

HEALTH AND SAFETY: RISK MANAGEMENT

Dr Tony Boyle

FIFTH EDITION



Health and Safety: Risk Management

Health and Safety: Risk Management is the clearest and most comprehensive book on risk management available today. This newly revised fifth edition takes into account new developments in legislation, standards and good practice. ISO 45001, the international health and safety management system standard, is given comprehensive treatment, and the latest ISO 9004 and ISO 19011 have also been addressed.

The book is divided into four main parts. Part 1.1 begins with a basic introduction to the techniques of health and safety risk management and continues with a description of ISO 45001. Part 1.2 covers basic human factors including how the sense organs work and the psychology of the individual. Part 2.1 deals with more advanced techniques of risk management including advanced incident investigation, audit and risk assessment, and Part 2.2 covers a range of advanced human factors topics including human error and decision making.

This authoritative treatment of health and safety risk management is essential reading for both students working towards degrees, diplomas and postgraduate or vocational qualifications, and experienced health and safety professionals, who will find it invaluable as a reference.

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1: Preliminaries

Introduction

This book is intended to serve the needs of a number of audiences, in particular:

- those studying for university qualifications in health and safety or health and safety qualifications overseen by other organisations, for example the National Examination Board in Occupational Safety and Health (NEBOSH)
- those working towards a vocational qualification in health and safety, for example via National or Scottish Vocational Qualification (N/SVQ) in the UK
- managers and others who have health and safety as part of their responsibilities
- health and safety professionals.

The book is in four main parts, preceded by the present chapter, which describes the material covered in the book and the audiences for which it is most relevant.

Part 1.1: Risk management – introduction

Part 1.1 is primarily concerned with the fundamentals of health and safety risk management and, as such, it is relevant for all students of health and safety. Managers and others whose responsibility includes managing health and safety will also find this part valuable.

Health and safety professionals will already be familiar with the material in Part 1.1, but they may wish to use sections of it to develop training courses for managers in their organisation. To help with this, there is a chapter on training and communication techniques at the end of Part 1.1. By using the Part 1.1 material in this way, health and safety professionals can encourage the idea that managers are responsible for managing health and safety while health and safety professionals are responsible for providing advice and guidance.

Thus, there are the following main audiences for Part 1.1 of this book:

- those studying for university or equivalent qualifications
- those working toward a vocational qualification in health and safety
- managers with health and safety responsibilities
- health and safety professionals.

These are also the audiences for the other parts of the book, but the extent to which they may wish to use the material differs from part to part as described below.

Part 1.2: Human factors – introduction

Part 1.2 covers the basic human factors material required by those studying for qualifications in health and safety.

As far as managers are concerned, most of the material may be of interest since it deals with how humans function. In practical terms, only those managers who will get involved in detailed accident investigations, or some of the more advanced risk control measures described in Part 2.1, need to be familiar with the contents of Part 1.2.

For health and safety professionals, the material will again be familiar, but they may wish to use it for training purposes.

Part 2.1: Risk management – advanced

Part 2.1 deals with the more advanced aspects of risk management required by those studying for qualifications in health and safety.

As far as managers are concerned, they should use only those parts of this section which are relevant to their requirements. For example, managers involved in designing complex processes may well wish to make use of the chapter on detailed risk rating techniques.

For health and safety professionals, all of Part 2.1 is relevant, although particular individuals may already have knowledge and skills in some of the areas covered. Many aspects of the more advanced risk management techniques are still actively being researched and developed, and the discussions of these topics, and reading the references will help health and safety professionals in their continuing professional development.

Part 2.2: Human factors – advanced

This part covers the more advanced human factors material required by those studying for qualifications in health and safety.

Much of this material will be beyond most managers' requirements, although, where risks are high, or risk management is already at a high level of expertise, they may wish to study the chapters dealing with human error and human reliability.

For health and safety professionals, all of Part 2.2 is relevant and reading the references will be valuable in their continuing professional development.

