

Understanding the role of supply chains in influencing health and safety at work

Report submitted to the IOSH Research Committee

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Abstract

This report details a study which was commissioned by IOSH to provide a detailed systematic international review of the research literature and other information currently available concerning the nature of supply chain relationships, the factors that shape them, and their role in influencing health and safety management and standards among supplier organisations. Its findings, while highlighting the general lack of research evidence on the health and safety effects of supply chains, indicate that such chains frequently generate adverse consequences in supplier organisations and relatively rarely encompass attempts by buyers to influence positively how health and safety is managed within them. They further suggest that initiatives of this type are most likely to occur where they are seen to support the business interests of buyers and, in particular, when external economic, social and regulatory pressures serve to generate 'reputational risks', and that the success of such initiatives depends on their encompassing adequate mechanisms for supervising and controlling supplier compliance with them. The report ends by detailing a set of propositions regarding the health and safety-related dynamics of supply chains that merit further empirical exploration and by putting forward suggestions as to how these could most usefully be investigated through future research.

Executive summary

This report details the findings and conclusions of a study which was commissioned by IOSH to provide a detailed systematic international review of the research literature and other information currently available concerning the nature of supply chain relationships, the factors that shape them, and their role in influencing health and safety management and standards among supplier organisations.

In line with this research agenda, the study encompassed the following elements:

- a wide-ranging review of the international research literature on the economic, social and regulatory relations of supply, in order to understand the factors that help to determine how they can be expected to influence health and safety management practice and performance
- a parallel review of the theoretical and empirical literature, shedding more direct light on how supply chains act to worsen or improve health and safety management, and how they have so far been used to act as a force for supporting the effective management of health and safety within them
- the development, on the basis of these reviews, of a set of propositions concerning the nature of supply chain influence on health and safety, and its implications for regulation, inspection and control, that take into account the economic, social, organisational and regulatory constraints and facilitators identified by the literature
- the identification of further research that could be undertaken to test the validity of these propositions.

Three methods were used to identify relevant literature:

- the design and implementation of searches of appropriate databases
- follow-up of potentially relevant references listed in the literature thus identified
- identification and inspection of relevant ‘grey’ sources of literature.

Overall, these three processes revealed a remarkable lack of systematic and rigorous evidence on how the internal dynamics of supply chains affect health and safety management and performance. In doing so, they therefore also revealed a marked disjunction between official policy pronouncements on how supply chains can be used to improve health and safety standards and the evidence base which exists to support such pronouncements.

Insofar as evidence on the health and safety effects of supply chains was identified, it took three main forms:

- analyses which explore – conceptually and on the basis of secondary evidence – the potential for outsourcing, and hence supply chains, to have adverse health and safety effects
- empirical findings which shed light on the propensity for workers employed in subcontracting organisations, or in jobs commonly associated with the growing use of outsourcing, to experience work-related ill health and injuries
- empirical explorations of how the operation of supply chains in particular sectoral settings affect the working conditions of those who work for supplier organisations.

These sources of evidence, both individually and in combination, provided considerable support for the view that the dynamics of supply chains frequently lead to adverse health and safety effects. They further indicated that these effects were intimately connected to the way in which such dynamics serve to exert downward cost pressures on suppliers, thereby leading them to adopt more intensified and casualised employment regimes, and, more generally, act to engender poorer quality and more fragmented health and safety management arrangements.

At the same time, the research reviewed indicated that such negative, ‘indirect’ effects can occur alongside attempts by those at the head of supply chains to influence ‘directly’ and improve how health and safety is managed by suppliers. Such attempts to improve health and safety management in supplier organisations were found to vary in terms of their form and foci; they encompassed, for example:

- procurement strategies that used health and safety standards to select contractors
- certification schemes aimed at ensuring the competence of contracting organisations and those working for them

- the imposition of requirements relating to the more general management of health and safety, including the use of risk assessment and communication on multicontractor/subcontractor work sites.

They were also found to differ in terms of their level of operation, with some operating on an industry or sector basis, and others at the level of individual contracting organisations or, as in the case of construction, of individual projects.

In general, systematic evidence regarding the impact of these types of initiative was found to be lacking. A limited number of examples were, however, identified where they had been demonstrated to have positive effects on standards of health and safety management and performance. In these cases, a central feature of the initiatives concerned was their incorporation of internal regulatory arrangements, whereby suppliers (or buyers, in the case of supply chains involving the provision of hazardous substances) were subjected to meaningful processes of supervision and control.

More generally, the research reviewed suggested that the precise effects of supply chains can vary, even within the same sector, as a result of differences in such factors as the attitudes and objectives of buyers, clients and suppliers, the balance of power that exists in the relationships of supply, and the degree to which these relationships are based on trust and mutual co-operation. However, it further suggests that the potential that exists to use supply chains as a source of improved health and safety is unlikely to be widely harnessed on the basis of narrow, market based business considerations alone. The wider supply chain literature reviewed, for example, indicated that proactive, voluntary attempts by buyers to protect and improve health and safety standards in their suppliers are likely to be relatively uncommon, and to be concentrated in supply relationships where these standards are of high relevance to the satisfactory delivery of the goods and services required. Meanwhile, the best examples identified of supply chains being used to positively influence health and safety were found in contexts where action of this type was encouraged and supported by external pressures stemming from wider social, political and regulatory sources that create 'reputational risks'.

In summary, on the basis of the often limited evidence reviewed, it would seem that:

- attention accorded to health and safety-related issues by supply chain buyers varies considerably
- this variation in attention is likely to reflect differences in the extent to which:
 - health and safety is managed by suppliers has implications for the effective supply of required goods and services to buyers
 - relevant pressures are exerted by legislative provisions, regulatory agencies and others
- the health and safety consequences of supply chains are influenced both directly and indirectly by buyers
- the nature of these direct and indirect influences can vary, with for example the former exerting a positive effect and the latter a negative one
- attempts by buyers to influence supplier health and safety management will be more effective where:
 - they are supported by adequate monitoring and penalty regimes
 - they occur in a supply relationship which is relatively collaborative and trust-based
- such collaborative and trust-based relations are more likely to exist where:
 - buyers and suppliers have worked together satisfactorily for a relatively long period
 - the wider institutional context supports them
 - there is some form of regulatory scrutiny in place
- attempts by buyers to influence supplier health and safety management will be less successful where:
 - they are seen to clash with the business interests of suppliers
 - the risks of failing to comply with them are seen by suppliers to be relatively low
- regulation of supply chain relations can take various forms but, regardless of form, there are implications for both internal and external inspection and auditing of compliance that are likely to present challenges for traditional strategies in this respect.

It is, however, acknowledged that, while these concluding propositions are supported by existing research evidence, the current evidence base is insufficient to provide a sound and rounded understanding with regard to:

- how far the operation of modern supply chains should be viewed as problematic in health and safety terms

- which types of supply chain are more or less supportive of effective health and safety management within them
- the factors that act to influence standards of health and safety management and performance in such chains
- the need that exists for policy initiatives to improve how health and safety issues are addressed in supply chains
- which parts of the economy initiatives of this type should focus on
- how far such initiatives should involve legal requirements, as opposed to voluntary undertakings
- more generally, how initiatives in the area can be best designed and most effectively implemented.

The report therefore ends by highlighting the need for further empirical research to explore the validity of the above propositions. It suggests that this research should take a case study approach and encompass investigation of:

- types of supply chain activity that differ significantly in terms of the likely business criticality of the health and safety issues within them
- buyer–supplier relationships that vary with regard to their length, the distribution of power within them and the degree of mutual dependency they embody
- buyer demands on suppliers that vary in terms of the intensity and relative importance of price-based considerations
- buyer–supplier relationships that differ with regard to the presence or absence of attempts by the buyer to influence the supplier's health and safety management, and the nature of such attempts
- the role of regulatory scrutiny in all these relationships.

1 Introduction

This introduction has three purposes. First, it will describe briefly the aims and objectives of the study that formed the basis of this report. Second, it will contextualise these aims and objectives in relation to recent developments in the role of supply chains in the United Kingdom's economy and the policy issues and concerns that have evolved as a result. Thirdly, it will introduce the reader to the way in which the rest of the report is structured and hence what follows.

Aims and objectives of the study

This report was commissioned by IOSH with the overall aim of developing a detailed, systematic international study of the research literature and other information currently available concerning supply chain relationships, the factors that affect them and their role in influencing health and safety management and standards within them. This aim, in turn, was intended to involve an exploration of how the operation of supply chains affects the health, safety and wellbeing of workers, the impact of initiatives aimed at using such chains to protect and enhance levels of health and safety management and performance, and the implications that findings in these two areas have for regulatory strategies and policies.

Within these overall aims, the more specific objectives of the study were to:

- undertake a wide-ranging review of the international research literature on the economic, social and regulatory relations of supply, in order to understand the factors that determine how they are likely to influence health and safety management practice and performance
- carry out a parallel review of the theoretical and empirical literature to shed more direct light on how supply chains act to worsen or improve health and safety management, and how they have been used so far to act as a force for supporting the effective management of health and safety within them
- develop, on the basis of the above reviews, a set of propositions concerning the nature of supply chain influence on health and safety and its implications for regulation, inspection and control that take into account the economic, social, organisational and regulatory constraints and facilitators identified by the literature
- outline further research that could be undertaken to test the validity of these propositions, while also addressing key weaknesses identified in current evidence concerning the health and safety implications of supply chains.

Background context

While both private and public sector organisations have always needed suppliers and have themselves been suppliers of products and services, current business and organisational practices have tended to increase the importance of supply chains in national and global economies. It is also clear that a range of wider economic and regulatory factors has influenced the evolution of these practices. These have included:

- developments in information technology and logistics
- the rise of neoliberal economic, political and regulatory strategies
- the related withdrawal of the state from command and control regulation
- a reduction in the power and influence of organised labour
- a weakening of the traditional employer–employee contractual relationship as the legal basis of paid employment
- the more generally increasing prominence of so-called ‘porous organisations’ and flexible work patterns.

As businesses increasingly try to manipulate features of supply chains to improve their profitability, efficiency and market position, the question of what happens to the health and safety of workers affected by these strategies has become the focus of increasing attention and debate. This can be seen to encompass two rather different strands of analysis.

On the one hand, there exists a body of research literature on what can be generally described as ‘supply chain effects on health and safety’, which details a range of outcomes that make for poorer working conditions and which are seen as the ‘indirect’ consequences arising, in the main, from the manipulation of price and delivery conditions by those in powerful market positions in supply chains, and from the complex and fragmented webs of relations between contractors and subcontractors engaged at the same work sites.

On the other hand, within this overall picture of research identifying negative supply chain effects on workers' health and safety, in some of the same studies there is an acknowledgment that the economic relations involved may in certain circumstances support improved health and safety arrangements for individuals or organisations in dependent relationships in supply chains, as a result of the ability of powerful supply chain actors to require their suppliers to adopt certain specified policies and practices. These potential so-called 'direct' effects have not escaped the attention of national regulators and policy makers, who are faced with developing strategies for achieving and maintaining compliance with health and safety standards and protecting workers in a rapidly changing economy. They have, for example, become increasingly prominent in policy rhetoric concerning ways of reaching, supporting and sustaining good health and safety practice in small firms, among contractors and subcontractors, and in relation to the safe use of hazardous substances and machinery. They also feature extensively in public relations pronouncements concerning corporate social responsibility and fair trade arrangements, especially among companies engaged in global commerce.

But previously published research that offers explanations of the potentially positive direct effects of supply chains on health and safety has mostly been narrowly conceived, with a focus on demonstrating the power of business imperatives to influence economically dependent supply chain participants to improve health and safety management in quite restricted situations. In particular, they have largely ignored the more complex discussions of structure and influence in economic transactions and relationships of supply that can be found in the wider management and social science literature; similarly, they have taken no account of relevant discussions on the changing nature of regulation that feature prominently in recent and current socio-legal studies of forms of regulatory intervention in the economy. As a result, they seldom offer a serious analysis of the preconditions for the effects they describe and have had little to say about the sustainability or transferability of the initiatives they mention to other operational contexts.

Major doubts therefore surround the validity and appropriateness of policy rhetoric and prescriptions concerning the role that supply chains can play in maintaining and enhancing standards of health and safety management and protection among organisations within them. These problems, in turn, create a clear need for such pronouncements and prescription to be more rigorously located and evaluated in the context of what research evidence tells us about the conditions under which supply chains may support attempts to improve health and safety management, what factors influence the success of such attempts, and how initiatives of this type can most effectively be encouraged. Meanwhile, it is apparent that the rather disparate evidence which sheds light on the negative, indirect, effects of supply chains itself needs to be more systematically analysed in order to gain a more rounded, and deeper, understanding of their nature and causes, and what can be done to ameliorate them.

These inevitably somewhat interrelated tasks require, as already noted, the literature providing specific insights into the health and safety effects of supply chains to be comprehensively examined and analysed. But they clearly require more than this.

The use of supply chains, as well as how they are structured and operated, are issues that cannot be understood without a wider understanding of the business motivations of those participating in them, the nature of the relationships subsisting between them, and the broader economic, social and legal contexts that act to shape them. Consequently, it follows that such an understanding constitutes a necessary building block in any attempt concerned with more narrowly examining how supply chains do, and can potentially, affect health and safety management and performance in the organisations which comprise them.

A rounded analysis of both the actual and potential supply chain effects on health and safety therefore requires attention to be paid to sources of literature not related to health and safety, notably in the fields of management, law, economics and employment relations. These include, for example, those that examine why organisations choose to outsource the provision of goods and services; explore experiences of efforts to improve labour standards in global supply chains, especially in sectors such as textiles, food and transport; and analyse, and more generally focus attention on, the social and economic forces underlying supply chain relationships and behaviours.

It is against the background of these considerations that the present study has been conceived and conducted. It is also in the light of them that its outcomes, as detailed in this report, provide a more complete and useful understanding of the operation of supply chain relations in terms of their business context and the construction of the social, economic and regulatory environment in which they occur than has thus far been presented in research and writing on health and safety at work.

This is an understanding which the authors believe is crucial to a better appreciation of the strengths and limitations of using supply chain relationships to influence health and safety arrangements, and to a better understanding of how future regulatory strategies can be designed most effectively both to counter the adverse health and safety effects of supply chains and to enhance potentially positive ones.

This said, it was recognised from the outset that the nature of the literature available for review would be insufficient to provide an adequate, as opposed to better, understanding either of how the operation of supply chains affects health and safety or of the potential to use them to achieve improved health and safety outcomes. For this reason, the further objectives of the present study, as already noted, are to derive a set of postulates concerning such effects that could usefully be tested and explored by further empirical research.

Structure of the report

The rest of this report is divided into five sections. Section 2 provides a short outline of how the literature reviews on which it is based were undertaken and why they were undertaken in the way they were. Section 3 uses wider non-health and safety literature, drawn mainly from the fields of management studies and employment relations, to provide a theoretically and empirically informed contextual understanding of supply chains through an examination of five main issues:

- the growth of organisational outsourcing
- the business rationales and motivations that have led this growth
- the varying forms that supply chain relationships can take
- how such chains are managed
- the factors that influence the nature and dynamics of supply chain relations.

These factors are explored through a consideration of four interrelated themes:

- the institutional context in which relations are established
- the outsourcing objectives of buyers
- the extent of mutuality that exists between the risks and interests of buyers and suppliers
- the dynamics of buyer–supplier interactions.

Sections 4 and 5 review the literature on supply chains that relates directly to health and safety at work. Section 4 concerns literature primarily on the negative indirect health and safety consequences of business practices in which supply chain management has come to play an important part. In doing so, the section initially examines secondary analyses which suggest that a number of features associated with the growth of outsourcing of goods and services – such as the exportation of work from larger to smaller organisations and the fragmentation of management control on multi-employer work sites and in situations of labour outsourcing – have detrimental consequences for health and safety standards. It then moves on to examine evidence pointing to an association between poorer health and safety outcomes and employment-related features – such as increasing work intensity, nonstandard forms of employment and reduced job security – that have been found to be commonly associated with outsourcing, and the findings of studies that have examined the health and safety consequences of supply chains in a number of relatively high risk sectors, including road transport, railways, construction and the maritime industry. Lastly, the section turns its attention to review evidence that points to health and safety-related difficulties and challenges in supply chains involving the provision of hazardous substances.

In Section 5, attention is turned to the evidence for how these same business practices that have led to poor health and safety arrangements and outcomes could also be exploited to support health and safety management more directly. The section begins by reviewing the literature that focuses on the potential benefits for health and safety of improved supply chain management. It then moves on to explore some of the main examples of initiatives undertaken to secure such benefits, including procurement policies and strategies and certification systems, and to consider the evidence on client–contractor and supplier–user relationships in relation to these initiatives and their impact on health and safety management and performance. Finally, attention is paid to what current research tells us about the drivers that motivate interventions to support improved health and safety arrangements and practice in supply chain relationships and the factors that influence their impact in practice. This is an analysis which extends to encompass the wider literature on market regulation, both generally and more particularly in relation to global supply chains.

Finally, Section 6 brings together the key points emerging from the wider literature reviewed in the Section 3 and the insights arising from the more directly health and safety-focused analyses undertaken in Sections 4 and 5. On the basis of these lessons and insights, it also identifies a set of propositions to be tested through further empirical research and puts forwards suggestions as to how such research could be productively undertaken.

2 Methodology

This chapter outlines the methodology used to review the literature on the effects of supply chains on health and safety arrangements and outcomes. It begins with a brief consideration of some of the limitations of conventional approaches to systematic review in relation to the literature which sheds light on this issue, and the decision that was therefore taken to adopt a more flexible and intuitive approach in this study. It then moves on to outline the study's programme of work and, in particular, to describe in more detail how relevant literature was identified, including through database searches, and the main strands of analysis that this literature enabled. Finally, some concluding comments are made on the general nature and content of the literature reviewed in order to set the scene for the detailed analyses of it provided in the next three sections.

The limits of systematic review and its relevance to the literature on supply chains and health and safety

Ideally, in a review of research literature, if the purpose of reviewing evidence is to distinguish between the forms of intervention in health and safety management that work well and those that do not, or that may even lead to poorer outcomes, results from similar interventions need to be brought together. They should then be assessed and those that are of good quality and without bias should be combined to produce results which are both more reliable and more easily applied to other settings.

The methodology of systematic review provides one means of achieving this, encompassing as it does predefined and explicit criteria for identifying relevant studies, selecting them for inclusion, and collecting and combining their data. An alternative process, which uses less precise selection criteria, is a meta-analysis, where results of individual studies are combined to produce overall findings. While this approach is more precise than any one of the component pieces of research reviewed, it is potentially subject to some biases introduced by the lack of rigour applied to the study selection process.

However, although there can be significant advantages to conducting systematic reviews or meta-analyses of evidence from health and safety interventions, this does not mean that their use is always appropriate. It is argued strongly that this is the case with the present study.

After an initial review of recent research literature in which supply chains and health and safety were a main focus, it was clear that this literature contained relatively few studies and even fewer that provided evidence that lent itself to the selection criteria needed to compare studies through either systematic review or meta-analysis. More fundamentally, however, the viability of such approaches was further limited by the nature of the literature that needed to be reviewed.

As explained in Section 1, from the outset of the study it was clear that if a better understanding of the role of supply chains in influencing health and safety was to be obtained, it was necessary to pay attention to sources of literature unrelated to health and safety that shed light on such matters as the business motivations underlying the use of supply chains, the nature of the relationships subsisting between them, and the broader economic, social and legal contexts that act to shape them. In other words, it was necessary to examine relevant but more broadly based material located in a wide range of disciplines in the social sciences, including management and socio-legal studies, sociology, economics and social policy, to name but a few; material that, by definition, encompasses widely differing epistemological bases for theorising and analysis and hence does not lend itself to comparative examination via the processes of either systematic review or meta-analysis.

For this reason, a rather more intuitive and flexible, although still rigorous, approach was of necessity adopted for both the identification and analysis of relevant material. It is believed that this approach has allowed the production of a detailed and relatively comprehensive international study of information currently available concerning supply chain relationships, the factors that affect them and their role in influencing health and safety practice. It is further believed that this study provides a sound platform from which to consider the feasibility of regulatory and other strategies to enhance supply chain leverage in relation to the issue of health and safety at work.

Programme of work and literature review methods

The study's programme of work, as agreed at its outset, is summarised in Table 1. As can be seen, the first six months were devoted to a search for relevant literature and the second six months to analysing this literature and producing the final report.

Table 1
Programme of
work

Milestone number	Outline of milestone	Output of milestone	Delivery date of output
1	Organisation of the literature search	Search terms finalised; databases selected; piloted successfully	End of month 3
2	Undertaking systematic literature and intuitive supplements	Key references identified; main bibliography completed; interviewees determined	End of month 6
3	Analysis of literature	Analysis completed	End of month 9
4	Write-up of report; first draft of peer-reviewed article completed	Report and article completed	End of month 11
5	International seminar	Seminar held; article submitted; proposal for second stage research submitted	End of month 12

Searching the literature

The literature search concentrated, as proposed in the study's original programme of work, on the identification of materials on, firstly, supply chain management in general and, secondly, the nature and extent of supply chain influences on health and safety in different contexts. It used three methods to identify relevant literature in these areas:

- the design and carrying out of searches of appropriate databases
- following up potentially relevant references listed in the literature identified through these searches
- the identification and inspection of relevant 'grey' sources of literature, ie material contained in government reports and the publications of professional bodies rather than books and journals.

The research used conventional approaches to conducting a systematic search of online databases in the social and public health sciences for the period 1980–2007. A number of databases from the larger electronic systems were searched. They included Business Source Complete, BIDS International Bibliography of Social Sciences, PsychINFO, Emerald on the Web, ISI Web of Science, PubMed and Applied Social Sciences Index and Abstracts. In addition, the websites of the European Agency for Safety and Health at Work, the International Labour Organization, the UK Health and Safety Executive and the US National Institute of Occupational Safety and Health were also searched, especially to identify 'grey' literature. In the case of the first theme above (supply chain management), searches were made using the search terms 'supply chains', 'subcontracting' and 'outsourcing'. For the second theme (the nature and extent of supply chain influences on health and safety), these terms were supplemented by the additional phrases 'occupational health', 'health', 'industrial injury', 'injury', 'occupational safety' and 'safety'. In all cases, these various terms were used disjunctively (OR) and also crossed, using the term AND, with other relevant terms to ensure systematic and complete coverage. The search, it should be noted, was restricted to articles published in English, although some follow-up has led to the inclusion of occasional material in other languages.

