to some real-world hazards and risks.

<table>
<thead>
<tr>
<th>Probability</th>
<th>Catastrophic</th>
<th>Serious</th>
<th>Slight</th>
<th>Minimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Possible</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Negligible</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
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</table>

References


Suggested Reading


(Complete document can be accessed by clicking on the “PDF” symbol on the upper right side of the Web page, under “Cached”)

Find out more about this unit’s topics through research in the CSU Online Library’s databases. The following articles are available in the Business Source Complete database:


- “Managing Risks: A New Framework,” by Robert Kaplan and Anette Mikes, shows that rules-based risk management is not the only type of management. Topics discussed include identifying and managing preventable risks, understanding the three categories of risk, the risk event card, and the risk report card.

Learning Activities (Non-Graded)

Apply What You Have Learned

The Learning Exercises on pages 9-10 in the textbook give you the opportunity to use what you learned from the Chapter 1 assigned reading. Answer the questions as completely as you can, using concepts and information from Chapter 1. Reviewing and thinking about the information, applying it to respond to the exercises will help you remember what you learned.

Explore and Compare Models

Find a textbook for a college course in economics, biology, toxicology, or engineering. Search the book to find a model. Write down a brief description of the model and see if it fits any of the model types discussed in the textbook.

Diagram a Job Search

Make a process flow diagram to depict what a college student goes through to secure a job upon graduating. Allow various possibilities, including:

1. A botched first interview and no offer.
2. A second interview that lands a so-so offer.
3. A third interview that lands a great offer. Include at least one process, one decision, and one feedback loop.

The Hazards of Defining “Hazard”

Author C.A. Ericson advocates a three-part hazard description. Ericson’s three parts are:

1. A hazardous element
2. An initiating mechanism
3. The target and threat
The textbook also uses three elements when describing hazards (see Table 2.1):

1. Source of hazard
2. Mechanism of transfer
3. Harmful consequences

Compare and contrast the two sets of elements. How are they alike? How are they different? Which set do you think best describes a hazard?

**Think About It**

Older reports concerning safety performance in the occupational field used a ratio of number of injuries to number of items produced. Why do you think the labor unions strongly opposed this approach? Write a minimum 500-word essay explaining your answer. Cite all sources using proper APA format.

These are non-graded activities, so you do not need to submit them.

**Mini Project**

**Haddon Matrix**

Prepare a 3x3 Haddon Matrix (see Figure 1.1 on p. 7) that represents factors and phases involved in incidents where workers enter an empty fuel storage tank and are overcome due to lack of oxygen.

Propose one control for each factor/phase combination.

Non-graded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions, contact your instructor for further guidance and information.