Conventions

The English language has many words with multiple meanings, and many objects and concepts have numerous different words to describe them. In the hope of reducing ambiguity and repetition, the following conventions have been used throughout the book.

Occupational health and safety

In this book the term occupational health and safety (OH&S) is used in the way it is used in ISO 45001¹. However, ISO 45001 does not address health and safety areas such as employee well-being, product safety, property damage or environmental impacts. The risk management dealt with in this book has a wider range than that of ISO 45001 and covers all aspects of health and safety associated with work activities and workplaces. For this reason health and safety – with the abbreviation HS – is used throughout the book, except when discussing OH&S management systems.

Risk

In this book the term 'risk' is used as an abbreviation for 'health and safety risk'. Health and safety risk is defined in terms of the likelihood of hazardous events and the seriousness of their consequences, and is similar to occupational health and safety risk as defined in ISO 45001. However, risk as used in this book covers more aspects of health and safety than are covered in ISO 45001. There are various other definitions of risk, and these are described and discussed at relevant points in later chapters.

Opportunity

In this book the term ‘opportunity’ is used to mean any opportunity for improvement arising from risk management activities. For example, risk and opportunity assessments can identify ways in which an activity can be carried out more effectively or more efficiently. However, improvements that result in the elimination or control of risks are treated as a separate category because of their importance in risk management.

Categories of people

Dozens of words are used to describe the various categories of people that are relevant to risk management. However, certain important categories for the purposes of this book are defined as follows.

Operatives

These are people who have no management responsibilities and whose primary health and safety responsibility is to make sure that they carry out their activities without risks to themselves or others. Everyone has this responsibility, but the other categories of people listed below have additional health and safety responsibilities.

First-line managers

These are people who have operatives reporting to them. They are responsible for making sure that the operatives carry out their activities without risks to themselves or others. In some organisations these people are referred to as *supervisors* or *team leaders* and they are not considered as managers. They are the equivalent of non-commissioned officers – sergeants and corporals for example – in the armed forces. The terms supervisor and team leader are not used in this book.

Middle managers

These are people who have first-line managers, or other middle managers, reporting to them. Their main health and safety responsibility is to make sure that those who report to them effectively meet their health and safety management responsibilities.

Top management

These people who direct and control their part of the organisation and have overall responsibility for health and safety in that part of the organisation. They are responsible for setting policy on health and safety matters and typically control the organisation’s resources.

Note that there will be overlaps between these categories. For example, in small and medium-sized enterprises (SMEs), the top management may also be first-line managers, since there are no middle managers. In larger organisations, top management and middle managers may also have one or more operatives reporting to them directly (for example, secretaries and personal assistants) so that they are also first-line managers as far as these people are concerned. Where the term ‘managers’ is used without further qualification, it should be taken to include all of the categories listed above.

Self-employed

These people have all the health and safety responsibilities of the other groups although, obviously, they apply over a much narrower range.

Quantification

At various points, expressions such as ‘some companies’, ‘many organisations’ or ‘most people’ have been used. Unless otherwise stated, these should all be understood to mean ‘in the author’s experience some companies . . .’, ‘in the author’s experience many organisations . . .’, and so on.

UK legislation

The main concern throughout this book has been to describe good practice in risk management techniques. For some aspects of risk management, the use of this good practice is required by United Kingdom (UK) legislation and, where this is the case, details of the relevant legislation are given in clearly identified ‘UK legislation’ boxes. However, many of the topics covered in this book are not referred to in UK legislation.

The majority of health and safety legislation in the UK is divided into legislation applying to England, Wales and Scotland (collectively referred to as Great Britain) and legislation applying only to Northern Ireland. Great Britain’s legislation is primarily in the form of Statutory Instruments (SIs) and Northern Ireland’s legislation primarily in the form of Statutory Rules (SRs).

Typically, there will be a two pieces of legislation covering each health and safety topic, for example:

- The Management of Health and Safety at Work Regulations 1999 (SI 1999/3242)
- The Management of Health and Safety at Work (Northern Ireland) Regulations 2000 (SR 2000/388).