A first stage reading of the title and abstract references in each of the databases was used to enable refinement of the focus of the literature search. Material deemed to be relevant was then scrutinised in its entirety. In addition, cited references from this material that appeared applicable and fell within the same time period were followed up. Finally, to ensure saturation of the coverage, the search was supplemented by retrieving and checking 'related articles' in the databases.

A number of 'grey' sources of literature were also accessed via the internet, especially from the websites identified above, and these were analysed using the approach just described. In addition, UK health and safety practitioner journals, including *Safety and Health Practitioner*, *Health and Safety Bulletin*, *Occupational Health Review* and *Health and Safety at Work*, were subject to detailed searches to identify relevant material. Websites of international organisations involved in promoting fair labour standards were a further source of 'grey' literature, including case studies, monitoring reports, opinion leaders' commentary and company policies.

At the same time, the researchers' own experience of the health and safety and supply chain fields, along with a number of discussions with key informants among policy makers, researchers and

participants in relevant economic relationships, suggested that the diverse sources of relevant material meant that the formal literature search should be supplemented with a second, more intuitive, approach towards the identification of relevant literature, and this was therefore done.

Literature analysis

Although the range of search approaches and the subject matter of the research literature discovered in the course of the search made the literature less amenable to the application of prescriptive, systematic methods for analysing its scientific quality, it was nevertheless possible to determine the scope of the coverage of such material, including its underlying objectives, to ascertain whether it was empirically or conceptually orientated, and, in the case of empirical-based studies, also to make informed judgments regarding the validity, reliability and generalisability of the findings reported. This approach provided a firm base from which to:

- assess the state of current knowledge about supply chain effects
- identify significant gaps in present research-based knowledge concerning these effects
- judge the soundness of current understanding of these effects and present regulatory strategies towards supply chain regulation.

More specifically, in the case of the first of these issues, it was found possible to pursue four strands of analysis in relation to the implications of supply chains for health and safety management and performance:

- use of the broad literature reviewed on the supply chain management of such potential implications on the basis of 'logical extrapolation'
- the identification of the features of supply chains that can lead to adverse health and safety outcomes
- the gaining of insights into how supply chains can potentially be used to support and enhance health and safety arrangements and standards, the conditions that act to facilitate their use in this way and the outcomes of such usage
- the identification of common features arising from these lines of analysis and their use to develop a set of propositions concerning the health and safety effects of supply chains and the factors that influence them which could be further tested in subsequent research.

It should also be noted that the project's deliverables included not only the production of a final report and peer-reviewed publications, but also the organisation of an international seminar. The seminar, and the correspondence with the researchers presenting their work at it, allowed for some further reflection and refinement of the authors' own work. In particular, this seminar, details of which are given in Annex 1 of this report, provided the authors with an opportunity to discuss their research with leading researchers on supply chain effects on health and safety from the UK, other parts of Europe, Canada and Australia. The seminar, which was held at Cardiff University on 6 March 2009 and had 50 participants, including researchers, practitioners, regulators and policy makers, was organised with the same broad objectives as the research as a whole. It was acknowledged by participants to be a unique and highly successful event. As a result, further dissemination of its content is currently being pursued.

Some comments on the broad features of the literature included in the review

As noted above, the literature searches undertaken during this study focused on two themes: supply chain management in general and the nature and extent of supply chain influences on health and safety in different contexts.

Supply chain management

A large and disparate literature was identified in relation to this theme. Considerable thought was required on how to use it most effectively in relation to the overall aims of the study and for the purposes of subsequent detailed analysis. The outcome of this process of reflection was a decision to focus attention on the following issues:

- rationales for outsourcing and hence engagement in supply chain relationships
- the varying nature of supply chain relationships and the factors that shape them
- how differing outsourcing rationales and different types of supply chain relationship affect the employment conditions of those employed by suppliers within them.

In relation to *rationales*, it was clear that these vary and overlap, but centre on the perceived advantages and disadvantages of externalisation compared to carrying out the relevant activities in-

house. It was also clear that these advantages and disadvantages cover a variety of considerations, notably relating to such matters as cost, quality and reliability. It was further apparent that considerations in these areas are closely connected to the nature of the surrounding product markets and, in particular, the availability of providers possessing the necessary capacity and competence, the degree of competition present and, related to both of these last issues, the degree of risk involved in relying on external suppliers.

Regarding the nature of supply chain relationships and the factors which influence them, the literature draws a distinction between those that are more transactional, and primarily cost-based, and those which are more collaborative and incorporate a greater degree of financial mutuality. It also indicates that the existence of a substantial degree of trust between the contracting parties is crucial to the establishment of the latter types of arrangement and that such trust is most likely to exist where there is a good deal of mutual dependency and risk sharing, and where power is relatively evenly distributed.

As regards the way in which differing outsourcing rationales and different types of supply chain relationship affect the employment conditions of those employed by suppliers within them, the literature in this area was found to be somewhat less extensive, but several observations can be made with some confidence. One is that there are contexts in which organisations at higher levels in a supply chain choose to impose employment-related conditions on suppliers lower down the chain as a result of 'quality' considerations. These conditions have been shown to include the specification of some basic terms and conditions, and requirements concerning the qualifications of staff and the training that they should receive. Another is that strongly cost-based supply chain relationships can have adverse implications for the employment conditions applying to those employed by lower level suppliers. A third is that such adverse implications can, somewhat ironically, also arise where actors higher up in the supply chain impose employment-related conditions on their suppliers but do so in the context of strongly cost-based contracting practices.

The nature and extent of supply chain influences on health and safety in different contexts. In very broad terms, the literature on supply chains and health and safety falls into two general categories. The first comprises quite a large and rapidly growing disparate international literature that deals primarily with global supply chains and their relationship to externalising financial risks and the consequent exploitation of labour in underdeveloped and newly industrialising economies. While seldom explicitly addressing health and safety management issues, the focus of a large part of this literature is on the influence of supply chain issues on labour conditions and increasingly on the adequacy of arrangements in place to ensure compliance with labour standards. This means that the nature of the structures it explores, the dynamics of processes analysed and the contexts of influence discussed are all indirectly concerned with health and safety effects, and are therefore relevant to the objectives of the present study.

Overlapping with this material is a discussion located in the socio-legal literature, again mostly at an international level, that concerns itself with issues of regulation and governance of matters that affect labour conditions in an increasingly neoliberal global economy. Again, while health and safety is seldom the explicit focus, most of the issues raised concerning the nature, appropriateness and effectiveness of forms of regulation and governance are nevertheless relevant to understanding the economic and regulatory contexts in which the issues pertaining to health and safety and supply chains are operationalised. Additionally, while most of this literature has a global focus, some concentrates on national or sectoral levels, especially in relation to sectors where the abuse of labour standards has been of long-standing concern, such as the clothing, food production and processing, and transport industries.

The second major area covered in this health and safety-related literature is that which has an explicit focus on supply chain effects on health and safety conditions and management. By far the largest part of this literature concerns the harmful effects of various forms of supply chain management on the workers involved in them, and the factors underlying these effects. These factors are identified as including organisational and management fragmentation, notably on multi-employer worksites, the transfer of work to small firms, increasing use of nonstandard forms of employment, rising work intensity and reducing job security. However, a further strand in this literature was found to focus on the role of suppliers in controlling exposure to hazardous materials.

A smaller part of the literature explicitly focusing on health and safety effects of supply chains was found to address the role of supply chain management in promoting and sustaining improvement in

health and safety arrangements and outcomes among suppliers and users of hazardous goods. Indeed, only a handful of relevant monographs, including research reports by the UK Health and Safety Executive (HSE), a small number of 'grey' items of literature and relatively few research-based papers, were identified, some of which were themselves rather partial literature reviews. Nevertheless some useful studies were found among this material, although the reliability and wider applicability of the insights gained from them is open to question.

3 The nature of supply chains and their dynamics

The vast majority of supply chains, to state the obvious, are not centrally concerned with the issue of workplace health and safety. Rather, they owe their existence to the demands that buyers have for other types of goods and services. It follows from this that the way in which supply chains affect health and safety management and performance within them, and the potential that exists to use them to enhance such management and performance, cannot sensibly be analysed without an understanding of their wider nature and dynamics, as well as the factors that act to shape them.

This section draws on existing theoretical and empirical research to provide such a wider contextual understanding of supply chains. It starts with an examination of the growth of organisational outsourcing and the nature of the goods and services covered by it. Attention then turns to the business rationales and motivations that lay behind outsourcing and its growth over the last few decades, the varying forms that supply chain relationships can take, and their internal management. Finally, the factors that influence the nature of supply chain relations are explored through an examination of four interrelated themes:

- the institutional context in which relations are established
- the outsourcing objectives of buyers
- the extent of mutuality that exists between the risks and interests of buyers and suppliers
- the dynamics of buyer–supplier interactions.

In exploring these issues, consideration will additionally be given throughout the section to the likely implications of the evidence presented for the management of health and safety in supply chains. The validity of these implications is the subject of further exploration through the examination of research evidence relating more directly to health and safety undertaken in sections 4 and 5.

Supply chains: recent developments in their role and scope

Supply chains have always formed an important element of the British economy. In the early days of industrialisation in the 18th century, for example, much manufacturing was carried out through the ‘putting out’ system, whereby production was organised through networks of middlemen, who organised for goods to be produced by homeworkers. Later, as factory production developed, an in-house version of this system was sometimes used, whereby internal subcontractors were used.

These forms of work organisation fell in importance as the notion of integrated in-house production came to hold sway – a development which also coincided with a trend towards the bringing in house not only of production but also of the creation of many of the raw materials used in it. However, recent decades have seen a substantial increase in the use of various types of external supplier and contractor by organisations and hence a return to a reliance on more decentralised organisational forms and processes.

In considering the extent and growth of this reliance on external suppliers and contractors, it is useful to draw a (necessarily somewhat crude) distinction between their use to provide peripheral goods and services that do not relate directly to the central purposes of an organisation and core goods and services that do relate in this way. This distinction can be illustrated, on one hand, by the use of external catering services and the purchase of such goods as toilet rolls, overalls and computer equipment, and, on the other, by the outsourcing of call centre work and component production by financial services and manufacturing organisations respectively.

As regards the first of these categories of outsourcing, the 2004 Workplace Employment Relations Survey reveals that 86 per cent of workplaces in Britain outsourced at least one of 11 specified services, with positive responses being more common among smaller establishments and those that did not belong to a larger organisation.¹ As can be seen from Table 2, the services most commonly contracted out were building maintenance (59 per cent) and cleaning and premises (52 per cent), with the remainder of services being mentioned by between 34 per cent (training) and 12 per cent (recruitment) of workplaces.

The 2004 survey findings further indicate that 19 per cent of the workplaces making use of contracted-out services of these types were using them, at least in part, to do work that had been done by internal employees five years previously. They also show that such a situation existed in 38 per cent of public sector workplaces compared with 13 per cent of private sector ones. This finding highlights the fact that much of the growth of service outsourcing during recent decades has stemmed from its greater use by public sector organisations.

Service	% provided by independent contractors
Building maintenance	59
Cleaning of buildings and premises	52
Training	34
Transport of documents and goods	29
Security	29
Payroll	28
Computing services	25
Temporary filling of vacant posts	16
Printing and photocopying	15
Catering	14
Recruitment	12
Any of the above	86

Table 2
Proportion of workplaces subcontracting services in 2004

An examination of earlier survey findings on the subcontracting of such services tends to confirm that its current extent is the product of shifts in organisational policies towards a greater reliance on contractors. In a survey of large, multi-establishment, private sector organisations conducted in the second half of the 1980s, for example, it was found that at the corporate level, 56 per cent of the companies reported a policy change with regard to the subcontracting of services of this type, with the great majority indicating that this change had been towards an increase in its usage.²

Data from earlier workplace industrial or employee relations surveys relating to establishments with 25 or more employees, undertaken in 1990 and 1997, paint a similar picture of significant but far from universal subcontracting growth (see Table 3).^{3,4}

Activity	% of establishments subcontracting services in:		% change
	1990	1997	
Cleaning of buildings and premises	41	59	44
Security	21	35	67
Catering	17	–	
Building maintenance	46	61	33
Printing and photocopying	18	–	
Payroll	8	–	
Transport of documents and goods	30	39	30

Table 3
Subcontracting in establishments, 1990 and 1997

Reliable, economy-wide statistics on the extent to which organisations are engaged in subcontracting more core activities and the types of activity outsourced do not exist because of the conceptual and methodological problems that surround the collection of such data. There would, however, seem little doubt that in a range of sectors of the economy the role of outsourcing has become more important, leading the authors of one recent analysis to argue that three 'generations' of outsourcing can be,

broadly, distinguished. The first involved a focus on 'peripheral activities'; the second, on 'near-core activities'; and the third, and most recent, on 'traditionally defined core activities'.⁵ Franchising, for example, has expanded considerably, such as in department stores and in other parts of the retail sector, including fast food outlets and clothing retail.⁶ Organisations in a variety of sectors have similarly frequently chosen to outsource parts of their marketing and customer relations operations to external call centres, sometimes based overseas. This development is reflected in the fact that in the early part of the current decade, outsourcing was estimated to account for 10–15 per cent of call centre employment in the UK and to be growing at between 15–20 per cent a year.⁷

It is also clear that in some sectors, supply chains have been restructured to embody a much more pronounced and explicit tiering of suppliers, whereby those at the head of them have strategically chosen to work directly with a smaller number of major suppliers who themselves then rely, in turn, on goods and services provided by second-tier contractors. This strategy has been notably pursued by, among others, motor vehicle manufacturers and food retailers.^{8,9}

Data like those from the successive Workplace Industrial/Employee Relations Surveys (WIRS/WERS), which shed light on the extent to which particular organisations rely on the use of external suppliers, do not, however, provide a rounded and detailed picture of the structure of the supply chains with which they are involved. Thus, they do not provide any insights into the extent to which a particular supply chain relationship is supported by further 'downward' ones in which suppliers act as clients for others, which are used to support the contractually required provision of goods or services to their own clients. It is nevertheless important to understand these relationships if their effects on the health and safety of the workers involved are to be adequately grasped. Similarly, nor do they provide insights into the extent to which organisations that use external suppliers are themselves acting as suppliers to other client organisations. Again, this is important from the perspective of the effects on health and safety arrangements for the workers concerned.

Furthermore, such findings also fail to shed light on the physical closeness or proximity of supply chain relationships and the supply-related activities subsumed under them – in other words, how far the relationships extend beyond the simple delivery of relevant goods and services to encompass forms of 'co-location' of work activities. This is typical, for example, in the case of construction sites, where a multitude of supply chain suppliers may be working alongside each other, and who themselves form part of a number of different multitiered supply chains. This feature, of course, has important implications for both day-to-day supply chain management and the management of health and safety at work more specifically.

The outsourcing of call centre work can be used to illustrate all these last points. Here, for example, such outsourced activities may or may not be undertaken alongside similar activities performed by staff directly employed by client organisations and in premises owned by them. In addition, the staff used by the external call centre operator may be made up of a combination of directly employed personnel and others that have been supplied by a temporary employment agency.

Rationales for supply chain relationships

A substantial literature now exists on the considerations that have informed the growing reliance that has come to be placed on outsourcing the supply of goods and services. These considerations can, rather crudely, be divided into two broad categories: firstly, those that have served to facilitate its use, and secondly, those that have acted to promote its greater use in practice.

Attention here is focused primarily on the second of these categories. However, in passing, it should be noted that information technology developments have been frequently identified as having served to increase the viability of outsourcing and hence made an important contribution to its expansion. In particular, it has made communications and co-ordination between buyers and suppliers easier and has increased the ability of the former to better monitor the performance of the latter, as the following quotation from Sir Terry Leahy, Chief Executive of Tesco, illustrates:

We have linked our ordering to our electronic point of sale system. And we've linked our ordering system to our suppliers with electronic data interchange. Now when we sell a sandwich, for example, the sale is registered by the scanner which automatically speaks to the ordering system, which orders a replacement. This is transmitted to the supplier straight into the supplier's production planning system, automatically calculating the raw ingredients required, the amount to be produced on the next shift, the labour needed, the line capacities, the dispatch and distribution details and so on. Out go the lorries in the distribution centre depots, deliver straight to the stores, back on the shelf, back in the trolley and across the scanner within 48 hours.¹⁰

As regards the business motivations that have informed the shift towards outsourcing, contributions in this area have been made from researchers working in a number of different subject fields, including labour economics, organisational theory and business strategy, and have encompassed a number of different explanatory frameworks.¹¹⁻¹⁴ Nevertheless, it is possible to identify two main, although somewhat complementary, explanatory approaches: those based on transaction costs and those encompassing a resource-based perspective.

In the transaction cost approach, internal and external modes of production and service delivery are both noted to have associated costs of control.^{15,16} For example, reliance on externalisation is seen to lead to incurring costs as a result of the need to update market intelligence, negotiate appropriate contract terms, and monitor and enforce contracts. Meanwhile, the use of internalisation is noted to require expenditure on the acquisition of assets and the establishment of effective managerial hierarchies.

Weighing up the relative attractiveness of externalisation within transaction cost economics is complicated by four factors which serve to make the costs (and risks) associated with outsourcing difficult to calculate reliably, and, therefore, influence the degree of uncertainty associated with it. These are:

- the existence of imperfect information
- bounded rationality stemming from limits to human foresight and cognition, particularly in the context of imperfect information
- uncertainty regarding future business developments
- the potential for suppliers to use incomplete or distorted information disclosure to engage in opportunistic behaviour that favours them.

The risks associated with the last of these problems is seen as greater in the presence of ‘asset specificity’, that is in situations where the purchaser has to make investments, say in dedicated equipment, in an external transaction that are specific to it and which will hence be lost in the event that the contractual relationship comes to an end. This is a feature which consequently acts to increase the vulnerability of client organisations to such behaviour because of the reduced ability they have to challenge it.

From a transaction cost perspective, the move towards the greater use of externalisation must, logically, have stemmed from a growth in the volume of potential transactions that are seen, in terms of their associated costs and risks, to support it. For example, the cost advantages they offer may have grown relative to the uncertainties associated with them or, perhaps, it may have been possible to reduce these uncertainties by lessening the scope that external suppliers have to engage in opportunistic behaviour through such means as the use of enhanced methods of monitoring supplier performance, increasing the dependence of suppliers or developing more mutually dependent, and trusting relationships with them (see below).

In contrast to the transaction cost approach, the resource-based perspective focuses attention on an organisation’s capacity to use various types of tangible and intangible resources to gain competitive advantage. These resources have been identified by one leading theorist as falling into five categories:

- financial
- physical
- human
- technological
- reputational.^{17,18}

From this perspective, externalisation is therefore attractive where it does not threaten the ‘core competitive competences’ of an organisation, while affording access to desired resources on a more attractive basis, for example because of their lower costs or superior quality. This perspective therefore suggests that the move to establish less integrated organisational structures in recent decades reflects a growth in the number of situations where it is seen on resource grounds to offer superior competitive outcomes.

Both the transactional cost and resource-based perspectives consequently suggest, although in rather different ways, that the recent trend towards the de-integration of organisational structures has arisen from changes in business environments that have acted to alter the relative advantages and

disadvantages of internal and external modes of production and service delivery in favour of the latter. In doing so, these perspectives suggest the growth of these organisational forms as having been centrally driven by rational business logics which view them as contributing to improved competitiveness and financial performance through such means as cost reductions, enhanced production and service efficiency and quality and the transference of business risks onto others, be these the suppliers of products, services or labour, or the workers engaged in the relevant work activities.

Admittedly, some analysts have questioned whether explanations rooted wholly in rational economic business logic are sufficient to account for recent developments. For example, Purcell *et al.* have argued, in relation to the use of labour provided through temporary employment agencies, that the dynamics underlying it involve social and economic contexts that are much more complex than those implied by a 'demand-side rational choice perspective'.¹⁹ Nevertheless, there seems to be a general agreement that such logics have exerted an important, if not determining, influence over both the externalisation of previously internally conducted work activities and the shift towards the greater in-house use of contingent or peripheral forms of labour.

This is not to say, however, that Purcell *et al.* are wrong to point to the potential role played by of 'non-business logics'. Colling, for example, has identified five potentially overlapping motivations for using subcontracting arrangements:²⁰

- a desire to align organisational practices with current 'fads and fashions' and hence what is widely seen to constitute good or best practice
- a means of covering short-term peaks in demand and of avoiding incurring additional fixed employment costs in such situations
- a source of specialist expertise that is not, for whatever reason, seen as available in-house
- a means of bypassing internal obstacles to change that are viewed as having a negative impact on operational costs, efficiency and profitability
- a mechanism for obtaining cheaper goods and services.

Certainly, existing survey evidence tends to support the view that several different motivations have informed the use of outsourcing. In the 2004 WERS survey, for example, when managers were asked why services of the type mentioned above had been outsourced, the most common responses given were to:

- achieve cost savings (47 per cent)
- gain an improved service (43 per cent)
- achieve a greater 'focus on core business activities' (30 per cent)
- 'acquire greater flexibility' (10 per cent).¹

It would also seem, on the basis of existing evidence, that such factors are frequently interrelated.²¹ Thus, in a manufacturing-based study undertaken in the United States, Harrison and Kelley found that the three main reasons for outsourcing to be 'capacity constraints limiting expansion', 'access to specialised skills and tools not available at the plant' and 'cost-cutting'.²² However, they also found that these motivations were not necessarily mutually exclusive, as the following quotation illustrates:

Even where managers do cite cost-cutting as a rationale, it is rarely separable from the motivation to transcend perceived capacity constraints. In more than three out of four cases where labour costs were important to the decision to subcontract, a capacity or technology constraint was also reported by management to at least temporarily limit expansion at the plant.²²

Finally, to return to the growth in outsourcing by public sector organisations in Britain, the role of political factors in influencing it should not be overlooked. For, despite the fact that in the 2004 WERS survey only 2 per cent of management respondents indicated that outsourcing had been driven by compulsory competitive tendering (CCT) or government regulations more generally, it would nevertheless seem clear that, in the public sector, recent government policies have in fact played an important role in encouraging it. This is clearly demonstrated by numerous studies that have focused attention on the implementation of such policy initiatives as CCT, public-private partnerships, and Best Value.²³

Overall, then, the evidence relating to the factors that have acted to prompt the growth that has occurred in outsourcing suggests that political pressures and a desire to adopt fashionable managerial

methods have played a role in this regard. However, it also suggests that bottom-line business considerations have constituted the most important drivers. At the same time, the evidence suggests that these considerations vary in nature and are often interrelated, thereby encompassing not just cost-based objectives, but also others relating to matters such as a desire to obtain access to superior skills, expertise and competence, improvements in quality, and increased and more flexible capacity.

Given these differing motivations, and in particular the fact that a reduction in labour costs is not necessarily a prime motivator, it cannot be straightforwardly assumed that outsourcing necessarily has adverse implications for health and safety standards among supply chain providers. It would, however, seem reasonable to conclude that proactive attempts on the part of buyers to protect and enhance such standards are likely to be most common where the issue is viewed as being intimately connected to the business objectives underlying their outsourcing strategies and policies – for example, when good standards of health and safety are considered to play a potentially important role in ensuring that outsourced goods and services are provided reliably and to an appropriate standard. In addition, the fact that a desire to reduce costs can potentially exist alongside other more qualitative objectives also suggests that proactive (positive) action of this type can exist alongside price-based pressures which at the same time act to challenge existing standards of health and safety in supplier organisations.

Forms of supply chain relationships

In his pioneering work on transaction cost economics referred to earlier, Williamson distinguished conceptually between control by internal organisational hierarchy and via externalised market-based relationships. In his work, however, and in common with Coase,²⁴ he also acknowledged that marked differences could exist in the nature of the latter relationships.

A number of writers have subsequently distinguished between two different types of contracting relationship and hence have effectively identified three different forms of production configuration. The work of Powell, as summarised diagrammatically in Table 4, provides a good illustration of this approach.²⁵

	Market	Hierarchy	Network
Normative basis	Contract – property rights	Employment relationship	Complementary strengths
Means of communication	Prices	Routines	Relational
Methods of conflict resolution	Haggling – resort to courts for enforcement	Administrative fiat – supervision	Norm of reciprocity – reputational concerns
Mixed forms	Contracts as hierarchical documents	Market-like feature: profit centres, transfer pricing	Multiple partners, formal rules

Table 4
Stylised comparison of forms of economic organisation

As can be seen, Powell posits a distinction between two forms of externalisation, or contractualisation – ‘market’ and ‘network’ – and goes on to identify differences between them in terms of three sets of characteristics:

- the normative basis of compliance or co-operation
- the primary means of interorganisational communication used
- the methods adopted to resolve conflicts.

In doing so, he also more generally highlights the potential for interorganisational relationships to be based on mutual dependencies, high levels of trust and extensive horizontal communications.

Similar distinctions have been drawn by a variety of other analysts, although the terms used to describe the two categories identified have varied. For example, labels used to describe the intermediate forms existing between ‘market’ and hierarchy, include ‘quasi-firm’,²⁶ ‘relational contracting’,²⁷ ‘dynamic network’,²⁸ and ‘obligational contractual relations’.²⁹ Of these alternative categorisations, Sako’s has been one of the most widely quoted and used and is therefore examined more closely in what follows.

Sako, in an analysis aimed at shedding light on the relative competitiveness of Japanese and British manufacturing industries, juxtaposed the abovementioned ‘obligational contractual relation’ (OCR) with an ‘arm’s-length contractual relation’ (ACR) as a means of establishing ‘the ends of a multi-dimensional spectrum of possible trading relationships’ that can exist between manufacturing buyers and suppliers. These two forms of contractual relations were seen, as Table 5 shows, to incorporate differences of practice along 11 different dimensions of buyer–supplier interactions.

Table 5
Features of ACR
and OCR patterns

Feature	ACR	OCR
Transactional dependence	Buyers seek to maintain low dependence by trading with a large number of competing firms within the limits permitted by the need to keep down transaction costs. Suppliers seek to maintain low dependence by trading with a large number of customers within limits set by scale economies and transaction costs	For buyers, avoidance of dependence is not a high priority; they prefer to give security to a few suppliers, though may still dual- or triple-source (some from a fringe group of suppliers with which they have an ACR) for flexibility. For suppliers, avoidance of dependence is not a high priority, but they may well have several OCR customers (plus, perhaps, a fringe group of ACR customers)
Ordering procedure	Bidding takes place; buyers do not know which supplier will win the contract before bidding. Prices are negotiated and agreed before an order is commissioned	Bidding may or may not take place. With bidding, buyers have a good idea of which supplier will get which contract before bidding. Without bidding, there is a straight commission to the supplier. Prices are settled after the decision about who gets the contract
Projected length of trading	For the duration of the current contract; short-term commitment by both buyers and suppliers	Continued beyond the duration of the current contract; mutual long-term commitment
Documents for exchange	Terms and conditions of contracts are written, detailed and substantive	Contracts contain procedural rules, but substantive issues are decided case by case. Contracts may be oral rather than written
‘Contractualism’	Contingencies are written out and followed strictly	Case-by-case resolution with much appeal to diffuse obligations of long-term relationships
‘Contractual trust’	Suppliers never start production until written orders are received	Suppliers often start production on the basis of oral communication before written orders are received
‘Goodwill trust’	Multiple sourcing by buyers, combined with suppliers’ low transactional dependence	Sole sourcing by buyers, combined with suppliers’ transactional dependence
‘Competence trust’	Thorough inspection on delivery; the principle of <i>caveat emptor</i> predominates	Little or no inspection on delivery for the most part (buyers may be involved in establishing suppliers’ quality control systems)
Technology transfer and training	Only the transfer, training or consultancy which can be costed and claimed for in the short term occurs	Not always fully costed, as benefits are seen as partly intangible and/or reaped in the distant future
Communication channels and intensity	A narrow channel between buyers’ purchasing departments and suppliers’ sales departments with frequency of contact kept to the minimum necessary to conduct business	Extensive multiple channels between engineers, quality assurance staff and top managers as well as between purchasing and sales managers. Frequent contact, often extending beyond the immediate business into socialising
Risk sharing	Little sharing of risk; how risk resulting from price and demand fluctuations is to be borne by each party is spelt out in explicit prior agreements	Much sharing of risk, in the sense that the relative share of unforeseen loss or gain is decided case by case by applying some principle of fairness

Sako, in common with other analysts, views collaborative relationships as being characterised by:

- relatively lengthy and ongoing links
- a substantial degree of mutual dependence and therefore a high degree of risk (and power) sharing
- an emphasis on objectives that extend beyond issues of cost to embody a substantial focus on quality and innovation
- the presence of trust-based relationships which are in turn supportive of, and exist alongside, open communications and joint problem-solving behaviour.

Meanwhile, transactional relationships are seen to embody characteristics that effectively represent the mirror image of collaborative ones, in that they are seen to be relatively short-term, place a heavy emphasis on cost competitiveness, and be less marked by trust-based relationships, power sharing and mutual dependence, and joint problem solving.

At the same time, for Sako, the ACR and OCR contracting models are viewed as lying at each end of a spectrum of trading relationships that could incorporate different combinations of the 11 dimensions of practice identified. As a result, it is argued that such relationships can vary in terms of the degree to which they tend towards the ACR or OCR ends of the spectrum, although, for reasons of internal consistency, it is expected that they would 'have mostly OCR features or mostly ACR features bunched together, rather than a mix of OCR and ACR' ones.

A number of other analysts have effectively echoed this point concerning the way in which supply chain relationships can take on forms that reside somewhere between the extremes of 'arm's length' and 'obligational' contractual relations and hence vary in the extent to which they are trust-based. Adler, for example, has argued that all such relations can potentially embody elements of 'hierarchy', 'trust' and 'market', and that the central difference between them consequently consists in the differing reliance placed on them.³⁰ At the same time, however, Adler further argues that while all three of these elements might be present in a particular interfirm relationship, it needs to be recognised that within a capitalist society they operate 'under the overall predominance of the market'. This point is well illustrated by the Chief Executive Officer of Woolworths:

Strategic alliances should never exclude competitive forces. If they do, in the long term they will be to the detriment of both parties to that strategic alliance. We've got some really big suppliers but I'm making sure all the time they don't feel there isn't competition for them and that they haven't got all the action, and if they're not on their toes then someone else will take the business. Competition is a really good thing.³¹

Other researchers have noted that buying organisations can develop different forms of supply relationship with both different suppliers and the same ones that vary considerably in terms of the extent to which they are 'obligational' or 'transactionally' based.^{32,33} Thus, in one study a chemical company was found to have established markedly different forms of relationships with a major supplier of raw materials, a security company and haulage companies.³⁴ Meanwhile, in another study, a large aerospace manufacturer 'estimated conservatively' that it had more than 500 different relationships with the same company.³⁵ As a result, these last authors, in common with others, have argued that supply chain relationships should be analysed at the 'level of the individual product or service', rather than that of the firm.

Taken together, the literature that exists on the underlying nature of supply chain relationships therefore suggests that they can vary considerably in terms of the extent to which they have a trust-based and obligational character and hence encompass co-operative (partnership) joint working, rather than more 'arm's-length' and transactional relations. It also points to the fact that all such relationships will have a market-based element and hence a competitive dimension. This means that attempts to establish co-operative relations will inevitably exist alongside potentially conflicting economic objectives; therefore, to varying degrees, supply chain relations will in general involve both co-operation and conflict.

At one level, the literature reviewed in this section therefore lends weight to the point made at the end of Section 2 concerning how proactive action on the part of buyers to protect and enhance health and safety in supplier organisations can occur in a context in which cost pressures are being exerted that potentially threaten these same standards. At a broader level, it further highlights that actions of this type cannot be assumed to occur in a straightforwardly co-operative, 'partnership-based' context, in which a substantial degree of mutuality of interest exists between buyers and suppliers, even if they are presented as forming part of a relationship of this type.

These last points in turn suggest that such proactive action on the part of buyers may not necessarily be viewed by suppliers as encompassing issues and activities that are seen as beneficial to their own interests. This suggestion raises some doubts as to how far issues and activities such as those involving health and safety will in reality be implemented unproblematically on a co-operative and widespread win-win basis.

Internal management of supply chains

Whatever the form of the relationship between buyers and suppliers, it is clear that the extent and intensity of communications between them and the nature of their interactions differ widely. At one extreme, for example, contacts can be limited to the minimum necessary to place orders and ensure that the necessary goods or services are delivered in the right quantity, to the right quality and at the right time. Meanwhile, beyond this, interactions can extend to the joint development of new products and work processes, and co-investments in equipment and premises. They can also encompass buyers engaging in the delivery of training to suppliers' staff, or the specification of the training they should receive, intervening to shape work processes and quality procedures, laying down requirements as to the types of staff recruited and the terms and conditions under which they are employed, and establishing monitoring and audit arrangements to check and support supplier compliance with requirements laid down in any of these areas. The potential of these latter forms to include health and safety arrangements is obvious from many of the examples that are discussed in detail in Section 5.

Studies undertaken to explore the degree to which and ways in which buyers act to shape the employment strategies and policies of their suppliers' staff can usefully be drawn on to illustrate the variation in the extent to which such client organisations intervene in the internal management of suppliers. Research carried out in call centres, for example, has shown how client companies can, at one extreme, limit their interventions to simply laying down performance targets and subsequently monitoring performance against them. It has also, however, shown that they can engage in interventions such as specifying the skills needed by staff working on their contracts, taking an active role in the selection of such staff, detailing their rates of pay, providing them with training and development, and influencing their career progression.^{36,37} However, while Section 5 reports some examples of cases in which health and safety arrangements between clients and contractors are specified in this way, it also demonstrates that they are seldom discussed in these terms in the literature reporting them.

Meanwhile, research indicates that even where such direct forms of employment-related influence are absent, buyers often indirectly influence how staff in supplier organisations are managed.^{38,39} For example, it has been noted how the demands placed by major supermarkets on supplier manufacturers in relation to matters such as price, quality, demand responsiveness and just-in-time delivery can lead the latter to change shift patterns, improve staff training (perhaps in conjunction with moves to greater multiskilling among staff), increase the reliance placed on temporary agency staff, introduce tighter staffing levels, and intensify workloads.³¹ As the work of James and Lloyd, discussed in detail in Section 5, demonstrates, in the case of suppliers of meat to UK supermarket chains, there is some evidence to show the consequences of these effects in relation to health and safety arrangements and outcomes.

The findings reported above, it should be noted, invariably relate to relations between buyers and immediate, or first-tier, suppliers. In fact, remarkably little research seems to have been done on how such direct and indirect effects act to influence the actions of lower-tier suppliers. There is, however, some evidence which demonstrates that they sometimes prompt first-tier suppliers to exert somewhat parallel pressures on their own suppliers.³⁹ One survey, for example, found that most large automotive suppliers were, against the background of major customers forcing them through stringent quality audits, actively encouraging (and in some cases teaching) their own suppliers to operate statistical process control.⁸ Again, the potential here for positive effects on the health and safety arrangements of lower-tier suppliers is theoretically considerable but, as the following sections demonstrate, it is almost completely undocumented in terms of research evidence.

More generally, it would seem that the type of direct interventions mentioned above are relatively uncommon, with the result that indirect employment effects are much more pervasive and frequent.⁴⁰ In addition, where attempts at direct intervention are made by buyers, it does not follow that suppliers will straightforwardly accept them or comply with them. To anticipate the health and safety analysis that follows, case study findings relating to the relationship between a chemical company and a security contractor, for example, revealed how the latter had failed to provide health and safety training for emergency procedures, despite having been instructed to do so.⁴¹ In a similar vein, a study

of the relationships between car manufacturers and franchise firms highlighted instances where the latter successfully resisted proposed human resource initiatives by the former.⁴²

There is also evidence that similar problems can arise for first-tier suppliers in relation to their own suppliers. One of the case studies undertaken by Scarborough, concerning a company which assembled lighting products for major retail chains, illustrates this. Here, the major customers of the company concerned were requiring it to carry higher levels of stock, produce a wider range of products, and meet increasing quality and delivery requirements. In response to these pressures, the company had radically changed internal work processes but still faced problems meeting customer requirements as a result of the unwillingness of its own (often overseas-based) suppliers to make supportive adjustments. This unwillingness that led to frequent production disruptions, which in turn contributed to a stressful production environment, more labour turnover and absence problems and difficulties in pursuing 'a coherent and proactive HR policy'.³⁹

The evidence examined in this section therefore confirms that buyers do at times intervene to influence substantially the internal operations of their immediate suppliers. But it also indicates that such intervention is relatively uncommon and that the main way in which buyers influence the behaviour of suppliers is indirectly via the demands they place on them with regard to matters like price, quality and delivery of goods and services. It appears that these pressures often lead to indirect changes in working and employment practices which include the greater use of nonstandard workers and the introduction of higher, and more intense, workloads. As shall be seen in the next section, these outcomes have been found to be associated with adverse health and safety outcomes.

Some limited evidence also emerged of immediate suppliers responding to the demands of buyers by requiring similar changes from their own suppliers in turn. But the limited nature of the evidence here means that it remains unclear how far proactive attempts by buyers to influence health and safety standards in their immediate suppliers serve to prompt the latter to impose similar demands on those who supply them. This lack of evidence means that it cannot be discounted that such attempts rarely go beyond the particular supply chain relationship concerned; hence, they may exist alongside actions on the part of immediate suppliers in respect of their own providers that simply engender the more indirect and negative changes in working and employment practices noted above.

Factors shaping supply chain relationships

Many factors have been identified in the literature as influencing the nature and dynamics of supply chain relationships. In what follows, the main factors are discussed through an exploration of four issues:

- the institutional context in which relations are established
- the outsourcing objectives of buyers
- the extent of mutuality that exists between the risks and interests of buyers and suppliers
- the dynamics of buyer–supplier interactions.

However, it needs to be borne in mind that the factors explored in this way are inevitably interrelated and hence interdependent.

Institutional context

A number of pieces of research have identified that the wider institutional context within which supply chain relationships are established can exert an important influence over their nature. In doing so, this research has indicated that such contexts can differ in the extent to which they act to facilitate the establishment of collaborative, as opposed to more adversarial, relations between buyers and suppliers.

In an analysis of how 'institutionalised rule systems, particularly of technical standards,' affect supplier relations in the British and German mining machinery and kitchen furniture industries, for example, Lane found that marked national differences existed in these systems, which had significant implications for the relationships established between buyers and suppliers.⁴³ In particular, she concluded that a number of aspects of the German institutional context served to support longer-term and closer relations between customers and suppliers, notably by easing the drawing up and interpretation of contracts and, more generally, reducing opportunism and risk among contracting parties. These aspects included:

- the much more extensive use of industry technical standards, the creation of such standards, as well as rules on the 'standardisation of business terms in contractual relations' and 'market conduct', by trade associations, to which all but the smallest firms belong
- the degree to which this membership of associations supports contacts between firms
- the presence of a system of contract law which affords greater protection 'to the weaker party'.⁴⁴

In Section 5, the effects of these infrastructural features of the German economy are shown to be especially significant in determining the extent and nature of supply chain-based support for health and safety arrangements relating to the use of hazardous substances in smaller firms.

In a similar vein, Sako's study, referred to earlier, of the comparative competitiveness of Japanese and British manufacturing industry also shows that a number of features of the historical, cultural, financial and employment relations contexts of buyer and supplier relations in Japan support OCR-type relationships better.²⁹ For example, Sako draws attention to the insistence by the Japanese legal framework on the exchange of written contracts intended to provide legal protection to weaker contracting parties; to an appeal to the reputation and moral responsibility of stronger parties as a way of preventing them from abusing their market power; and to the existence of informal dispute resolution services to facilitate the maintenance of trust relations. Indeed, because of such differences, Sako concludes – perhaps somewhat controversially and pessimistically – that 'it would be neither feasible nor desirable to adopt OCR-type supplier relations in Britain'.

Nevertheless, notwithstanding this conclusion, it would appear that in the British economy some contexts are more supportive of such relationships than others. For example, this would seem true of the 'Responsible Care' code of practice developed by the Chemicals Industries Association (CIA), which is again addressed in more detail in relation to its specific effects on health and safety in the use of hazardous substances in Section 5. This code's provisions on interorganisational relations, along with the personal contacts that arise as a result of membership of the association, were cited by Carroll *et al.* as helping to explain the presence of some OCR-type supply relations that they found to exist between two chemical companies.⁴¹ This view was supported by the following observation from one of the CIA's directors about the role that the code plays in protecting the reputation of firms:

It is possible to bring peer pressure to bear because so much in the industry depends on reputation. It's in everybody's interest to help one another. There is a common cause underlying this.³⁴

In contrast, it has been found that aspects of the context surrounding outsourcing in the public sector can militate against the establishment by public sector bodies of 'partner relations' with suppliers. Erridge and Greer, for example, have noted that government regulations and rules on financial probity, and the requirements of the European Commission's procurement directive relating to competitive tendering, can work against the creation of such relations by encouraging risk aversion in government departments, engendering highly rigid and bureaucratic contracting procedures, placing an emphasis on short-term cost savings and, as the following quotation illustrates, introducing uncertainty as to whether relations will continue in the longer term:⁴⁵

As long as compulsory competitive tendering remains, it will be very difficult to establish and maintain trust. You are awarded a contract, you work closely with the procurement personnel and build up a relationship, and then after two or three years, they say: 'Thanks for what you have done; we're now going out to open tender and all your competitors are going to come in.'

These last observations exist alongside another strand of current government policy towards outsourcing, which encourages public sector organisations to work towards establishing relationships with contractors that are not purely cost or price-based and that incorporate 'partnership working'. In local government, for example, the abolition of CCT and its replacement by Best Value can be seen to illustrate both of these elements of government policy, as a result of its emphasis on striking a balance between cost and quality considerations, as well as the emphasis it places on partnership working with suppliers.⁴⁶ Meanwhile, the government's view as to the more general desirability of collaborative supply chain relationships is clearly indicated by the joint establishment by the Department for Business Enterprise and Regulatory Reform and the Confederation of British Industry of a company, Partnership Sourcing Ltd, to promulgate and provide guidance on the creation of outsourcing partnerships.

In short, the nature of supply chain relations established between buyers and sellers are, in part, a product of the wider institutional context in which they are established and operate. In particular, there is evidence to suggest that such environments can help to introduce greater or lesser degrees of uncertainty, and thereby risks, into contractual relations and in this way influence the extent to which buyers and suppliers feel secure enough, in Adler's terms, to supplement market-based transactions with trust-based relationships. There is also evidence to indicate that, at a general level, the British institutional context is less supportive of the establishment of relationships of this type than those in Germany and Japan.

It would therefore seem that supply chain relationships in Britain tend to be relatively adversarial, with the result that collaborative joint action between buyers and suppliers on health and safety matters is likely to be generally difficult to establish and sustain in a context in which, as noted earlier, supply chain relationships will inevitably include conflicts of economic interest to some degree. Insofar as buyers do want to influence health and safety standards in their supplier organisations, it seems that the success of action in this area on their part will be intimately connected to the resources they devote to monitoring and auditing supplier compliance with any health and safety requirements they impose.

Buyer outsourcing objectives

It was noted earlier that a number of different motivations can influence the decisions of organisations on whether to engage in outsourcing. These motivations, however, cannot be considered sensibly in isolation from broader business objectives that are themselves inevitably shaped by organisations' core business activities and product markets.

Developments in outsourcing in the British automotive industry illustrate how such considerations have in practice influenced the outsourcing strategies of firms and the types of relationships they seek with suppliers. In the 1980s, motor manufacturers began to realise that, in the face of rising competition and market difficulties, the role of component suppliers and the types of relationship they had with them needed to change in order to reduce costs and resolve problems of poor quality, unreliable delivery, excessive stockholding and inadequate data exchange.⁸ To this end, moves were made towards the single sourcing of components, and action was taken to establish longer supply contracts, improve the quality of components supplied, create greater collaboration on research and development, and make suppliers responsible for providing subassembled component systems rather than individual parts.^{47,48}

These changes, in turn, were associated with attempts to replace traditional 'arm's-length', adversarial supply relationships with more co-operative and collaborative ones and thereby increase the intensity, as well as the focus, of buyer-supplier relationships. This shift is demonstrated well by one of the case studies undertaken by Beaumont *et al.*,⁴⁰ where it was found that the major motor vehicle customer of a supplier had, in line with its own introduction of a quality improvement programme and greater employee involvement, required the supplier to make similar changes and supported it in this endeavour. This case study has, as we note in subsequent sections, been cited frequently in discussions concerning the potential for direct supply chain effects that are beneficial to health and safety arrangements.