However, so far as duties imposed by the legislation are concerned, the content of the two pieces of legislation is usually the same. For this reason, only the Great Britain title is given in the text with, in the References section, the SI and SR number for the relevant legislation for Great Britain and Northern Ireland, respectively. An exception to this is legislation on fire safety, which is not health and safety legislation, and where there is separate legislation for England and Wales (SI), Scotland (Scottish SI (SSI)) and Northern Ireland (SR).

HSE

In line with UK legislation, the functions of the Health and Safety Executive (HSE) are carried out by separate organisations in Great Britain (the HSE) and Northern Ireland (the HSENI). In this book, the UK HSE is used to describe these two organisations.

More detailed information on these organisations is available at www.hse.gov.uk and www.hseni.gov.uk.

Convention for references

At the end of relevant chapters there are references classified as follows:

- 1 **References.** These are provided so that readers can check the accuracy of attributed quotations, summaries of referenced work, and so on. These are identified in the text with a superscript number, for example ISO 45001¹.
- 2 **Essential reading.** These texts form part of one or more courses of study or are important for other reasons and students should be as familiar with these texts as they are with the contents of this book. Items in the list of references that are printed in bold are essential reading.

Reference

- 1 British Standards Institution. *Occupational health and safety management systems – Requirements with guidance for use*, BS ISO 45001:20018. BSI, 2018.

PART 1.1

Risk management – introduction



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2: Part 1.1 – overview

Introduction

Part 1.1 contains a number of chapters which, taken together, form an introduction to all the basic concepts of risk management. The present chapter is intended to provide a route map through this risk management material by describing briefly what is contained in each of the chapters in this part.

Risk management, like most specialist subjects, has its own vocabulary and basic principles. While it would have been possible to begin the description of risk management with a detailed exposition of these, it is likely that this would put an unnecessary intellectual burden on the reader. Instead, the next chapter (**Chapter 3: Risk management – setting the scene**) is devoted to an informal introduction to risk management with the minimum of specialist vocabulary. Chapter 3 also deals with the various reasons why risk management is important, including ethical and financial reasons.

Following this informal introduction, **Chapter 4: Key elements of risk management** sets out the various activities, which have to take place if risk management is to be effective. This is done in two stages:

- A **risk and opportunity management model** is described that illustrates the core elements of risk management and how they are linked with each other. This model includes such things as risk assessment and monitoring.
- A widely used **occupational health and safety management system** (OH&SMS) is described which illustrates the additional activities needed to keep the risk management model operating effectively. This system includes additional elements such as policy, planning and audit.

In the course of Chapter 4, all the aspects of risk management to be dealt with in Chapters 5 to 11 are described in outline, and information is given on which of these chapters contains more detailed information on each aspect. Readers who are not familiar with basic risk management terminology should read Chapters 3 and 4, and then use Chapter 4 as their route map through Chapters 5 to 11. For those readers with a working knowledge of risk management terminology, the main contents of Chapters 5 to 11 are as follows:

- **Chapter 5: Risk and opportunity assessment.** Risk assessment – that is identifying the nature and magnitude of risks – is a key part of risk management. Chapter 5 describes the basic risk and opportunity assessment techniques.
- **Chapter 6: Risk control.** There is a variety of ways in which risks can be controlled, some of them more effective than others. This chapter describes the main types of risk control and how their relative effectiveness can be estimated.
- **Chapter 7: Safe systems of work.** Making sure that people work safely is an important aspect of risk management. In Chapter 7 three aspects of getting people to carry out tasks safely are described. These are safe work procedures, permit to work procedures and safety rules.
- **Chapter 8: Monitoring and measuring losses.** This chapter begins with a general description of the sorts of losses people, organisations and the environment can sustain, and identifies which of these losses will be dealt with in the remainder of the book – for example, injury, ill health and asset damage. There is then a discussion of how data on these losses can be collected effectively and analysed.