At the same time, it needs to be borne in mind that this linkage between the business objectives of buyers and the relations they have with suppliers can result in relationships that have little common with the OCR type of contracting described by Sako. In one study, for example, Cousins and Lawson³⁵ found that the adoption by buyers of a 'leverage sourcing strategy' – ie one in which they attempt to gain a cost or price advantage in relation to the purchase of items that, while of strategic importance, have little supply risk – was not statistically related to collaborative supply chain relations. This was true despite the fact that the strategy was associated with relationship outcomes encompassing 'collaborative goals, such as integration of business processes, shared capital investment, risk and reward sharing, shared capital investment and joint product development'. In contrast, such relations were found to be statistically associated with the adoption of a 'critical sourcing strategy' in respect of 'scarce and/or high-valued items that have a high profit impact and high supply risk'.

On one level, these last findings caution against assuming that collaborative relationships are a necessary precondition for a substantial degree of co-operative behaviour between buyers and sellers. Case study research on public-private partnerships by Reeves⁴⁹ reinforces this point by showing that neither the presence of strongly transactional relations nor a preference among clients and contractors for relationships of this type precluded the presence in reality of a good deal of co-operation and trust between them.⁴⁹

At another level, the findings of Cousins & Lawson³⁵ also highlight how the types of supply chain relation that buyers seek are intimately connected to perceptions of supply chain risks that are influenced by the availability of alternative sources of supply, the criticality, as already noted, of the goods and services to an organisation's activities and reputation, and the complexity of these goods and services and hence the scope for failures in supply to occur. This point is borne out by the observations made above concerning supply chain developments in the car industry and is further

supported by a number of other analyses and empirical studies. The likely linkage between the scope and intensity of buyer–supplier interactions and relations more generally, and perceived business criticality (and risk), for example, is supported by the dynamics that underlay the close relationship that Marchington & Vincent³⁴ found to exist between two chemical companies. It is similarly supported by the case studies on franchiser–franchisee and knowledge-based client–supplier relationships undertaken respectively by Truss⁴² and Swart & Kinnie,³⁶ as well as the research of Hunter *et al.*,³⁸ where a strong linkage was identified between the business and procurement strategies of the customers of suppliers. The same is also true of a survey of manufacturing organisations undertaken by Heide & John,⁵⁰ where the existence of joint action between buyers and suppliers and ‘verification efforts by the former were found to be associated with the percentage of end product value accounted for by the component being supplied, an inability to forecast technical requirements accurately, and the existence of difficulty in measuring supplier compliance with expected outputs.’

Nevertheless, it needs to be borne in mind, in line with Adler’s observation that all ‘network’ relationships include a ‘market’ element, that buyer cost or price considerations will invariably exist alongside others relating to such matters as supply quality and reliability. Consequently, actions in the latter area that look ‘collaborative’ can exist alongside more ‘conflictual’ objectives in the former arena. This means that what may be viewed as a partnership-based supply chain relationship from the perspective of a buyer may be viewed rather differently by a supplier and its workforce.

In summary, then, the evidence explored in this section reinforces some of the key points that emerged in the analyses provided in earlier sections – for example, the way in which supply chain relationships invariably embody a combination of co-operative and adversarial elements, and the fact that attempts to directly influence the internal operations of suppliers can occur even in the context of relationships that are far from obligational in nature. At the same time, it also extends these existing analyses by highlighting the way in which the nature of such relationships is strongly influenced by the cost sensitivity of the goods and services being provided, as well as their complexity and business criticality, and the extent to which alternative sources of their supply exist.

By extending the earlier analyses in these ways, the evidence considered here suggests, albeit tentatively, that buyers are most likely to seek to influence supplier health and safety arrangements where features of the goods and services being supplied tend more generally to encourage them to take an active interest in how suppliers are internally managed. It also suggests that the price sensitivity of these goods and services will affect how far any attempts at positively influencing arrangements of this type can exist alongside contracting pressures that potentially threaten current standards of health and safety in supplier organisations. In doing so, the evidence suggests that supply chain health and safety effects will tend to be most favourable (but still not necessarily positive) where the goods and services being supplied are complex and critical to the buyer but the cost pressures on suppliers are relatively low, such as when buyers operate in a relatively sheltered product market.

Mutuality of buyer–supplier risks and interests

In the previous section, attention was paid to how the outsourcing objectives of buyers, and how they relate to their wider business strategies and market situations, act to shape the approaches that they adopt towards the establishment and operation of supply chains. It is obvious, however, that it ‘takes two to tango’ and that the business objectives, strategies and market positions of suppliers can potentially also exert an important influence over buyers.

For this reason it cannot be assumed that suppliers will willingly reciprocate the wishes of buyers to establish deep, intense, and substantial relationships with them. For example, the attempts by motor manufacturers from the 1980s onwards to rationalise their supply chains and place a greater reliance on single sourcing led, as has been noted, to some existing suppliers choosing to become ‘second tier’ ones as a result of doubts about their capacity to meet the greater demands that would be placed on them, and worries about the market risks involved in becoming so reliant on one customer.⁴⁷

The responsiveness of suppliers to the demands of buyers, both at the pre-contractual stage and subsequently, cannot be considered in isolation from the implications that these demands have for their own business interests. In line with this point, the balance of dependency between buyers and sellers has been particularly identified as exerting an important influence over the relationships established between them.

As already noted, a fear of too great a dependency may lead suppliers to resist becoming too closely involved with buyers. On the other hand, the existence of a high degree of such dependency may lead

suppliers to be willingly compliant with buyers. Nevertheless, even here, as the findings of Scarborough³⁹ highlight, they may still face problems in complying with buyer requirements, perhaps because of difficulties with their own suppliers.

In a similar vein, a low level of supplier dependency can lead them to resist to some extent the demands made by buyers. For example, the failure, noted earlier, of a security contractor to respond to a request to provide health and safety training for emergency procedures reflected the fact that the contract concerned ‘was not important to the overall success of its business’.⁴¹ At the same time, in cases where suppliers constitute an important source of specialist expertise or knowledge, buyers may be in a position of relatively high dependency, with the result that the suppliers may be well placed to gain a substantial degree of influence over the supply relationships established.³⁶

The balance of dependency between buyers and suppliers can therefore vary considerably. This point is well highlighted by Cousins & Crone⁴⁷ in the study they undertook to explore the relationships between vehicle manufacturers and major first tier suppliers, with a view to identifying those attributes of the relationships which motivated both parties to engage in obligational contracting. On the basis of their research, they produced the following matrix of dependency relationships between vehicle manufacturers and their first tier suppliers, with dependency viewed as a product of three factors: access to technology, degree of relationship-specific asset investment, and the percentage of total business involved.

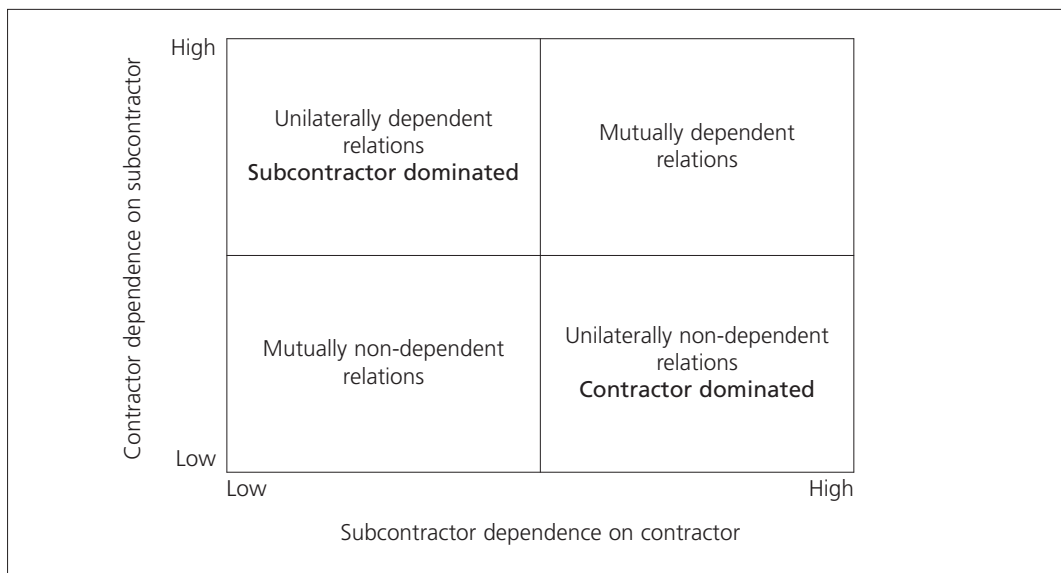


Figure 1
Summary model of
dependency-based
relations

The balance of dependency between buyers and suppliers can consequently have a significant role in shaping the nature and dynamics of immediate supply chain relationships because it has important implications for the distribution of power and risk between them. It can therefore influence such matters as how far suppliers (rather than buyers) shape the terms on which they undertake work, and the degree to which they are willing to take heed of, and comply with, buyer requirements. It can also exert an important influence over the scope that exists to establish collaborative, partnership-based relations.

In relation to this last point, Dore has pointed out that a partnership approach that seeks to match ‘business goals and needs’, reconcile ‘cultures’ and develop ‘the right chemistry’ is likely to prove challenging and frustrating where contracting is between ‘unequals’.⁵¹ Meanwhile, recent studies by Cunningham⁵² and Grimshaw *et al.*⁵³ that shed light on contracting in parts of the public sector have served to further reinforce observations on how the distribution of expertise and power among buyers and suppliers can influence the contractual basis and dynamics of relationships between them. On the basis of interviews with 24 voluntary organisations based in Scotland, Cunningham describes how their ability to resist and shape the demands of local authority service commissioners was crucially influenced by such factors as the extent to which they possessed a multi-customer base, the degree to which they were able to exploit favourable product market positions stemming from the types of service they provided, and how far they were able to draw on alternative, voluntary sources of funding. On the other hand, Grimshaw *et al.* concluded on the basis of case studies – one of an IT partnership involving a government department and the other of a NHS Public Finance Initiative

project – that there existed in both sets of arrangements ‘a great deal of potential for an imbalance of bargaining strength and an inequitable distribution of gains and losses between the public and private sector partners’, with this imbalance being crucially influenced by differences in ‘expertise in outsourced activity’, ‘expertise in negotiating and working to contract’ and ‘sensitivity to reputation in [the] area of service delivery’.

From the foregoing analysis, then, it is clear that the nature and operation of supply chains cannot be understood fully by reference to the objectives and actions of buyers alone. Rather, they are influenced critically by the balance of dependency, and hence power, that exists between buyers and suppliers, a balance that can in some cases be relatively even and, in others, favourable to either the buyer or supplier.

Where the balance of dependency is in favour of the buyer, as is often the case, there seems to be a clear potential for buyers to influence directly the health and safety arrangements of suppliers. At the same time, however, a greater potential exists for them to impose other demands on suppliers, notably in respect of price, that can have detrimental consequences for supplier health and safety management and standards. Meanwhile, where the balance of dependency is in the opposite direction, suppliers will be better placed to resist such demands but also more able to ignore buyer attempts to influence their internal management directly.

Buyer–supplier interactions

In her analysis of buyer–supplier relations, Sako²⁹ distinguished 11 different dimensions of such relationships. Of these, she argued that two were of particular importance in terms of the role they play in shaping the nature of the relationships between buyers and suppliers. One of these was the degree of interdependence between buyers and suppliers, already explored above. The other was the time span for reciprocity between them.

In emphasising the importance of the time span of reciprocity, Sako was drawing attention to the fact that longer-term relationships and exchanges between buyers and suppliers offer opportunities for relations to move beyond pure market-based transactions to encompass greater degrees of trust and collaboration. In doing so, she also highlighted the fact that supply chain relationships often have a dynamic quality which means that their character can, deliberately or not, shift over time.

Various subsequent analyses have reinforced this point and therefore have added weight to the point made above about the potential for relationships in supply chains to be actively shaped. Ring and Van de Ven, for example, have noted that co-operative interorganisational relationships emerge and evolve and can also dissolve over time as they are ‘continually shaped and restructured by [the] actions and symbolic interpretations of the parties involved’.⁵⁴ This process of change is further seen to be a product of informal and formal interactions relating to three interrelated subprocesses of interorganisational relations: negotiations, the making of future commitments, and the executions of those commitments. The dynamics involved are captured by the following quotation:

If parties can negotiate minimal, congruent expectations for a cooperative IOR [interorganisational relationship], they will make commitments to a future course of action. If these commitments are executed in an efficient and equitable manner, they will continue with or expand their mutual commitments. If these commitments are not executed in an efficient and equitable manner, the parties will initiate corrective measures by either renegotiating or reducing their commitments to the cooperative IOR.⁵⁴

In a similar vein, Hunter *et al.*³⁸ concluded that there are at least three main, although not inevitable, stages involved in the evolution of supply chain relations beyond ‘the standard market model’. The first of these, which they label the ‘demand model’, involves purchasers increasing their demands on suppliers, for example in relation to quality. The second, labelled the ‘audit model’, encompasses, in the case of suppliers who have proved satisfactory in their performance, trust-building and typically includes the expansion of the scope of supplier rating schemes, reciprocal visiting by technical personnel to develop a better understanding of the technical aspects of the trading relationship, and the stepping up of the audit process in terms of frequency and intensity. Finally, the third stage, termed the ‘supplier development model’, involves both a process of deepening trust, where this is seen as feasible and desirable, and an expansion of the relationship to include such activities as:

- exchange visits of shop-floor and supervisory personnel
- more frequent interaction of staff in the two companies, at a variety of levels and representing a broader range of functional areas

- formation of joint problem-solving or development teams
- subsidised use of consultants to provide advice or help to implement changes in management systems
- assistance in training for special techniques where the customer may require a particular level of competence to meet needs
- transference of management control systems and other management practices that are regarded by the customer as integral to the success of their own operations and which they would wish to see adopted or at least made compatible with the systems in use by the supplier.

It consequently needs to be borne in mind that the management of networks, in the words of Kickert & Koppenjan, involves ‘promoting the mutual adjustment of the behaviour of actors with diverse objectives and ambitions with regard to tackling problems within a given framework of interorganisational relationships’.⁵⁵ As a result, the dynamics within them, as well as how they evolve over time, can be potentially and significantly influenced by the interpersonal relationships established by boundary-spanning agents who interact at the interface between buyer and supplier organisations. Indeed, it has been noted that such relationships can even lead to the maintenance of interorganisational relationships in situations where their performance would, in business terms, support their discontinuation.⁵⁶

Research by Williams, for example, indicates that boundary-spanning agents can contribute to the building of sustainable relations through open and effective communications, listening, understanding, empathising and conflict resolution, and exhibiting trust-based behaviours.⁵⁷ It further shows that their role extends to cover managing through influence and negotiation; managing complexity and interdependencies; and managing roles, accountabilities and motivations.

Clearly, it is not possible to divorce how boundary-spanning agents approach their role, and the types of cross-organisational relationships they seek and are able to establish, from the wider contractual context in which they operate. As a result, they will inevitably be influenced by such features of this context as contract length, the subject focus of and need for cross-boundary interactions and collaboration, and how power and risk is distributed between the contracting parties. Within this context, however, it has also been noted that how they approach their work will also be influenced by their personal characteristics and previous work experience and that, in line with the observations made above, that they can exert an independent influence over the extent to which trusting and collaborative (or, for that matter, adversarial) relationships are forged with their counterparts on the other side of the organisational divide.⁵⁸

It is clear from the accounts reviewed in subsequent chapters that the role of boundary-spanning agents in respect to health and safety is seldom evaluated in the research literature. There is, however, considerable and obvious potential here for the activities of health and safety advisers and those with managerial responsibilities for health and safety to adopt prominent roles in this area. Although not adequately researched, there is some evidence from the ‘grey’ literature referred to in the following chapters that this already occurs to some degree in industries in which supply chain relationships and health and safety are already bound together, such as construction and the supply of hazardous substances. Its significance and potential for further development is, however, little understood and has been the subject of little in the way of research scrutiny.

What has emerged, then, from the evidence reviewed in this section is that the nature of buyer–supplier relationships can change over time, either in the direction of closer and more collaborative relationships or towards more distant and adversarial ones. The evidence reviewed has also highlighted the fact that the actions of key boundary spanning agents, and the relationships that they establish across organisational boundaries, can themselves play a role in shaping how such relationships operate and evolve over time.

It would consequently seem that buyer interest in influencing how health and safety is managed by suppliers can potentially change over time, with the result that proactive action in this regard can both wax and wane. It also seems that where influence in this area is sought, those who are charged with securing it have significant potential to shape its nature and extent, both through their personality, attitudes and skills and the quality of the relationships that they establish with representatives based in supplier organisations.

Conclusion

The available evidence indicates that supply chains have come to play a greater role in the UK’s economy in recent decades as organisations have chosen collectively to place a greater reliance on

obtaining required goods and services from outside suppliers. Several factors appear to have contributed to this trend. These can conceptually be viewed as comprising developments that have made outsourcing more feasible for organisations and those that have driven it in business terms.

In terms of feasibility, improvements in distribution logistics and technological means of co-ordinating suppliers and monitoring their performance seem to have exerted a crucial influence. Meanwhile, a range of overlapping considerations appears to have been associated with the willingness of organisations to place a great reliance on outsourcing. These have included a desire to:

- reduce costs and improve quality
- acquire greater flexibility, perhaps through avoiding internal rigidities
- draw on external sources of knowledge and expertise.

They have also included a shift towards organisations seeking to focus internally on core activities and to divest themselves of more peripheral ones. At the same time, related changes in government policy have advocated the greater use of voluntary and private sector providers by public sector bodies both at a philosophical level and on cost, quality and expertise grounds.

The existing research literature recognises that the nature of buyer–supplier relations can vary considerably. At the extremes, for example, a distinction has commonly been drawn between transactional, market-based relationships and those that have a more obligational, collaborative and trust-based character. However, it is also recognised that many supply chain relationships will include elements of both of these ‘ideal types’ and hence embody much more mixed combinations of transactional and obligational elements.

In a similar vein, the available evidence indicates that marked differences can exist in the nature of the interactions between buyers and suppliers. On one hand, they can involve no more than the minimum necessary to place orders and ensure that they are met in quantity and quality terms; on the other hand, they can be far more fundamental.

Nevertheless, it seems that such far-reaching interactions are relatively uncommon and that the main way in which buyers affect internal management of suppliers is indirectly through the requirements they impose in relation to such matters as price, quality, demand responsiveness and just-in-time delivery. These requirements have been found to have potentially important implications for the extent and nature of staff training, the recruitment of temporary staff, staffing levels, workloads and shift patterns.

There is also some evidence to show that these direct and indirect effects that buyers have on suppliers can lead the latter, in turn, to seek similar changes in their own suppliers. However, there seems to be surprisingly little detailed research which sheds light on these second tier or ‘downstream’ effects, either generally or specifically in relation to health and safety.

These variations in the nature and content of supply chain relations appear to reflect the influence of a number of factors relating to the institutional context within which relations are established, the outsourcing objectives of buyers, the extent of mutuality that exists between the risks and interests of buyers and suppliers, and the dynamics of buyer–supplier interactions. The exploration, described above, of the influence wielded by these factors has indicated that it is the characteristics of the goods and services provided through supply chains, the objectives and wider business interests of buyers and sellers and the distribution of power between them, along with the institutional context within which buyer–supplier relations are developed, which should be viewed as the crucial factors influencing the nature of supply chain relationships and the behavioural dynamics within them. In contrast, it has suggested that the personal predilections of key actors within supply chains should be considered as a lesser source of influence; although this is not to say that they are of no significance or that the interpersonal relationships that are developed on the basis of their interactions, both satisfactory and unsatisfactory, have no implications for the way in which supply chain relations evolve over time.

Consequently, on the basis of the evidence reviewed, it would seem that it is the dynamics of the interactions between these first mentioned factors that are likely to exert the most significant influence over the way in which the operation of supply chains affects the health and safety management and performance of organisations forming part of them. It would further seem reasonable to argue, albeit on the basis of logical extrapolation, that these dynamics are likely to mean that:

- attempts by buyers to directly influence health and safety are likely to be relatively uncommon, being mainly restricted to situations where it is seen as an issue encompassing significant business risk
- many buyers are likely to be able to extract concessions, notably in relation to price, from suppliers that have potentially adverse implications for the working conditions and work experiences of the suppliers' staff
- the utilisation of this ability will often not be strongly constrained by the presence of co-operative, obligational relationships based on the relatively equitable sharing of risks and rewards.

This is not to say, however, that these observations constitute 'universal truths'. In some cases, for example, the balance of power in a supply chain relationship may mean that suppliers are able to resist potentially detrimental pressures from buyers. Co-operative, obligational relationships of the type referred to above may also come about in certain circumstances, and there may also be cases where health and safety interventions on the part of suppliers are undertaken even where they are not underpinned by a strong business rationale.

Rather, the overall evidence reviewed in this chapter suggests that positive health and safety supply chain effects are unlikely at a general level to emerge spontaneously from the voluntary actions of buyers and the related compliance of suppliers with buyers' requirements. As a result, it would seem that if supply chains are to have positive, rather than negative, outcomes for worker health and safety, then the actions of buyers and suppliers need to be appropriately shaped and constrained by wider institutional forces, notably in the shape of a framework of legal regulation and enforcement.

This issue of regulatory policy will be revisited in Section 6. Meanwhile, in the next two sections, the validity of the above conclusions are further explored via an examination of the research evidence available, which sheds more direct and detailed light on how the operation of supply chains affects health and safety management and performance.

4 Outsourcing risks and improving market position – the health and safety consequences

To improve market position, business practices especially seek to outsource activities that afford opportunities for increased profitability and enhanced flexibility in their responsiveness to markets. This has important implications for matters of employment at both the level of the individual organisation and in the economy as a whole. In particular, in recent decades, outsourcing has contributed to a reduction of employment in large companies and a corresponding growth in small and medium-sized enterprises (SMEs).⁵⁹ It has also led to a significant rise in the use of contingent or 'non-permanent' labour, notably in the form of self-employment and temporary working, with the latter increasingly occurring through the use of temporary employment agencies.⁶⁰ These indirect supply chain effects often mean that risks are transferred to workers as businesses in economically dependent positions in supply chains find ways to cut costs.⁶¹ While the language of these developments is associated with business operations in private enterprise, the activities it describes are now by no means limited to the private sector. Markets have been deliberately created in the public sector too, and the same principles of flexibility and responsiveness applied, with related consequences for the many workers involved.

Consideration of the health and safety consequences of these developments involves some understanding of the nature of the processes involved in the supply of products and labour, including contracting and subcontracting, the use of agency labour, procurement, contract compliance, just in time (JIT) management, flexibility and so on. More broadly, it involves taking account of trends in business relationships and in the economy generally. This is because the current focus on the role of supply chains in advanced market economies is the result of a reorganisation of business and economic activities in which traditional models of production and services have given way to more flexible networks, whereby the management of work inside an organisation is bound up with managing supply to and from the organisation in the name of greater business efficiency.

The upheaval that has taken place in the operation of established norms of business practice in most market economies in recent decades is complex and beyond the analytical scope of the present report. The salient point, however, is that its consequences are felt in the changing nature of the employment relationship and the experience of work, with the structures and processes of supplying materials and labour being critical in this respect. These changes in the employment relationship and in the porosity of organisations to their wider business environment represent significant challenges for traditional approaches to regulating and managing health and safety and protecting workers. This report concerns itself primarily with these consequences.

There are numerous papers that discuss the effects of supply chains on health and safety. Overall, they amount to a considerably smaller literature than that which engages with the more general analysis of supply chains reviewed in the previous section. Most such accounts describe negative consequences that are brought about by the so-called 'indirect effects' of outsourcing business risks. This section will deal with these effects insofar as they relate to the impacts on the health and safety of workers in labour supply chains created through contracting out, subcontracting and greater reliance on agency or leased labour.

The chapter starts by considering the broad findings of the literature, which link the outsourcing of risk to poorer employment conditions in supply chains, before looking in more detail at the research focused on the sectors of economic activity where the health and safety consequences of this form of business restructuring have attracted the greatest interest. In addition, consideration is given to some of the health and safety issues associated with product supply chains as illustrated by the case of hazardous substances.

Outsourcing and its health and safety consequences

Greater control by market and related mechanisms in recent decades has led to changes in the organisation of work and employment. The most significant and emblematic of these changes affecting work organisation include the often-repeated rounds of restructuring or downsizing by large private and public sector employers and their consequent effects on:

- work intensity (via changes to staffing levels and workloads, multitasking, increased hours of work, 'presenteeism' and unpaid overtime)
- the decline in the proportion of the workforce in full-time permanent employment (especially for men) and increased part-time, temporary, fixed-term and leased (agency) work

- elaborate national and international supply chains
- the growing use of (multitiered) subcontractors and agency workers.

Outsourcing in the public sector usually results in privatisation (although privatisation may occur independently of this); increased use of outsourcing or subcontracting and franchising (essentially a structured form of internal subcontracting) has led to the growth of self-employment, microbusinesses and the number of small business employers. Subcontracting and franchising, as well as use of information technology, has facilitated the growth (sometimes re-emergence) of home-based, remote and transient work (the last-mentioned being exemplified by short-term call centres). There are further associations with increases in multiple job-holding, often associated with part-time and temporary work.⁶²

Of course, such change does not inevitably lead to adverse occupational safety and health outcomes. Outsourcing work could, for example, lead to it being carried out in an environment in which work-related risks are better understood and better controlled. A good example of this is seen in asbestos removal in the UK, where specialist contractors are preferred (and legally required) to undertake the highly hazardous activities involved because they have the necessary equipment and expertise to do so. Similarly, when temporary and subcontract labour are employed in high-risk production environments where an incident is potentially catastrophic, the user employer may have substantial business incentives to ensure that their use does not result in the undermining of existing standards of risk management.

Nevertheless, there are at least four sets of compelling reasons why the net aggregate effect of outsourcing is likely to be adverse:

- much of the externalisation of work activities has gone to smaller organisations, which possess less adequate and sophisticated systems of risk management than their larger counterparts
- problems arise with regard to the co-ordination of such management in situations where subcontractor and temporary staff work in physical proximity to in-house personnel
- interorganisational contracting can have a detrimental impact on conventional channels for the representation of the interests of workers
- associated commercial contracts can limit the ability of those organisations engaged in the supply of labour or the provision of manufacturing and other services to invest in preventive health and safety measures.

These theoretical expectations are generally supported by evidence from research literature on the effects of outsourcing.

For example, there is evidence that injury rates vary negatively with both workplace and establishment size. Logically, and empirically, a shift of work activities to smaller workplaces and organisations is likely to be associated with a rise in their 'riskiness'. Eurostat data for 1999 show, for the 15 countries that were then members of the European Union, that the average fatal injury rates per 100,000 workers for micro (1–9 employees) and small (10–49 employees) enterprises was around double that of larger undertakings.⁶³ Several British studies have similarly found the incidence of fatal and major injury accidents to be significantly higher in small workplaces.^{64–66} Indeed, a study by Stevens⁶⁶ showed the rate of fatal injury in small manufacturing workplaces to be double that found in medium and large ones.

Several factors have been identified as contributing to the poorer safety performance of small firms. Nichols, for example, has argued that it stems from a 'general and multifaceted lack of resources' which give rise to 'structures of vulnerability'.⁶⁷ Other studies have also pointed to the role played by the limited resources that small businesses have to invest in health and safety measures, including management time, training and investment in new equipment and plant. These studies also suggest that the problem is compounded by the low frequency with which small businesses are inspected, their low profile, the fact that employment tends to be less secure and also more likely to be illegal, and the limited access that staff have to trade union and other forms of independent collective representation which have been found to lead to both better health and safety outcomes and more adequate systems of risk management.⁶⁸ In addition, in a British study of health and safety in small firms, a number of the owners and managers interviewed reported that their ability to invest in health and safety was limited by the narrow profit margins that they were operating under as a result of the contract prices demanded by larger clients.⁶⁹

Such findings are not exclusive to small firms, but also are found in relation to other forms of outsourced labour. For example, in their review of the international literature on the health and safety consequences of precarious forms of employment, such as result from the supply of labour through employment agencies, through labour leasing or through subcontracting, Quinlan⁷⁰ and his colleagues have argued that the economic pressures and reward systems encountered in these forms of employment result in poorer health and safety outcomes than might be anticipated in more traditional employment arrangements.

This research on the health and safety performance of smaller firms and related labour supply scenarios exists alongside evidence to suggest that the co-ordination of risk management can become problematic in subcontracting and labour outsourcing because overall management control and responsibilities are more diffused in these situations.

A number of studies and official inquiries into the causes of injuries and disasters in chemical plants and in the rail and offshore oil industries have drawn attention to the difficulties that can arise with regard to the adequate management and control of workers employed by subcontractors.^{71–75} A case in point here is the commission of inquiry established by the French National Assembly to investigate the September 2001 explosion at the AZF chemical factory in Toulouse, which killed 30 people, including 21 workers, 13 of whom worked for subcontractors. The inquiry determined that problems with contractor safety management were a critical factor in the incident and recommended a ban on multitiered subcontracting on so-called Seveso sites.⁷⁶

There is also a considerable body of evidence relating the development of the kinds of work insecurity, intensification and flexibility typical of the results of supply chain pressures to a variety of adverse health and health-related outcomes, including increased incidence of cardiovascular disease, burnout and depression,^{77,78} and to poor workplace safety outcomes.^{79–83} The workplace factors that have been associated with poor health and safety outcomes again include greater job insecurity, poorer pay, lower access to training among precarious workers and less control over working time, which in turn contribute to lack of knowledge and awareness of safety issues and complaints about lack of voice.^{84–89}

Other reviewers have reported similar findings in relation to temporary employment.^{90,91} A British study in 2000, for example, revealed that around half of the recruitment agencies surveyed did not have measures in place to ensure that they were fulfilling their legal obligations and that there was a widespread lack of awareness among agencies and host employers that responsibility for health and safety is, under current law, a shared one. It further found that agencies were frequently unaware of whether host employers carried out risk assessments, and that the exchange of health and safety information between agencies and host employers was often poor.⁹² This survey also revealed that workers supplied by agencies tended to be inexperienced young people, placed in lower-skilled occupational areas, often in production and construction firms and particularly manufacturing.

More generally, a parliamentary inquiry in the Australian state of Victoria concluded that the use of 'labour hire arrangements' can complicate the co-ordination of work processes, including occupational safety and health standards, and that weak lines of communication between labour hire workers and agencies, and between host employers and employees, can lead to the obfuscation of occupational safety and health responsibilities.⁹³ These findings dovetail, in turn, with evidence indicating that the growth in use of temporary staff, as well as of self-employed contractors and home-based workers, has been associated with adverse health and safety outcomes.⁷⁰ Looking at the vulnerability of agency workers from a different perspective, in her extensive study of the experiences of injured workers in Australia, Underhill demonstrated very clearly their poor position compared with other employees in relation to returning to work following injury, both in relation to regulatory gaps and practice.^{94,95}

The Victorian parliamentary report referred to above also noted how the cost-sensitive nature of the labour hire industry could lead agencies to compromises or even non-compliance with occupational safety and health duties in relation to such matters as induction training and risk assessment. Indeed, the authors of an Australian investigation of the experiences of those working under subcontracting or outsourcing arrangements in four sectors – child care, hospitality, transport and building – reached the conclusion that reduced standards were associated with increased economic competition, as well as work disorganisation, regulatory failure and a divided workforce, and that in 'any organisation where outsourcing has become common, OHS standards deteriorate.'⁹⁶

Another way of looking at the impact of these structural changes in employment is to examine their influence on the achievement of a 'positive safety culture' by organisations. The notion of a positive safety culture is widely advocated by regulatory authorities⁹⁷ and in the health and safety management literature as a significant factor in aiding the prevention of workplace accidents. Although there is little universal agreement on what a positive safety culture actually constitutes and its theoretical underpinnings are arguably suspect,⁹⁸ there is general agreement concerning the preconditions necessary for its achievement. These include matters of good communication, trust, the presence of occupational safety and health feedback systems and shared perceptions of commitment to occupational safety and health. However, the structural changes brought about by the supply chain business orientations so far described do little to encourage the development or maintenance of such preconditions. Thus, following an extensive review of the theoretical and empirical evidence of the likely effects of changing employment relationships on safety attitudes and behaviours and their implications for organisational safety culture, Clarke argues:

An overview of the evidence suggests that organisational restructuring may damage the mutual trust between core workers and managers, undermining the existing safety culture. Furthermore adding contingent and contract employees to the workforce threatens the integrity of the safety culture by further eroding the trust of core employees.⁹⁹ [p. 49]

In summary, it is useful to return to the benchmark review, undertaken by Quinlan *et al.* in 2001,⁷⁰ of the health and safety consequences of precarious work that is often the consequence of greater business focus on supply chains. In it, the authors established the existence of a substantial and growing body of research which indicated that the effects of changes such as those consequent on the increased significance of supply chains in business arrangements were harmful to the health and safety of workers involved. They reviewed nearly 100 studies that had used indices such as injury rates, sickness absence rates, occurrence of cardiovascular disease, and knowledge of legal rights and responsibilities in health and safety, as well as subjective measures of health outcomes. Nearly 80 per cent of these studies found an association between the type of employment in question and adverse health outcomes. In a more recent review of the effects of the research literature,¹⁰⁰ which updated and applied more robust selection methods and quality criteria to the studies reviewed, the same authors confirmed these earlier findings and health and safety was found to have been adversely affected in a large majority of relevant studies.

Sectors of special vulnerability

While supply chain relationships throughout the private and public sectors have generally generally greater prominence now than previously, it is also clear that their role is more developed in some sectors than in others. Reasons for this can be found in the ways that supply chain considerations such as those discussed in the previous section have dominated the particular business strategies adopted to enhance profitability in these sectors. It is clear from studies already cited that the construction industry represents one such sector, but others include road, rail and sea transport, clothing, food and retail. The literature on supply chains and their adverse consequences for health and safety in each of these sectors will be considered next.

Construction

Studies seeking to understand the reasons for poor health and safety performance reveal how the use of on-site subcontracting can be associated with those working for subcontractors receiving lower levels of supervision and training than directly employed workers and can result in dangerously poor levels of communication between client managers and contracted personnel.^{101,102} Similarly, in construction, subcontracting has been found to lead to both workers and their managers being unclear about the division of responsibilities for health and safety.¹⁰³ In several case studies in the construction industry, Walters & Nichols⁸⁸ showed that subcontractor workers and agency workers were substantially less well informed on health and safety matters than workers of the principal contractor on the same construction sites. This finding was repeated in other studies. Interestingly, in the only one of the case studies carried out by Walters & Nichols in which subcontractor and agency workers' experiences of risk communication came close to matching those of the workers of the principal contractors, there was a full-time trade union health and safety convenor on site, who spent a considerable amount of time providing information and training to the subcontracted and agency workers.

In an earlier article, Mayhew & Quinlan¹⁰⁴ addressed issues of subcontracting and health and safety in the residential building industry in the UK in comparison with Australia, and found health and safety standards in both countries to be 'compromised in tandem with the increase in outsourced

labour' (p. 202). They argued that while self-employed construction workers face greater risks of harm, this is not because the hazards they experience are intrinsically different from those faced by employed workers; rather, 'it is because the self-employed work longer hours, more intensively, in more hazardous sub-sections of the industry under greater economic duress'. (p. 202). Indeed, they state that 'the most fundamental cause of diminished OHS performance is the fierce level of competition for building contracts'. From their empirical surveys and review of the wider literature they conclude that:

Subcontracting is a set of hierarchical economic relationships, which shape work organisation, employment status and effort levels. Four key factors link outsourcing with poorer OHS, namely economic/reward pressures, disorganisation, diminished regulation and the inability of outsourced labour to organise. [p. 202]

Wider studies of subcontracting and management arrangements for health and safety in the construction industry from a variety of countries,^{105–108} as well as of contractor selection¹⁰⁹ and the management of small building works,¹¹⁰ have similarly suggested that poor health and safety outcomes may be related to failures to manage supply chains effectively. The same conclusions have been reached by numerous government-commissioned inquiries into the performance of the industry, trade union publications, the recommendations of parliamentary select committees and other independent reviews.^{111–116}

Transport

Road transport

A number of studies of accidents in the road transport industry in the US, Australia and EU countries have drawn attention to the link between unsafe driving and work patterns imposed upon drivers through recent subcontracting in the industry.^{117–121} The academic literature, which in this case is often based on data compiled in reports of quite extensive and robust government inquiries into safety practices in long haul road transport (see for example, Hensher *et al.*,¹²² Williamson *et al.*¹²³ and Quinlan¹²⁴), makes the point that, because of the overlap with road traffic regulation in most jurisdictions, there is a tendency not to treat fatalities and serious injuries involving road haulage as work-related. A consequence of this is that despite the strength of the evidence of their causal links to working conditions brought about through subcontracting in transport industry supply chains, these practices remain relatively obscure.

Interestingly, there is also evidence that the negative health and safety effects of fragmentation and contracting are not confined to the private sector of road transport. A study of outsourcing and occupational health among Danish public bus drivers found that it exacerbated their already abnormally high levels of stress-related ill health.¹²⁵ In a subsequent detailed study of outsourcing operations in the same industry, Hasle drew attention to some of the reasons why this might be the case, including strong competition on price and the limited decision-making responsibility for health and safety assumed by contractors.¹²⁶

Rail transport

Rail transport is another area that has seen a massive shift from large nationalised industries to privatised or semi-privatised ones in which competitive markets for services and infrastructures have been established in many countries. Following several major accidents resulting in loss of life, the consequences of these developments for public safety have been much discussed in the UK and reforms have been introduced to address a situation that is widely perceived to have been caused by multicontracting in the supply of services. Less well known, however, is the toll of injury and fatalities suffered by the railway workers caught up in these changes of business practice. In a paper concerning the impact of privatisation on railway workers, Baldry⁷³ (p. 256) argues that 'it is the financial and organisational structure of the fragmented rail industry following privatisation which has served to compound the risks to worker safety and continues to do so despite recent Government-led changes'. In particular, he argues that the rise in injury rates which followed the 1993 Railways Act was at least partly caused by the poor communications present in the fragmented cluster of autonomous organisations 'with little previous experience of railways' that were the result of the privatisation introduced by this Act.

The maritime industry and ports

Perhaps the most extreme example of a fragmented relationship between labour supply and company operation in transport is found in the maritime industry. Here, the last two decades have witnessed

major changes in both the nature of the labour force, its relationship with ship owners and the way in which work in the industry is organised. Even though the largest share of ownership in the industry remains with the so-called 'embedded maritime states' of Europe and North America, the large majority of the more than 1 million seafarers working on merchant ships worldwide now comes from a small number of developing countries such as the Philippines, India and China and from former communist Eastern Europe. They are recruited through crewing agencies on short-term contracts and work on ships managed by ship management companies.¹²⁷ Their working conditions are extreme by land-based standards, involving long working hours, shift work and intensive work patterns as well as serious physical hazards.^{128,129}

The key role of merchant shipping in the logistics of global supply chains has meant that to increase profitability, the organisation of the labour process for seafarers has changed profoundly, with simultaneous drives towards work intensification through the employment of smaller crews, operating faster ships, the containerisation of goods and the redesign (and relocation) of ports to achieve shorter times spent in loading and unloading cargoes.¹³⁰⁻¹³² Arguably, the consequences of these changes are seen in the fact that occupational mortality and morbidity rates for seafaring remain among the highest for all occupations.^{133,134} They are further seen in the high incidence of shipping incidents ascribed to seafarer fatigue, and the range of psychosocial health effects caused by working patterns and the social isolation experienced among seafarers, both at sea and in modern port facilities.^{135,136}

The logistics revolution that enables the focus on supply chains to feature so significantly in modern business practice has not only had a profound impact on the structure and organisation of the life and work of seafarers but also on that of dockworkers and related labourers. As Bonacich & Wilson write:¹³⁷

Containerisation had a major impact on the way longshore work was done. Before the introduction of containers, longshore workers would go down into the hold of a ship and load or unload packages sent down by pallet. Containerisation completely changes the work. They are loaded by an overhead crane whose operator is highly skilled. The containers on deck are then lashed into place to secure them. The process is reversed for the discharge of ships. [p. 177]

While these authors point out that some dockworkers and their trade unions (such as those on the west coast of the US) have managed to hold onto a favourable labour market position in the logistics revolution, this has not been so for all dockworkers. And even where it has been the case, it has by no means prevented the considerable job losses that have accompanied port redesign and relocation, which has occurred on a major scale in North America, Europe and elsewhere in recent decades. Such redesign has led not only to changes to facilitate containerisation but also to specialist terminals for handling oil, chemicals and other cargoes.

What all these developments have in common is a focus on speed, efficiency and economy in the carriage of cargo. Their results have had major implications for the dockside labour force, with a significant reduction in the number of workers involved, destruction of dockland social communities and, for those fortunate enough to be retained in work, relocation of workplaces to 'transport hubs', sometimes considerable distances away from previous worksites and involving major changes in the nature and intensity of the work involved. As a result, with a much-reduced labour force and huge technological development, the overall incidence of harm from the hard physical labour associated with the work of loading and unloading of ships could be expected to have reduced in scale. But it is evident from the incidence of major and fatal accidents that in fact the work remains hazardous and the occurrence of serious and fatal injuries continues to be a problem – as do the hidden health effects of all these changes on the populations affected by them.

For seafarers, too, the redesign and relocation of ports adds not only to the intensification of their work but also to their social isolation, as they are no longer able to enjoy the extent of shore leave that was once the norm, nor are the major ports in which their ships berth any longer found near the centre of maritime cities. The result is a further contribution to the institutionalised and isolated lifestyles of seafarers, which has been noted to contribute to poor mortality and morbidity outcomes.

The food industry

The food industry is another sector in which considerable attention has been paid to supply chain effects. In critiques of the business practices prevalent in large-scale food retailing, there has been a focus on the direct and indirect effects of the imbalance of power between customers and suppliers in

the industry, especially when viewed on a global scale. It is starkly evident, for instance, that large food retailing companies whose sales are mainly located in advanced market economies wield a huge influence over suppliers and their workers in other parts of the world. As Appelbaum & Lichtenstein¹³⁸ argue, in contrast to the mid-20th century era of transnational commerce, in which US or European manufacturing multinationals played the leading role, 21st century globalisation is increasingly structured by a set of retail-dominated supply chains. This strategic shift in the locus of corporate power has arisen out of two conjoined phenomena: first, the logistical integration made possible and necessary by the revolution in information and transport technology (barcodes, data storage, containerisation, global communications), and second, the neoliberal transformation of the worldwide political economy, which in advanced market economies in North America and Europe has facilitated the expansion of a low-wage, import-dependent retail sector, while in developing and newly industrialising economies it has generated a huge export manufacturing boom.

The dependencies thus created and their consequences go far beyond the remit of the present review, but there are some lessons from the substantial literature on global food supply chains that are nevertheless relevant and which are also demonstrable in practices closer to home. For example, many observers have noted a paradox often evident in these dependencies, in which the economically powerful customer is potentially able to exert considerable influence over the way the suppliers conduct their operations, including those concerned with health and safety management, but where, at the same time, the business priorities that underpin the rationale behind the relationship are ones that may cause the economically powerful customer to make demands on the supplier in terms of price and delivery that undermine the possibility of improved working conditions.

In supply chain relations between supermarkets and their suppliers in the UK, for example, Newsome & Thompson¹³⁹ suggest that suppliers face considerable problems in coping with the demands of their more powerful customers and indicate that supermarkets are successful in transferring risks and costs down their supply chains. In a subsequent paper, Newsome and her colleagues suggest the impact of this is mainly felt by suppliers in the form of work intensification and in unstable patterns of work and working time.¹⁴⁰ Similar results have been reported in Australian research where prevailing workplace trends among suppliers have included increasing casualisation, agency work, outsourcing and work intensification undertaken to meet the pricing and delivery demands of customers.³¹ As we have already shown, these practices are all associated with negative health and safety effects.

In a recent study of the meat processing industry that supplies the main UK supermarkets, researchers found contradictory pressures on health and safety evident in the supply relationships they examined.¹⁴¹ They point out that direct pressures from customers could act to promote improved health and safety standards and that auditing and inspection by agents of these companies could help to maintain them. However, they also show that the indirect pressures of pricing and delivery schedules demanded by the same customers can create problems for health and safety. Overall, they conclude that their research:

suggests that supermarkets add to the difficulties of managing health and safety as cost pressures and delivery requirements push companies towards using agency workers, increasing the pace of work and utilizing long working hours.

However, they concede that their findings also show substantial differences between suppliers in their health and safety management processes and outcomes. They ascribe a significant role to management approaches towards health and safety among suppliers in explaining these differences and to the ability of workplace trade unions to influence approaches to health and safety in the companies they studied. Thus, they suggest that while customers' pricing and delivery pressures undoubtedly create challenges for health and safety, which are not adequately offset by demands for standards from the same customers, poor health and safety management and outcomes are not an inevitable consequence and can be influenced through a variety of additional factors such as trade union input and regulatory scrutiny. These issues will be examined in greater detail in Section 5.