- **Chapter 9: Identifying causes and patterns.** This chapter deals with two main topics: incident investigation and a specialised form of data analysis used to identify patterns in the occurrence of accidents.
- **Chapter 10: Monitoring and measuring conformity and achievement.** Monitoring is checking that, for example, risk control measures are in place and are working as intended. Chapter 10 deals with the purposes and scope of monitoring, the techniques that can be used, and how monitoring conformity can be extended to measuring conformity.
- **Chapter 11: Other elements of occupational health and safety management systems.** This chapter describes those elements of OH&SMSs that have not already been dealt with in previous chapters – for example, review and internal audit.

Taken together, these seven chapters deal with the majority of topics required for effective risk management. However, two other topics are also required – communication and training – and these are dealt with in **Chapter 12: Communication and training**, which is the last chapter in Part 1.1.

3: Risk management – setting the scene

Introduction

This chapter deals with risk management in a fairly informal manner as an introduction to the subject. It is covered more formally in the next chapter. This two-stage approach is desirable because risk management is a potentially complex subject and it is preferable to go for gradual immersion, rather than diving in at the deep end.

Since getting to grips with risk management is not a trivial task, it is worthwhile considering whether it is worth doing. For this reason, the chapter also contains a discussion of the reasons why people would want to manage risk.

Basic terminology

There are four basic terms used in risk management: ‘hazard’, ‘hazardous event’, ‘risk’ and ‘loss’. However, the term ‘harm’ is often used instead of loss, and harm and loss will be used interchangeably in this bookⁱ. This part of the chapter deals with how these words are used in the context of risk management, which can be succinctly defined as the management practices put in place to reduce losses.

Hazard, hazardous event, risk and loss

Imagine that you are the owner of a house and that, for some reason, the roof has been temporarily removed. If this were the case, you would naturally be concerned about rain, since this could damage the decoration in your house and its contents.

In these circumstances, rain clouds would be a hazard and a period of rainfall would be a hazardous eventⁱⁱ. As illustrated in Figure 3.1, you would want to know various things about this hazardous event.

What the rain clouds constitute is a threat to your assets – that is, your possessions are ‘at risk’ of water damage and you may sustain a loss. The extent of your loss depends on the value of your

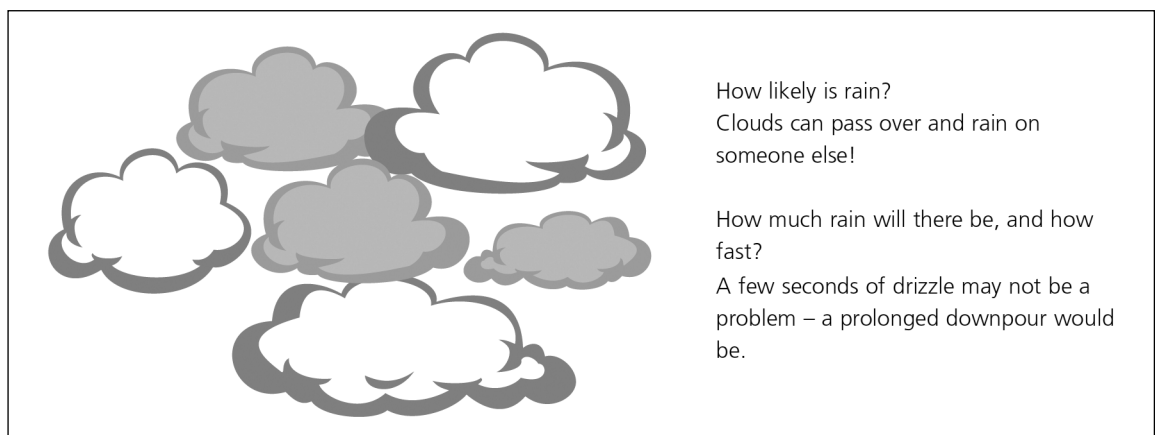


Figure 3.1 What you need to know about hazardous events