At the bottom of food supply chains are the experiences of the low-skilled and migrant labour involved in casual and seasonal work in agribusiness. Tragedies such as that which befell the Chinese cockle pickers who were drowned in Morecambe Bay in England in 2004 helped to expose some of the extreme forms of exploitation of vulnerable workers in these situations. Here, again, it is acknowledged that the practices involved are not new, in the sense that the seasonal employment of casual labour with relatively poor working conditions is an embedded feature of farming and food gathering. But what is different about recent practices can be found particularly in the changing

nature of business structures and relationships in this part of the food industry, where, increasingly, many small-scale operators supply labour to numerous small-scale producers, who, in turn, supply their products to very few large-scale customers (such as supermarket chains). Although these small-scale labour users may be subject to a range of ethical trading checks, as Scott *et al.* (p. 8) noted in their report for the Gangmasters' Licensing Authority in 2007:¹⁴²

Some labour users felt that the pressures they are under from multiples' ethical trading teams to regulate their labour supply are in conflict with the pressures they are under from the multiples' buyers and category managers to minimise costs.

Furthermore, there appears to be some feeling among the labour users in the sector that efforts by the authorities to introduce improvements have failed to reach many of the perpetrators of malpractice among labour providers, who continue to quite easily avoid detection and increase their profit margins by operating their businesses illegally, in whole or in part. The view that the supermarket chains and other powerful customers could do more to condemn such malpractice in the sector was also felt (Scott *et al.*,¹⁴² pp. 8–9).

The second major feature of temporary informal work at the base of supply chains in agribusiness is the combined extent to which labour users have attempted to increase their economic efficiency by increasing their use of temporary and minimum wage labour and the degree to which this has involved the use of migrant labour.^{143–145} The result of this combination contributes further to the complexity and obscurity of the labour hire practices in the sector and makes attempts to formalise arrangements more difficult.

The scale of the resulting problem of illegal and informal temporary agency work at this end of the food supply chain in the UK has begun to be acknowledged. However, its very nature means that its dimensions cannot be documented accurately – not even with regard to such fundamentals as the extent of the presence of undocumented workers, or the degree of their illegal treatment by businesses.¹⁴⁶ In such a scenario, hard data on the effects on health and safety are impossible to come by and existing descriptions certainly underestimate the extent of the problem. Indeed, in the end, events such as the Morecambe Bay incident would seem to provide only a partial glimpse of the serious exploitation of labour that occurs in the UK as a result of these practices.

The introduction of the Gangmasters Licensing Authority followed the public outcry over the Morecambe Bay incident. It represented an attempt to introduce greater formality into the sector, through which improvements in the exploitative conditions of labour that lead to such incidents might be achieved. However, the authority itself acknowledges the limited extent to which this is possible, given the complex nature and range of the practices involved and the limits of its reach either as a regulator or as an adviser.

Textiles, clothing and footwear

Outsourcing and the global relocation of production have covered widely in the literature on the clothing and footwear industry.^{147–152} The details are largely beyond the remit of the present study, as they apply in the main to global supply chains, but there are implications that are pertinent. Firstly, the economics of the industry, and especially the powerful market position occupied by retailers and their increasing ability to source supply globally, has driven down labour costs, increased competition and reduced profit margins in the sector. Secondly, this has led to outsourcing closer to home as well as abroad, and has increasingly resulted in complex supply chains involving multiple subcontracting, homework and middlemen. A common feature of such chains remains the exploitation of labour that often consists of particularly vulnerable workers, such as newly arrived immigrants, who frequently work informally, illegally and in unregistered workplaces, and are subject to long hours, unsafe and unhealthy working conditions and very low pay.

In 1999, Mayhew and Quinlan¹⁵³ reviewed the published research on the health and safety consequences of modern textile work. They concluded that (p. 96):

In sum, international research has consistently uncovered a high incidence of injuries in garment workers that are clearly related to job tasks and the intensity of production.

They further noted other areas of agreement in the literature, including the weak position of immigrant workers and the role of piecework in exacerbating risks of injury. But they also found that existing research on the health and safety consequences of work in the industry was generally

confined to factory-based workers and took little account of the wider labour process involved. To demonstrate this, they studied, more systematically than previous research had done, the health and safety outcomes among factory and outsourced home-based clothing workers in Australia. They found that 'outworkers worked significantly longer and were paid less than factory-based workers', that 'while the same types of injury occurred in both groups, outworkers suffered far more frequent and severe injuries than did factory-based workers', and that there was 'an overwhelming correlation between piecework/bonus payment systems and the development of short term as well as chronic injury' (p. 99).

These findings have not been challenged since. Indeed, with reference to other researchers' findings in Australia,¹⁵⁴ Rawlings¹⁵⁵ has observed (p. 523):

In the TCF (textiles, clothing and footwear) industry, retail and manufacture typically involve a chain of numerous (more than three) contracting parties that constitute a pyramid of interlocking contractual arrangements. This 'supply chain' structure permits the effective business controllers to profit from the use of cheap labour without any need to deal directly with those performing the labour. Within these supply chain arrangements, the retailers who act as effective business controllers thereby avoid the legal proximity with clothing outworkers that might attract labour law obligations, at the same time as these retailers still maintain effective commercial control over the TCF manufacturing work performed. The extent of this control is made possible by the concentration of market share of the major retailers and is exercised through chains of supply by way of market power and explicit contractual provisions.

In their acclaimed analysis of the development of lean retailing and the transformation of textiles manufacturing in the US, Abernathy *et al.*¹⁵⁶ similarly concede that despite the revolutionising of business practice in the industry brought about by the demands of large retailers and facilitated through information technology and supply chain management, the problem of poor labour conditions and textiles sweatshops remains close to home. In doing so, they argue that while the decline in collective bargaining power of trade unions in the sector and renewed immigration help to facilitate the continuation of these problems, business advantage may also play an important part:

Although one reason government labour standards continue to be flouted is the ever-present pressure to reduce the labour-cost component of garments, the growing importance of replenishment also explains the recent re-emergence. Sweatshop operations offer the dual 'advantage' of low labour costs and proximity to the American market. Suppliers relying on contractors that violate wage and hours laws can achieve timely replenishment without holding large inventory risk and still pay low wages. [p. 184]

Similarly, in her conclusions from the findings of her research on supply chains in the UK clothing industry, Warren writes:¹⁵⁷

It is clear that workers producing in different garment subcontracting chains experience considerable variations in pay and condition, which in turn, are mediated through gender, ethnicity and legal status. Yet the intensification of global competition is squeezing workers' conditions across all sectors of the UK garment industry in familiar ways.

In summary, then, the clothing industry already had a poor reputation for various exploitative labour practices that were essentially supply chain-related, including sweatshops, homeworking, the exploitation of female and immigrant labour and so on. Recent findings confirm that these practices have by no means disappeared and demonstrate that, in fact, some elements of modern business practice actively (and knowingly) encourage them.

Of course, large business organisations in the industry eventually responded to widespread international criticism of the profits they derived from the exploitation of labour in underdeveloped and newly industrialising countries. As a result, they increasingly used their position at the head of supply chains to exert more direct influence on labour conditions at the base, in much the same ways as large food retailers did. Consequently, current global business practices in the clothing industry have been claimed to be exemplars of the exercise of corporate social responsibility through the market-based regulation of supply chains. At the same time, they still attract widespread criticism and it is notable that health and safety issues still rank among the most frequent of failures cited. For example, the 2006 report of the Fair Labor Association¹⁵⁸ – whose participating companies sign up to its fair labour code of conduct – states that in its 99 independent external inspections of the factories of the suppliers of these companies during

2005, it found over 1,500 non-compliance issues, by far the largest number (45 per cent) of which were on health and safety matters. This is despite the facts that the participating companies include some of the largest and most prominent global brand names and that their commitment under the terms of their membership of the Fair Labor Association involves conducting internal monitoring and remedying instances of noncompliance found in their supply chains. These findings echo those of many other observers of global supply chains in the clothing industry and at the very least demonstrate that the ability of heads of supply chains in the industry to manage improved health and safety standards on a global scale, by voluntary means, is actually more limited than corporate image makers would like to believe. It is also important to note in this context that such agreements are still the exception and most of the global clothing trade still falls outside the scope of their monitoring arrangements.¹⁵⁹ This aspect of the market regulation of the supply chain will be addressed again in the next section.

From producer to user: the case of hazardous substances

Another kind of supply chain relationship with serious consequences for the health and safety of workers is found in product supply, as illustrated by the case of the supply and use of hazardous substances, where the direction of influence flows from producer to user.

Hazardous substances are supplied for use in many workplaces. If used appropriately, the risks to health represented by their hazards can be minimised. However, this requires certain preconditions concerning the effectiveness of risk communication to be present in the supply chain between suppliers and users. Key factors in influencing the existence and operation of these preconditions in the business relationships involved would seem to be the dependency of one end of the supply chain on the other and the unevenness of the market power wielded at each end.

Many chemical substances are hazardous to health. Prolonged workplace exposure to relatively small amounts may result in long-term health effects, such as respiratory and skin diseases, disorders of the nervous system and cancer. Many of these conditions prove fatal. It has been estimated from EU aggregate data that nearly a third of all occupational diseases recognised annually in the EU are related to exposure to chemical substances.¹⁶⁰ Accidental workplace exposures to larger quantities may also have more acute toxic effects, including poisoning, burns and asphyxiation.

While there is much that remains unknown about the long-term health effects of substances currently in use in workplaces, enough is known about their risks to warrant the extensive development of regulatory provisions governing the management of risks associated with their use. Despite this development, however, exposure to hazardous substances remains one of the commoner causes of work-related mortality and morbidity. There are several reasons for this.

The scale of chemical production is enormous. Global production of chemicals increased from 1 million tonnes in 1930 to 400 million tonnes by the early 21st century. While the range of chemical products has also extended massively, good data on their health effects exist for only a minority of them. The EU is responsible for about one third of the total international output and as such has the largest chemical industry in the world, with a 65 per cent share of world exports and a 53 per cent share of imports, accounting for 2.4 per cent of the EU's economy. It is Europe's third largest manufacturing industry, employing 1.7 million people directly with a further 3 million jobs dependent on it.¹⁶¹

Although large multinational corporations are dominant in terms of employment and production in the chemical industry, in Europe there are also 36,000 SMEs that between them account for 28 per cent of chemical production.¹⁶² Moreover, users of chemical products span the full range of enterprise size. As with other aspects of health and safety management, while there is no room for complacency concerning exposures to hazardous substances in large firms, generally risk management approaches in these organisations will be better resourced and developed than in their smaller counterparts. The one important exception to this is where certain operations in larger organisations have been outsourced. While these operations may be still performed on the premises of the large organisation, they are undertaken by the workers of small contractors or subcontractors, without much of the protection supplied by the health and safety management arrangements of the larger organisation to which they are contracted (see Rebitzer¹⁰¹ for an example).

As well as having the largest chemical industry in the world, the EU also provides the single largest market for the industry's products. As Table 6 shows, chemicals are used not only in the chemicals industry itself, but in a huge number of workplaces across the spectrum of economic sectors, both private and public. Workers who are at risk of exposure to hazardous chemicals are consequently to be found throughout the economy.

Table 6
Chemical
consumption in EU
industry

Industrial sector	% of total chemical consumption
Textiles and clothing	6.3
Agriculture	6.4
Electrical goods	3.9
Office machines	0.7
Industrial machinery	1.9
Metal products	2.5
Services	16.4
Rest of manufacturing	6.1
Construction	5.4
Automotive	5.3
Paper and printing products	4.5
Consumer products	30.3
Rest of industry	10.3

Documenting this exposure and its health effects is far from straightforward. Surveys conducted by the European Foundation for the Improvement of Living and Working Conditions found that 22 per cent of respondents throughout the EU considered themselves to be exposed to dangerous substances for at least a quarter of their working time, while 16 per cent thought they handled dangerous substances daily.¹⁶³ In an earlier study, it was estimated that some 32 million workers in EU countries were exposed to occupational carcinogens,¹⁶⁴ leading researchers in 2000 to conclude that a substantial proportion of workers in the EU were exposed to them.¹⁶⁵ There is further information from national surveys supporting this thesis; for example, analysis of the French 2003 SUMER survey indicated that 14 per cent of the French workforce was exposed to one or more of 28 carcinogenic substances in their workplace.¹⁶⁶

The supply chains involved in the distribution of chemical products are complex. They may be long chains with many links that may serve to interrupt the flow of information on safe usage. For example, in addition to the original manufacturers and importers of chemical products, there are also formulators that use chemicals supplied by their original manufacturers or importers in their own products before marketing them on to further users. There are also distributors of these products as well as those of the original manufacturers and importers. In other cases there may be considerable breadth to the chain, resulting in end users of the same product using it in different situations under completely different conditions, again making adequate and appropriate risk communication between supplier and user difficult.

Information on exposure and its effects at the bottom of supply chains is limited. For example, in only one of six western EU countries involved in a recent study was any systematic national survey of exposure to chemical substances by company size found. But this evidence, coming from the Netherlands, confirms what might be anticipated: workers in small enterprises experience greater frequency of exposure than those in larger organisations, as shown in Table 7.¹⁶⁷

Since the 1960s, the regulation of the risk management of hazardous substances has been based around two sets of assumptions concerning the quality of suppliers' information and the capacity of users to act on it appropriately. However, for many work scenarios in which hazardous substances are used, neither set of assumptions is justified. To understand why this is so, it is first important to acknowledge the role that the supply chain infrastructure plays in both supporting and limiting possible good practice.

As noted, chemical supply chains are not uniform entities. They vary in breadth and length and in the number of actors they engage. They may be anything from local to global in reach. They are mostly

	Frequency	Company size (no. employees)						
		1–9 (n = 1,516)	10–49 (n = 2,782)	50–99 (n = 1,525)	100–499 (n = 2,278)	500–999 (n = 623)	1000+ (n = 1,262)	Total (n = 9,986)
Skin exposure	Daily or weekly	45.3	33.5	33.6	27.4	28.4	23.7	32.4
	Monthly	11.3	9.5	7.3	8.3	4.2	5.4	8.3
	Never	43.4	57.0	59.0	64.3	67.4	70.9	59.3
Respiratory exposure	Daily or weekly	50.0	43.5	43.0	36.1	33.1	29.4	40.3
	Monthly	10.0	9.7	8.1	9.4	8.8	9.0	9.3
	Never	40.0	46.8	49.0	54.5	58.1	61.6	50.5
Total exposure	Daily or weekly	58.4	50.0	48.8	41.5	39.8	33.6	46.4
	Monthly	9.6	8.8	7.7	9.0	8.2	8.0	8.7
	Never	31.9	41.2	43.5	49.5	52.0	58.4	44.9

Table 7
Relationship between exposure to hazardous substances and company size

branch-specific and many of their features will be defined by the nature of the use of their chemical products, their market dependence and by the kind and extent of the technologies involved. Supply chains originate with manufacturers or importers of base chemicals, and final or intermediate preparations. These may be purchased directly by users in some cases but in others they will be transformed into different products by formulators who create new preparations from mixtures of substances they have received, before selling these formulations on to end users either directly or through further intermediary traders or distributors. Generally, the SMEs that form the vast majority of end users of chemical products purchase them from distributors.

There are estimated to be 1,200 chemical product distributors in the EU.¹⁶⁷ They may purchase substances and preparations from manufacturers inside or outside the EU and store, repackage or relabel products before selling them on to the next link in the supply chain. It is recognised that distributors can represent a significant barrier to risk communication in chemical product supply chains, since they may have little knowledge of the use to which the substances they supply will be put by users, and because their role in supply may be limited to identifying a source of a particular product for a customer, and obtaining and passing it on to the customer at a competitive price. At the same time, this is not always the case and some distributors have a very good market overview and technical knowledge and may even provide consulting and technical support for clients.

There has been some interest in describing the variation in supply chains in research projects undertaken to inform policy in the run-up to the implementation of the EU's Registration, Evaluation, Authorisation and Restriction of Chemicals legislation (REACH). For example, in a project concerning the production of technical guidance for downstream users, researchers describe supply chains in several different branches of economic activity, including textiles, printing, adhesives and paints, microchip production, detergents and construction.¹⁶⁸ In reviewing this work, Walters¹⁶⁷ notes how special characteristics of the economic activity in a sector help to determine the nature of the supply chain within it. He draws attention to the contrast between, for example, the textile finishing industry and construction. In the case of the former, where market pressure (consumer demand) is a critical driver of innovation, businesses are critically dependent on the supply of appropriate chemicals and their manufacturers, and formulators and users all have close ties with research and development in the chemical industry, leading to good technical understanding. Even though many of the firms involved in supply and use are SMEs, market pressure ensures close relationships and good communication in the supply chain, both because of its critical role in business success and also because of the stringent demands of environmental and consumer protection requirements.

In contrast, in construction, supply chains are broad and diverse, and may include the supply of single substances such as solvents, preparations, raw materials and semifinished or finished articles. There are bulk chemical products such as cement, concrete and bitumen used in very large quantities and speciality chemicals such as paints and adhesives that are used in smaller amounts. The technical understanding of the users of these products is generally poor and further complications are

introduced by the practices of contracting, subcontracting and self-employment on construction sites as well as by the use of migrant and casual workers.

In other sectors, such as graphic printing and the supply and use of paints, sealants and adhesives, supply chains are often quite long and there may be concern about revealing business-sensitive information on the composition and use of products that may affect communication in the supply chain. Despite the long-standing existence of regulatory requirements on suppliers to provide sufficient information to enable users to use their products safely, the complexity of supply chains for hazardous substances, combined with a reluctance on the part of suppliers to divulge the requisite safety information concerning their products, has resulted in poor risk communication, a fact confirmed by many studies internationally.^{169–172}

This has been shown to be the case both with regard to labelling and especially for the safety data sheets (SDSs) required by law. Briggs & Crumbie¹⁷³ found that for small firms, the supply end was the most common source of information on the chemical products. Two in three users cited container labels, closely followed by suppliers and sales representatives, while 40 per cent cited SDSs as sources of information. But Briggs & Crumbie found that the most influential source was the supplier sales representative, (38 per cent of respondents). In a similar vein, the more recent REACH Implementation Project¹⁶⁸ conducted to support the implementation of the REACH provisions states that (p. 14):

...it is interesting to note that none of the chain studies report that SDS is the most important source for information on chemicals. All the chains have supporting information sources from their suppliers, from their customers and/or from their associations.

More significantly, studies identify severe limitations in the quality of information and also its accessibility to users, especially those in smaller enterprises. They also demonstrate that help from services or consultants that might be available to larger organisations is much more limited for small firm users, partly because of restricted access to such expertise and partly because services and consultants, even if accessible, often themselves fail to appreciate the context in which their expertise is required in small enterprises. For example, they often fail to understand how business is undertaken and work gets done in small enterprises, or the priorities of owner-managers in these establishments and related situations.⁶⁸ Numerous further studies demonstrate that as a consequence, owner-managers of small firms where hazardous substances are used do not understand suppliers' information or use it appropriately, they frequently do not understand the application of chemical risk management strategies aimed at exposure assessment and control, and are not willing or able to employ experts to help them do so.¹⁶⁷

Therefore, although technical knowledge exists to minimise the risks of exposure to hazardous substances at work, and despite regulatory requirements on suppliers' information and the well-established finding that users, especially those in smaller firms, depend most on this information, unnecessary and risky workplace exposures still occur. The details of the consequences of these exposures for workers' morbidity and mortality often still remain unclear, but there is widespread agreement that they are nonetheless significant and serious.

Conclusions

The overwhelming conclusion drawn from the research literature concerning supply chain effects on health and safety generally, and those across several specific sectors, is that there is a great deal of evidence concerning the existence of harmful working conditions that are the consequences of the indirect effects of current business practices aimed at reducing labour costs through outsourcing and through influencing the resulting supply chains to dictate favourable price and delivery terms. There is also evidence to suggest that these harmful conditions occur because of the difficulties in managing health and safety in the increasingly fractured organisational relationships that are the result of current business.

As was made clear in Section 3, these business practices are designed to reduce costs and maximise opportunity. But it is clear they often act in concert to cause a worsening of labour conditions further along supply chains. They lead, for example, to the transfer of work from larger organisations to smaller ones with less capacity to manage health and safety. The same organisations are also less likely to be unionised and therefore often do not have arrangements for worker representation that can act to challenge unsatisfactory working conditions. They serve to encourage subcontracting, which in turn often leads to multi-employer worksites and the introduction of more fragmented

systems of health and safety management. In all these scenarios, cost pressures on suppliers act simultaneously to reduce expenditure on health and safety while cutting labour costs by introducing more intensified work regimes, reducing employee benefits in the terms and conditions of employment and increasing reliance for labour on 'nonstandard' forms of employment, including the use of employment agencies, casual work and even so-called 'bogus self-employment' (entailing the creation of a 'legally incorrect' impression that a worker is an independent contractor rather than an employee).

As has been indicated, there has been some recognition of these issues in public scrutiny of business practices, especially in relation to global supply chains. One response to this public concern has been the introduction of voluntary, market regulatory approaches to influence conditions of work and labour standards at the base of supply chains. The extent to which such approaches address health and safety issues and are effective in doing so, in the following sections. Regulatory frameworks have also shifted their focus to accommodate these changes and have to an extent adapted to the resulting scenarios for seeking regulatory compliance. As part of this adaptation, ideas concerning the role of leverage in dependent business relationships as a potentially useful means of promoting good practice in health and safety have become embedded within the policy literature on regulating health and safety. The evidence for the success of such approaches is also considered next.

5 Managing health and safety in supply chains: evidence of good practice

The problems that supply chains create for health and safety management and for protecting workers' health and safety have not gone entirely unnoticed and ways of solving them have been sought. This section will review the literature that examines these 'direct effects' of supply chain management on improving labour standards and health and safety arrangements. A particularly noticeable feature of many of these interventions is the recognition that the same business practices and market relations that have led to poor labour conditions for workers at the bottom of supply chains and poor use of hazardous products could also be exploited to support health and safety management, rather than to act to its detriment.

Although there is considerable business rhetoric concerning good intentions in this area, there is only a relatively small research literature examining their effectiveness. This section will look in some detail at this literature, identifying its main strengths and weaknesses as well as the gaps that could be filled by further studies. The review which follows has been organised under several headings, broadly reflecting the concerns evident in the literature. First, it examines literature that focuses generally on the benefits of improved supply chain management for health and safety arrangements. Second, it considers some of the main examples of the initiatives involved, including procurement policies and strategies, and certification systems and their influence on more systematic occupational safety and health management arrangements. Here, particular attention is paid to research on client–contractor and supplier–user relationships in relation to these initiatives and ways in which compliance with health and safety standards and appropriate management systems that are demanded in contracts governing supply relationships are achieved in practice.

It is plain that the remedies described in the literature have been influenced by the regulatory climate of the past two decades, in which, for a host of reasons, command and control approaches to legal responsibilities and their enforcement have been largely eschewed in favour of private and market regulatory mechanisms deemed more appropriate both for the subject and the climate. This section will close with some discussion of relevant aspects of the critical literature on regulation inasmuch as it applies to interventions to protect labour and manage health, safety and working conditions in both global and domestic supply chains.

The benefits of managing health and safety in supply chains

Policy rhetoric on health and safety in recent years has strongly advocated voluntary approaches to achieving improved health and safety through manipulation of supply chain relationships. In the UK from the end of the 1990s onwards, such approaches have been in evidence in a variety of HSE publications on improving health and safety management arrangements. For example the HSE's 'flagship' guidance on health and safety management, HSG65, argues that organisations would want to improve their occupational safety and health management systems as a consequence of pressure from suppliers or customers and that accidents and ill health disrupt delivery in supply chains and therefore harm profitability.¹⁷⁴ A number of specific guidance notes offer similar advice.^{175,176} A Health and Safety Commission (HSC) source similarly suggests that good health and safety standards in the supply chain are important because they help ensure quality, value, competence and reputation, and claims that they are in the interests of all the organisations involved in supply chain relationships.¹⁷⁷ Meanwhile, research commissioned by the HSE on how large firms approach the management of health and safety argued that dependent supplier organisations needed to consider their health and safety arrangements carefully in order to retain the business of their larger customers.¹⁷⁸ This advice has been repeated in subsequent HSE-commissioned reviews of the role of supply chains in health and safety.¹⁷⁹

Much of this rhetoric is echoed in the practitioner literature, where the benefits of the 'business case' for improved health and safety have been aired frequently.^{180–187} The view is also shared in the publications of employers' organisations.^{187,188}

Various supposed business benefits for the economically powerful party in the supply chain (usually customers or clients to whom labour, goods or services are being supplied, but sometimes suppliers of materials such as hazardous chemicals) are claimed. They include addressing the company's corporate image, its social responsibility agenda and its reputational risk. They further include notions that link profitability to quality and, in turn, quality generally to quality in health and safety management arrangements among dependent suppliers specifically. There is a further argument that the latter can be viewed as proxy evidence for wider quality in the delivery of the services or goods supplied.

Perspectives on how this supply chain influence might be achieved have been aired extensively in writing on the role of supply chains and labour conditions. It is argued that the economically more powerful party in the supply chain – for example a customer that holds a sufficiently powerful market position – can exploit its position to secure compliance from the supplier on a range of issues that are conditional to the terms under which goods or services to the customer are to be supplied and can insist that health and safety and working conditions be included in these terms. This is essentially the approach adopted by the corporate social responsibility agendas of companies at the head of global supply chains and promulgated in the various ethical trading agreements and codes of conduct that have been introduced over the past few years.^{190,191}

The same approach is also assumed in more localised supply chain relationships, as illustrated by many of the examples in the following sections. Arguing the potential of these approaches, researchers such as Beaumont *et al.*⁴⁰ have suggested that positive effects may additionally work through customer demands that suppliers rethink working practices, leading to improved outcomes for workers, including as a result of improvements in health and safety management that parallel efficiency gains in relation to profitability.

However, robust research evaluating the extent or effectiveness of such domestic approaches is difficult to find. For example, the bulk of the literature cited in reviews commissioned by the HSE on the subject simply restates unsubstantiated opinion, anecdotal accounts and guidance concerning the benefits of supply chain management, rather than consisting of new research findings on the effectiveness of the approaches discussed. Not surprisingly, this leads its authors to recommend further investigation of the role of supply chain management.¹⁹² This was acknowledged by a recent review of HSE-commissioned research on the evidence base for ‘what works’ in delivering improved health and safety outcomes:¹⁹³

The literature identified that further work could be done to understand how to develop the potential power of supply chains. [p. 64]

It goes on to state that while its authors were aware that the HSE was ‘doing some work in this area’, no published evaluation data was available.

Despite the comparative weakness of the evaluative literature concerning the effectiveness of supply chain management in influencing health and safety arrangements and the factors that support or constrain it, accounts in which experiences of supply chain management are discussed are broadly in agreement concerning the particularly important roles of procurement practices, contractor and systems certification, and communication issues in multi-contractor or subcontractor worksites in achieving successful intervention in supplier health and safety management arrangements. Some of the key examples of this literature and their strengths and weaknesses will be examined next.

Procurement and health and safety management

Both researchers and policy rhetoric on supply chain relations point to the opportunities that procurement gives clients and customers to influence improvement in health and safety management among suppliers. In the UK, the regulatory framework provided by the Construction (Design and Management) Regulations 2007¹⁹⁴ encourages them to exploit these opportunities, as does supporting guidance.^{195–197} However, research on procurement practices in construction suggests that the effective achievement of such influence may not be entirely successful. For example, following an industry survey and criticism of the way that some public sector clients discharged their health and safety obligations with regard to procurement,¹⁹⁸ Davies Langdon¹⁹⁹ undertook a questionnaire-based survey to ‘assess the strength of the health and safety input by contractors into the tender process’ and ‘establish the level to which best practice health and safety criteria have been embedded within public sector procurement processes’. Low response rates (less than 14 per cent) for the survey warrant some caution in interpreting it, but the findings suggest a bureaucratic approach to health and safety requirements in public sector procurement. It shows that clients are familiar with setting contractual requirements on health and safety in the procurement of services but also demonstrates that they are far less engaged with efforts to monitor compliance or undertake post-completion review of such arrangements. Since occupational safety and health in the construction process involves not only building but also design, the frequently observed late appointment of contractors also means little engagement with design decisions that might have health and safety implications.

In other words, opportunities to monitor and improve supply chain influence – regarded as essential by both proponents and critics of supply chain influence even in much looser situations of global

supply – were being overlooked by public sector clients in the UK construction industry, despite its comparative accessibility and tight regulation.

In a detailed research study into fatal accidents in the UK construction industry published in 2003 following a series of workshops held with private and public sector industry participants, researchers highlighted a range of procurement issues they believed contributed to the high incidence of deaths in the industry. They said that:²⁰⁰

The principal area of uncertainty, of concern across all workshops, related to policy level approaches to contracting strategy. Increased outsourcing contractorisation etc ... means contracting forms and strategies deserve attention, particularly as the workshops indicated there was generally little effective attention to health and safety in contractor selection, within contract terms or as part of contract monitoring. This also explains the absence of strong agreed paths of influence from contracting strategies to specific organisational factors. [p. 118]

Procurement and health and safety in large-scale construction projects

In contrast, there is some evidence to indicate that procurement approaches used to improve health and safety arrangements by large construction concerns during major projects meet with some success. For example, during the building of the major landworks supporting the Öresund bridge and tunnel between Denmark and southern Sweden in the 1990s, evidence showed that initiatives on health and safety requirements in procurement helped to reduce the incidence of occupational accidents in the construction works.²⁰¹ In this case, the organisation responsible for the Danish construction work set up a range of health and safety and environmental management requirements and applied them in tender specifications for its contractors. As well as meeting these requirements in their tender, successful contractors and their subcontractors were subject to monitoring and auditing of their subsequent work activities. In addition, accident reporting systems were applied rigorously and a high-profile safety awareness campaign operated across the construction sites. The overall approach was evaluated, and as a report of the scheme indicates:

The main conclusion is that the initiatives have had a substantial impact on safety and health... The evaluation reveals that every third employee has gained OHS knowledge and changed their working habits during the project period.

Here, again, there are clearly a number of important preconditions that made the success of the initiative possible, including the leadership and commitment of the client organisation and its capacity to monitor and audit the compliance of its contractors effectively.

Another example of a procurement approach to improving occupational safety and health on large-scale construction projects was seen in the controls on subcontracting adopted by Renault in building a new industrial plant in France in the 1990s. These included the adoption of health and safety management systems by contractors and their monitoring by Renault staff. It was deemed to be successful because it achieved a much improved accident frequency when compared to the French construction industry as a whole.²⁰¹ In their evaluation of the initiative, the authors of the case study in which it is described state that:

The players interviewed for this case study consider that the key factor for the success lies in the involvement of the client and the overall approach to site management. The presence of a permanent prevention unit on the spot is the second key factor in this success. [p. 93]

Similar approaches were adopted in the UK during the construction of Heathrow Airport's Terminal 5 and are presently in use in the construction of facilities for the London Olympics. During the construction of Terminal 5, the relationship between the client and the main contractor also involved the trades unions and key elements of the understanding between them included a commitment to achieving exemplary levels of health and safety alongside procedures for good industrial relations, training, pay and working conditions.²⁰²

Construction projects that provide the physical infrastructure for major sporting events such as the Olympics are interesting because they demonstrate how their high-profile and associated business risks can lead to a greater willingness on the part of major clients and contractors to ensure their activities are not damaged by bad press arising from such things as occupational accidents. This concern can also be used by trade unions and others to achieve effective support for a commitment to improved health and safety management. But they also demonstrate that achieving best practice in

relation to health and safety in such situations is not an isolated occurrence, but is embedded within a set of commitments to maintaining appropriate standards on pay and conditions in a wider sense.

The model often cited for these arrangements was that applied to the preparation for the Sydney Olympics in 2000.²⁰³ In that case, government, businesses and trade unions agreed to collaborate to achieve a number of shared objectives, including improvements in ‘productivity, *the highest level of occupational health and safety* [our emphasis], access to training for all building workers, the negotiation of redundancy provision and the prohibition of illegal employment’, in order to establish *inter alia* ‘the highest possible standards of health and safety’.

The guiding hand of the state is also evident and important in all these examples of large-scale construction projects. While it may not be explicit in terms of the overt imposition of regulatory standards or their enforcement, because of their size, prominence and degree of risk all these projects were the subject of close scrutiny by regulatory bodies. Their high profile and that of the major contractors involved clearly provides opportunities for inspectors to exert influence in the design, management and execution of the activities involved. The positive preconditions that they present for regulatory inspection and monitoring of the supply chain management issues are therefore significant factors in helping to determine their successful outcomes.

Procurement and health and safety in construction more generally

The projects mentioned above are all examples of good practices that are mainly the responsibility of organisations with a clear concern about the reputational risks of publicly perceived failings in relation to health and safety management. The construction industry overall is, however, hugely varied in structure and organisation; much of its business, and the consequent labour conditions, is handled by small firms and through casual labour. At this end of the spectrum of activities there is much less evidence of positive influences on health and safety management through supply chain initiatives. Indeed, as recent trade union evidence has illustrated, the industry ‘has seen a huge increase in gangmasters and labour-only employment agencies in recent years’. The construction workers’ union UCATT claims to have ‘found gangmaster activity on 69.7 per cent of sites in London and the South East and on 28.2 per cent of construction sites throughout Britain.’²⁰⁴ In such situations, positive supply chain influences would seem to be at best no more than of marginal significance for improving health and safety arrangements.

The more general research literature on selection issues in the procurement of contractors in construction and key criteria for assessing subcontractors’ eligibility for tender invitation and award, and on subsequent performance at the construction stage, sometimes mentions health and safety. For example, findings in an early, small study²⁰⁵ indicated that the most common criteria considered by procurers during the prequalification and bid process were ‘those pertaining to financial soundness, technical ability, management capability, *and the health and safety performance of contractors*’ (our emphasis). Most however show that companies’ quality record, contractor experience and reputation are the most influential criteria for selecting subcontractors at the prequalification stage, and for assessing their performance at the construction stage, with tender price exerting the most significant influence in the subcontract award.²⁰⁶ While health and safety performance may be one measure of experience and reputation, it is by no means always a prominent one. Other research emphasises how cost remains the most significant factor in procurement choices,¹⁰⁹ while one study on the influence of the Construction (Design and Management) Regulations 2007 (CDM) on the procurement and management of small building works in the UK suggested that CDM had ‘left ambiguities, primarily through specified exclusions to application, through which health and safety responsibilities may be downplayed or even simply disregarded’.¹¹⁰

Procurement and occupational safety and health outside the construction industry

Beyond the construction industry, the role of procurement in requiring improved health and safety from suppliers is cited in a number of accounts. For example, included in a range of case studies in a review of good practices published by the European Agency for Safety and Health at Work²⁰¹ is an account of the practices in the main electricity producing and distributing company in Belgium, where health and safety requirements are applied both to the procurement of services (labour) and products (pp. 94-99). This appears to be aided by the presence of national contractor certification systems in Belgium (see Section 6) that enable the company to choose appropriately experienced contractors, but in addition it also has systems for informing contractors concerning the risks in the industry, as well as for training and for inspecting their activities. In the case of the procurement of products, the authors of the case study describe the purchasing department of the company as working with the occupational safety and health department to develop risk assessment procedures to apply to all

product purchasing, and with the aid of IT-supported administrative management systems, to have safety assurance systems that cover all incoming products. Similar schemes are reported in case studies of other large companies in pharmaceuticals as well as by associations representing public sector purchasers in Denmark (pp. 100-111) and by the Beschaffungsservice in Austria (see below). However, these claims do not appear to have been subjected to objective evaluation.

As purchasing strategies emphasising health and safety are applied by purchasers in powerful market positions, it should follow that to maintain or develop their own business, manufacturers and suppliers would be more likely to emphasise the health and safety credentials of their goods. There is, though, only limited evidence of such effects in the literature and little in the way of evaluation. However, one example where it does seem to have occurred is in the hire tool trade in construction. Here, under the stimulus of regulatory requirements and the threat of litigation, larger tool hire companies have begun to emphasise the safety benefits of their equipment as a marketing strategy. They are also well placed to influence the introduction of safety design improvements by the manufacturers of the equipment they purchase to hire out, since they occupy an important intermediate position between manufacturer and end-user in the supply chain and are particularly concerned with discharging their own responsibilities for safety in this respect. Hire Association Europe (HAE), the European hire tool trade association, has developed a standard for health and safety and customer service as well as offering a range of training in conjunction with some of the larger hire firms that is aimed at promoting the safe use of its equipment by construction companies.²⁰⁷ Although only less than 6 per cent of its 1,000 or so member companies have achieved accreditation to its standard, HAE believes this includes many of the larger organisations involved, some of which have themselves run prominent safety information and training campaigns in relation to hired equipment.²⁰⁸ Other examples of similar influences are found in relation to the reduction of hand-arm vibration and the supply of power tools.

Public sector purchasing power is a potentially powerful supply chain lever for improving risk management of hazardous substances and there is some evidence to suggest that approaches and instruments developed in relation to eco-efficiency may also produce indirect positive effects on the health and safety situation of the enterprises involved. An example from Austria is the Beschaffungsservice Austria. This free service was established in 1997 to give advice and to offer assistance to public purchasers in the form of guidelines and information. Its primary focus is on ecological purchasing, but health and safety-related considerations are closely linked, as for instance with the main purchasing areas involving cleaning agents, paints, varnishes and chemicals used to maintain machinery and vehicles. *Beschaffungsservice Austria* publishes regularly updated guidelines and a criteria catalogue for green procurement.^{209,210} While improved health and safety may be only a 'side-issue' to environmental concerns, such an environmental focus provides producers and suppliers with powerful economic incentives to develop products and services in line with the requirements. In Austria, a market has emerged for ecologically improved and healthier products because large purchasers such as public authorities (eg the city of Vienna²¹¹) changed their procurement policy by legislative means (such as by banning PVC products and requiring environmentally friendly procurement). These moves are thought also to have resulted in positive health and safety effects in the producing companies.

Other procurement-focused supply chain approaches that are primarily environmental in orientation but which are argued by their proponents to be likely to have improved health and safety spin-offs include those that use the 'chemical leasing' business model applied in the car, electronic and clothing industries at an international level. In Austria, for example, chemical leasing models have been strongly encouraged by the Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (the ministry for agriculture, forestry, environment and water, BMLFUW), which argues that studies it has commissioned have showed the considerable potential for Austrian companies to reduce their annual usage of chemicals by these means, therefore not only saving costs and reducing emissions but potentially also reducing chemical risks for workers.²¹² Currently, the BMLFUW supports pilot projects to explore this potential and has established a local centre of excellence for metal cleaning in Austria.²¹³⁻²¹⁴

Ethical investment and occupational safety and health

While not exactly a strategy for procurement, the influence of economic power in business partnerships is also illustrated in another way: through the inclusion of health and safety criteria in ethical investment. The criteria for eligibility for investment by the Meerwarde Fonds (value investment fund) of the Dutch ethical investment bank Triodos²⁰¹ (pp. 140-145) is a case in point. The fund operates two sets of preselection criteria that it uses to screen potential investments. One set

provides an initial test by which some companies will be excluded from investment, while a second set of comparative criteria is used to rank those not excluded by the first set. Only the top 50 per cent of the companies meeting this second set of criteria in any one sector will then be considered for financial screening for potential investment. In the first set, there are 33 exclusion criteria, and on health and safety they include:

- working conditions – companies that frequently and seriously fail to take measures to avoid unsafe or unhealthy working conditions
- breaches of legislation, codes of conduct and treaties – companies that frequently and seriously breach labour legislation, other relevant legislation, codes of conduct and treaties.

The comparative criteria (second set) applied to companies that pass the first set include requiring evidence of companies' systems for monitoring health and safety at work, absence, staff turnover, accidents, security of employment, work climate, stress and overtime. Companies' performance is assessed and compared on these criteria (among others) and they may be excluded from investment because of comparative underperformance.

Certification, competence and supply chains

Regulatory frameworks and their impact

If customers are required to assume some responsibility for choosing their suppliers or contractors from among those qualified and competent to undertake work safely and without risk to health – as is the case in some jurisdictions – it follows that they need information in order to make appropriate choices. This requirement has stimulated the development of certification covering both the organisational and individual health and safety competences of contractors. In Belgium, for example, the law requires that companies use contractors that comply with occupational safety and health laws. This has led to the development of two major systems for the certification of contractors: the Veligheids Checklist Aannemers (VCA), a list originally developed for subcontractors in high-risk work in the petrochemical industry but widely used elsewhere, and the more general BeSaCC (Belgian Safety Criteria for Contractors) system developed by the Federation of Belgian Enterprises. It is not clear how effective these systems are in practice.

Similar responsibilities exist under CDM in the UK construction industry, where the application of legal requirements on the competence of contractors, designers and co-ordinators and their monitoring in construction projects means that these issues are closely bound up with those involving procurement. CDM is an attempt to regulate health and safety in construction while taking explicit account of the complex nature of work organisation in the industry and the importance of the supply chain in this respect. The regulations place a duty of care for workers' health and safety not only on employers but, as their title suggests, on a whole range of parties involved in safety in construction, including owners, customers, clients and designers, as well as the contractors and subcontractors involved in actually carrying out the construction work. The original regulations were introduced in 1994 and they were most recently amended and updated in 2007.

While it is widely accepted that the orientation of the regulations is correct and that they have contributed to achieving some improved practice in the management of construction works, especially on larger sites, their downside has also become increasingly evident, especially in relation to the over-bureaucratisation of supply chain management. In the report of his investigation to aid the development of guidelines for CDM, Carpenter²¹⁵ reiterates many of the known problems confronting their operation in the industry. Although not based on especially rigorous research criteria (the study mainly reports discussion of views from industry and client umbrella groups rather than in-depth investigations of practice in the industry itself), the report does convey something of the complexity of the challenges facing the use of supply chain relations to improve health and safety management in the industry. For example, in the case of the criteria by which clients can assess the competence of contractors and others in the construction process, it provides details of no fewer than a dozen schemes that are available for assuring individual competences and more than twice this number for assuring organisational health and safety competence. Not surprisingly, one of the overriding themes of the report's recommendations concerns ways of standardising these approaches. This echoes recommendations made by others on this same subject, in particular that of a 2008 report by the Better Regulation Unit, which lays some of the blame for unnecessary bureaucracy on supply chains and warns that the growth of multiple schemes covering different sectors and client groups, which rarely recognise one another, merely adds to the confusion and bureaucratic burden for SME contractors.²¹⁶

At the same time, while accepting the need for regulatory intervention that is appropriate to organisational and employment relationships in the industry, others point out that in many cases a combination of the limited resources for inspection, the weakness of the power of labour, and the complexity of the work relationships involved lead to incomplete or misdirected implementation of requirements and poor outcomes in terms of support for health and safety.

In public inquiries into the poor performance of the industry in recent years, concern over the inspection and enforcement of the regulations has been particularly prominent. The level of inspection in the industry nevertheless remains limited despite repeated calls for increased resourcing. The House of Commons Work and Pensions Committee noted in 2008¹¹⁴ that the HSE's construction inspectorate is not adequately resourced to ensure the maintenance of health and safety standards in the industry and expressed a conviction that there was a correlation between inspection and safety standards and a belief that recent increases observed in fatalities in the industry underline the need for more resources for inspection. Despite these concerns, and despite the supply chain focus of the regulatory framework for health and safety in the construction industry and the considerable amount spent on commissioning research into health and safety in the industry since its implementation, there is virtually no UK research that explores the role of inspection in achieving improved supply chain management of health and safety arrangements in construction.

Schemes to support customers' selection of contractors

One way of addressing the bureaucratic overload involved in selecting contractors is through establishing a centralised certification registry service, which reduces the necessity for clients to request and evaluate prequalification information from contractors every time a contract is tendered. In the UK, the Department of Business Innovation and Skills' Constructionline provides such a service, while specifically for public sector clients, the Contractors' Health and Safety Assessment Scheme (CHAS) undertakes a similar function. Constructionline has been criticised for the limited information it seeks on health and safety and because it does not itself assess this information. Originally established by the Greater London Employers' Association in 1998, CHAS provides a basic, prequalification assessment of contractor health and safety arrangements through requiring contractors to complete a standardised questionnaire, which according to its originators:²¹⁷

... ensures a common approach by all participants and provides clear standards for contractors; it avoids duplication of effort for both contractors and clients and gives feedback to contractors that, at first, fail to make the grade.

The resulting database of contractors meeting this standard is made available to the scheme's members, allowing them to concentrate on the more advanced assessment of contractors' health and safety arrangements specific to the contract in question, such as method statements and risk assessments. However, the CHAS assessment criteria are not substitutes for these subsequent assessments, nor do they provide a measure of contractor competence.

Certification of competence for individuals

The two main certification systems for individuals in the construction industry are the safety passport system developed by the Client Contractor National Safety Group (CCNSG) in the 1990s and used in the UK construction engineering industry since that time and the parallel, similar but bigger scheme in the construction industry known as the Construction Skills Certification Scheme (CSCS). They both stem from the idea that duty holders and operatives in the construction industry would benefit from a simple system for accrediting and swiftly identifying workers trained to an acceptable level of awareness of health and safety as a prerequisite to worksite entry. But accreditation in the former scheme is no longer recognised as exempting holders from the requirements of the latter scheme.

There are also questions concerning the evidence of the usefulness of these 'passport schemes'. The CCNSG scheme was subject to some preliminary and rather inconclusive evaluation supported by the HSE during the late 1990s.²¹⁸ Additionally, it has featured in several published accounts written by representatives of companies that have adopted it, and in which success has been claimed. For example Texaco notes 'a significant change in contractor's safety culture' and claim that their contractors considered the scheme to be the biggest single cause of this change.²⁰¹ According to the European review of occupational safety and health in marketing and procurement in which this statement appeared:

The CCNSG passport training scheme definitely seems to be a success within engineering construction industry for which it was developed... The scheme supports a reduction in accident

rates, increased safety awareness, contributing to higher standards of safety performance. It provides better understanding of roles and responsibilities, familiarity with legal requirements and reduced on-site induction, which can be revised to deal with key issues only, resulting in quicker site mobilisation.

Similar claims are made for the larger CSCS scheme, on which some 735,000 operatives in the UK construction industry are registered. Indeed, following its endorsement by the Construction Industry Safety Summit in February 2005, the scheme became part of a menu of mandatory health and safety measures applicable to central government clients. But the claims for the success of both schemes remain somewhat inconclusive and are based on anecdotal opinions supplied by either the users or deliverers of the scheme, rather than robust scientific evaluation. For example, in a study undertaken to provide the HSE with a basis for a future evaluation of regulatory effectiveness in the UK construction industry,²¹⁹ researchers report 'a feeling amongst those who contributed [to the study] that there should be one competency standard across the industry, thus levelling the playing field. Some consider this to be happening with the CSCS scheme, while others view such a scheme more cynically.'

Beyond the construction industry

Organisational certification approaches of relative long standing are found in some other European countries. For example the European *Sicherheits Zertifikat Contraktoren* (Safety Certificate Contractors, SCC), introduced some 15 years ago, is an example of supply chain leverage on contractors that supply larger companies to evaluate and certify their health and safety and environmental management systems. It is intended as a way of demonstrating that a contractor complies with fundamental statutory requirements in national health, safety and environmental legislation. It was developed as a third-party certification system to evaluate and enhance the contractor's performance on safety and health and environmental protection by putting in place agreed, industry-proven best practices in health, safety and environmental management, specified in a checklist. Significant improvement has been reported as a result of its development.²²⁰

There is also a simplified system, the limited certification SCC, for enterprises with fewer than 35 workers, which assesses health and safety and environmental protection management activities directly at the workplace. SCC is used and accredited in the Netherlands, Belgium, Germany, Switzerland and Austria, and a Euro-SCC Platform has been established. In Austria for example, SCC is required of suppliers mainly by large enterprises in the paper and oil industries.²²¹ Currently there are about 100 Austrian companies certified with the international SCC certificate.^{222,223} But here again detailed evaluation of the underlying factors influencing its implementation, operation and outcomes appears lacking.

Supply chains and health and safety management standards and systems

An example of potential supply chain support for improving health and safety arrangements in smaller firms servicing the products of larger ones is found in the health and safety networking of car repair shops such as practised in the Austrian Kfz-Werkstättennetzwerk project, where the Mercedes Wiesenenthal group of 11 car repair companies decided, as a result of an analysis, and with the support of the larger car firm, to improve health and safety performance. The group developed a series of training workshops, a health and safety manual and checklists for internal reviews. The materials were published on an intranet site and made available to other repair shops by internet.²²⁴ But it is unclear whether any significant evaluation of the scheme was undertaken.

In Germany VW-Audi offers specific support for the management of hazardous substances it supplies to about 2,600 contractual car dealers and garages, each with an average of 10 employees. About 2,500 different chemical products are available under the VW-Audi label, the use of which is prescribed by VW-Audi. For those products classified as hazardous or which contain hazardous ingredients, VW-Audi checks that no less hazardous alternatives are available, so the users are relieved of the obligation to do this themselves. Furthermore, product- or substance-related model work instructions are provided, which have to be completed by the garages themselves according to the details of the tasks for which the products are used and the specific situation found on the premises (BMA 2002 and Sul 2004, in Walters¹⁶⁷). An inventory of those hazardous products provided by VW-Audi is also offered. Hazardous substances acquired from other suppliers have to be added by the enterprises. Test kits for measuring the air concentration of hazardous substances are also available from VW-Audi, as is advice on the construction of garages with regard to fire protection and environmental obligations. The allocation of a protection class (*Schutzstufe*) according to a new Hazardous Substance Ordinance is being considered as an extension of the support system

(for each of the hazardous products offered). Since the allocated protection class depends not only on the classification of the substance but also on the exposure conditions defined by the task it is used for, this will also require consideration by the company. Provision of written work instructions according to the Hazardous Substances Ordinance has also been proposed but not yet implemented.²²⁵ Again, there is no published evaluation of the impact of this support, but anecdotal observations suggest users rely on it (Sul 2005 in Walters¹⁶⁷).

A reason for this dependency is that the dealers and garages are obliged to comply with the quality management system of the company. Under this system, compliance with storage obligations and regular updates of the inventory of hazardous substances that they are required to keep is checked during annual audits. A similar provision is made by Daimler-Chrysler for its contractual dealers and garages in Germany. These are clear examples of situations in which the very close and contractually determined association between the large car manufacturers and their economically dependent dealers and garages allow the latter little choice but to comply with the conditions of the larger organisation in order to retain its business.

Generally, however, there is unlikely to be such support for small firms to improve their health and safety arrangements, especially not for those small firms that operate outside tightly controlled chains – as is evident from the previous comments concerning these issues in the construction industry.

Two HSE research reports commissioned from the same research consultancy examined health and safety in supply chains from the perspective of the impact of contractorisation in three sectors – food processing, health services and private events management²²⁶ – and on client–contractor relationships in six economic sectors. Their findings are largely based on selected opinions that are rarely supported with any hard evidence, but, nevertheless, they reflect understandings also reported elsewhere in relation to issues as competences, communication and the conditions that support the application of client influence on health and safety practices of suppliers.²²⁷ For example, they comment on the tight control – including regular audit and inspection – by supermarket chains of the practices of their suppliers concerning food hygiene and note the obvious business reasons why this is so. But they note the absence of similar messages in relation to health and safety, thus echoing the findings of more in-depth research into the food retail supply chains cited in Section 4. In the latter studies, researchers observed that supply chains played a contradictory role. On one hand, they meant that large food retailers had a certain interest in ensuring supplier organisations met a set of minimum standards to offset possibilities of the negative commercial effects of bad publicity. On the other, they argued that the indirect supply chain effects observed in their study were likely to be more of a hindrance than help to health and safety. Issues such as pressure to cut costs and unpredictable delivery requirements lead to a series of consequences making the management of health and safety improvements more difficult.¹⁴¹

The chemical industry uses supply chains to promote its programmes, such as Responsible Care and Product Stewardship. The former is largely focused on environmental matters; participating companies commit themselves to reducing their emissions and to searching for processes that will be less of a burden to the environment. The latter concerns the sound management of safety, health and environmental effects of a product through continuous improvement during its entire lifecycle. It is the product and supply chain-oriented part of the Responsible Care programme and extends marketing efforts for a product to environmental effects that take place beyond the sales process, thereby requiring consideration of all phases of the lifecycle of products, from starting material to waste. This necessitates co-operation between dealers and users and the programme is intended to offer an early warning system for safety, health or environmental risks of a product, allowing problems to be tackled proactively and in co-operation with other involved parties. In theory, it should lead to increased trust between suppliers and customers and greater confidence throughout the whole product chain, as well as acting as a driver for continuous innovation that will enable incorporation of new regulatory and market developments.

There has been some limited evaluation of Responsible Care, which has suggested that it is successful within the industry itself, but there remains uncertainty concerning its reach, for example, to embrace relationships in product supply to users outside the tight relationships in the industry.¹⁶⁷ Generally, work on the nature of interorganisational relationships in the chemicals industry has highlighted the extent of integration that exists here and how it is governed by both the structure and the nature of the economic relations between customers and suppliers in the industry, how the development of trust is supported in these relations, and the role of individual ‘boundary-spanning’ agents in maintaining co-operative practices between organisations (see Marchington *et al.*,⁵⁸ pp. 135–156, for in-depth case

study accounts). In other words, the structure and organisation of economic relations in the industry provide the wider conditions that allow and support the development of supply chain management of health and safety arrangements so that it fulfils its potential in ways that are not necessarily transferable in the absence of this wider support.

There is some evidence to support the conclusions that not only are the direct relationships between suppliers and users, and customers and suppliers important locations for leverage to improve health and safety, but also related organisations in their business environment may be useful. For example, as a case study from Germany demonstrates, suppliers' associations can be important in supporting leverage to achieve the safe use of hazardous substances. The supply association for the painting trade in the Lübeck area (Einkaufsgenossenschaft der Maler zu Lübeck eG, MALEG) in the German state of Schleswig-Holstein is a wholesale association for enterprises in the painting trade, with about 8,000 products on offer, about 3,100 of which are hazardous substances. In order to support its members in their compliance with the obligations under the Hazardous Substances Ordinance, MALEG has set up a specific management system, Maleg-Gefahrstoff-Management (MGM) for users of paint products.²²⁵ In addition to the obligatory safety data sheets, model work instructions are automatically provided for products for which they are available; the compilation of an inventory of hazardous substances is also offered to the individual enterprise. Based on the inventory, enterprises can also receive personal advice from the association on replacing hazardous products with less hazardous ones.²²⁸ Unfortunately, once again, there appears to have been no systematic evaluation of the impact of this service.

A well-established feature of German industry is its strong (and regulated) sectoral infrastructure. As Walters¹⁶⁷ has argued, it is this feature that supports the well-developed interorganisational arrangements for health and safety that are often apparent at the sectoral level in Germany. In looser organisational contexts, such as in the UK construction sector, the fragmented and overlapping responsibilities for health and safety between clients, designers, contractors and their subcontractors on multi-employer construction worksites means that effective communication on health and safety in the industry has been long regarded as a challenge for health and safety management and its improvement a focus for research. As already noted, in the UK the CDM Regulations were a regulatory response to what was seen as the unacceptable consequences of this situation in terms of the level of injury and fatalities in the industry. Mulholland *et al.*²²⁹ investigated communication practices in the industry and found that duty holders believed that the regulations had raised awareness of health and safety issues across industry and especially among the larger contractors, but although communication had improved as a result, there were still significant problems. They note that:

... there were still perceived to be significant problems with the quality, quantity and effectiveness of communications and information exchanged amongst and between duty holders. It was suggested that Clients, Designers and SME contractors in particular needed more knowledge and awareness of the H&S responsibilities and how to provide and make information more useful relevant and succinct. It was felt that much of the information produced was not fit for purpose and did not improve H&S.

Single or multiple influences on supply chain management of health and safety?

A feature of many of the examples in the preceding sections is the rather one-dimensional way in which accounts describe the application of influence in supply relations between two parties – the party wielding the power in the supply chain and the recipient of this influence. Thus in client–contractor or customer–supplier situations, the nature of the relationship involved means that one client or customer, having assumed a powerful market position in relation to a contractor or supplier, is able to influence unilaterally the practices of the latter to improve health and safety or working conditions. Such relationships clearly exist in certain cases and there may be a direct benefit to the client or customer in wielding such influence, but, as is evident from our analysis of supply chain relationships more widely in Section 3, these scenarios are overall somewhat exceptional and probably represent an oversimplification of the reality encountered in supply chains more generally.

Nor do the dynamics involved in such bilateral relations entirely explain what drives the dominant party in the supply chain to achieve the desired influence on health and safety in the first place. Such motivators as increased profitability and business efficiency, addressing reputational risk, and corporate social responsibility agendas, as well as compliance with regulatory requirements, are frequently cited. But awareness of these benefits is not necessarily automatic on the part of the organisations concerned – nor are they entirely proven, especially not when the same organisations

have also outsourced functions to suppliers in order to improve profitability and market position in the first place. In understanding motivation, therefore, it would seem to be important to take account of the wider environment in which supply chain management of health and safety conditions operates, in order to properly account for what stimulates this motivation in the first place and what sustains it subsequently.

A more comprehensive reading of the literature on market regulation – and especially that on global supply chains – suggests that a striking feature of this environment concerns the involvement of a range of actors, structures and procedures beyond the immediate supply relationship, which act together to prompt and sustain the desired effects concerning improved working conditions for the vulnerable workers at the end of the chain. For example, in the global food, clothing and footwear industries, the business case for supply chain controls to improve health and safety conditions in the supplying farms and factories of developing economies is not made directly from the improvement of the health of the workers concerned, or even from the possible increased efficiency and quality achieved by this improvement. Rather, it is made from the potential for improvement in the public image of the client and the consequent selling potential of its labels in the advanced market economies, which are otherwise threatened by bad publicity associated with exposure of poor conditions of labour in its supply chain. That the same public image considerations potentially apply in domestic supply chains was illustrated recently by front-page headline coverage of sweatshop labour conditions and low wages experienced by immigrant workers manufacturing fashion garments sold by a prominent UK high street retailer.²³⁰ Similarly, in the global maritime industry, the rigorous auditing by the oil majors of safety management arrangements in place on board petrochemical tankers is not undertaken out of direct concern for the health and safety of the seafarers on board but primarily because of fear of the consequences of ship incidents involving oil spills, leading to poor public image and indirect damage to oil industry profits, as well as the possibility of greater regulatory attention.

Such threats to business and the freedom of capital emerge from the effects of the concerted efforts of social interest groups, regulators, the media and so on. They are further sustained by alignments of mutual interests among trade unions, non-governmental organisations, labour inspectors, consumer and community action groups and others seeking to represent the interests of exploited workers in negotiation and consultation with representatives of the companies at the heads of the supply chains concerned.

The ‘ethical trading partnerships’ that emerge from such relations are further supported by various international bodies such as the International Labour Organization (ILO), the World Health Organization, donor agencies and non-governmental organisations (NGOs) and also enjoy a degree of arms-length approval from associated governmental bodies. The results are seen in the more than 1,000 corporate codes detailing labour conditions for suppliers estimated in a World Bank survey in 2000²³¹ and the 98 per cent of the world’s largest 500 companies that are reported to have a code of ethics or similar.²³² They are also found in the flagship partnerships such as that between the multinational car manufacturer Volkswagen AG, the ILO and the German aid agency GTZ aimed at the development of an international guideline for health and safety and supply chain management.^{233,234} But as Rodríguez-Garavito¹⁵⁹ puts it, the stimulus for their development is found in the efforts of interest groups to expose the abuses of labour conditions for workers at the base of global supply chains and spur the formation of transnational advocacy networks:

... aimed at re-establishing the link, blurred by global outsourcing, between brands and retailers in the North and workers in supplier factories in the South. For instance, non-governmental organisations ..., labour unions, student associations, consumer groups, and labour support organisations have forged transnational consumer–worker alliances seeking to put pressure on transnational corporations ... to comply with international labour standards.... Recently the economic and political salience of these and other initiatives has been further expanded through the integration of the issues of sweatshop labour in broader discussions on fair trade, ethical consumerism and corporate social responsibility.

Analysis of these interventions has led to the emergence of a theoretical literature in which they are regarded as part of a new form of global economic regulation which increasingly occupies the space between the perceived failure of state regulation and that of the market to achieve such ends in supply relations (see, for example, the work of Jessop,²³⁵ Braithwaite & Drahos,²³⁶ O’Rourke,²³⁷ Weil & Mallo²³⁸ and others). This theorising is not used solely to explain global relationships but also has resonance closer to home, as the work of Arup *et al.*²³⁹ in Australia makes clear. Nor is it restricted to

regulating labour conditions in supply chains – thus similar theorising concerning the impact of multiple actors and strategies on product supply chains has been used to explain the stimulus towards substitution of safer products by Ahrens *et al.*²⁴⁰ in relation hazardous substances and to influence strategies to support the management of their risks in small firms by Walters.¹⁶⁷

The implications of these issues for regulation, and their influence in improving health and safety in supply chain management, are returned to in the following section. For the purposes of the present section, however, three observations are especially pertinent.

The first is the conclusion that it is concerted action that motivates businesses to act on conditions in their supply chains. Therefore the implication for the analysis of ‘what works’ in relation to using supply chains to influence health and safety conditions is that it needs to take such wider constellations of actors and actions into account. There is little evidence to suggest support for a ‘business case’ for supply chain management of health and safety conditions in their absence.

Second, it is clear that these wider alliances also help explain the background to so-called ‘partnerships’ in many supply chain initiatives, both globally and locally. Such partnerships are in reality a long way from the expressions of altruism or mutual benefit that sometimes characterise their description by the actors involved. They are rather the result of negotiated compromise, in which different forms of power are balanced so that supply chain management of labour conditions is improved. A key element for many of the actors involved is that their power stems from the alliances they have made rather than from their individual position. Thus, for example, the significance of the role of trade unions in influencing the terms under which the construction of sports stadiums takes place is a result of their potential to act in concert with others to draw attention to the damaging effects on large contractor company reputations in such high-profile situations, rather than stemming solely from their power in labour relations on construction sites. Or, in the case of the Fair Labor Association (FLA), a prominent public–private partnership that monitors its members’ adherence to its code of conduct, a glance at its history shows that its origins stem from public disquiet following a series of labour rights scandals involving American companies during the 1990s that caused the then US President to call for an approach to prevent a ‘race to the bottom’ in the global outsourcing of production. The result was the Apparel Industry Partnership, that brought together industry, unions, human and labour rights NGOs and the state to negotiate a Common Code of Conduct, with the FLA set up to ensure participating companies implement it.²⁴¹

Third, it is evident that although there has been a great proliferation of such codes of conduct and of the companies that are signed up to them, the role of unions, labour and human rights NGOs, the media and local activist groups remains crucial, not only in negotiating their content, but in drawing attention to the need for effective monitoring of their implementation on the ground. This is a conclusion that emerges powerfully in studies of the implementations of ethical trading codes in north–south supply chains.^{242,243} But it is also illustrated much closer to home by the recent Primark case in the UK, in which media exposure of labour abuses in one supplier factory caused the Ethical Trade Initiative, a trade body that monitors Britain’s top retailers’ compliance with good practice in relation to their suppliers, to demand posters advertising its endorsement be removed from the retailer’s storefronts, tills and its corporate website while investigations into the abuses continued.²³⁰

Conclusions

This section shows that although the business practices in which supply chains have become increasingly prominent create pressures on dependent organisations that are harmful to health and safety, in certain circumstances the same supply chain relations can be exploited in ways that lead to improved health and safety arrangements. In such cases, customer and client organisations in business relationships are able to use their market position to influence the behaviour of their suppliers to demonstrate that they have particular health and safety arrangements in place. The literature describes several ways in which such influence is applied, including generally through procurement strategies that use health and safety standards to select contractors, requiring standards of competence to be met and by demanding evidence that health and safety management systems are in place. It also highlights examples of more specific requirements, with contractual conditions demanding adequate evidence of procedures in place to address risk assessment and management issues pertinent to the particular tasks to be undertaken. It shows that key to the operation of all such requirements are the measures that customers and clients are prepared to undertake in order to monitor and audit compliance with them, as well as the role of external monitoring and inspection in this respect. The literature demonstrates considerable variation in the extent to which these measures are in fact in place.

It further identifies a range of experiences concerning relations between clients, contractors, subcontractors, agency labour and others in labour supply chains in which barriers to risk communication created by such complex relationships have been addressed. Again, findings here are varied and inconclusive. Finally, the research demonstrates some examples in which product safety has been targeted and shows that procurement strategies and support can be used to encourage improved safety in the supply and use of products as well as in relation to the management of labour.

However, a particularly noticeable feature of research specifically focused on enhancing health and safety in supply chains is its limited attention to some of the wider contextual issues that help to explain what motivates business consideration of this task in the first place. This absence of attention to these preconditions for successful supply chain influence on health and safety arrangements is a significant gap in present understandings. It has important implications for strategies to promote the uptake and transferability of the limited number of cases in which positive direct effects have been shown to occur. In contrast, the research on improving labour conditions in global supply chains has a much greater focus on the significance of the structure of the wider social, economic and regulatory environment and concerted actions of actors within it as sources of influence on the heads of supply chains and others to improve the labour conditions within them. This focus has been driven at least in part by a need to address the weak influence of state regulation in this respect. But while this is obviously a feature of global supply chains, it is clear from many of the examples outlined in this section that the wider socioeconomic and regulatory environment, and the concerted actions that are possible within it, are important in domestic situations too.

There have been some attempts to account for these issues. For example, Wright *et al.*²⁴⁴ and others, have pointed out that positive effects on health and safety are more likely to occur in heavily regulated sectors such as the chemicals industry, where regulatory responsibilities demand these kinds of intervention on the part of customers and clients, and in the construction industry in the UK, or where there is some obvious business gain to clients from wielding economic power in the supplier–user relationship to benefit health and safety. Further afield, Belzer,¹¹⁸ Johnstone *et al.*,¹²¹ Rawlings,¹⁵⁵ Weil & Mallo²³⁸ and others have argued the importance of regulatory interventions in particular supply chains, such as those already present in the apparel industry and in long-distance haulage in some countries. In the same vein, James *et al.*²⁴⁵ have argued for interventions more generally in the regulation of the heads of supply chains. But all these authors also acknowledge that regulatory reach is limited and increasingly so in a neoliberal, globalised economic environment. As the research on global supply chains and that more generally in governance in the global economy makes plain, successful attempts to influence business approaches to requiring improved labour conditions in their supply chains frequently involve mixed forms of regulation, in which top-down state regulation is mixed with private or market-based measures that are developed, implemented and monitored through the engagement of businesses, traditional state regulatory inspection, trade unions, consumer groups and other social interest groups, as well as through media attention. Similar constellations of measures and concerted actions and actors have been theorised in relation to product supply chains especially with regard to hazardous chemicals (see Ahrens *et al.*²⁴⁰ and Walters¹⁶⁷). But while there are some limited descriptions of this approach (such as in the building of large sports stadiums), research in relation to health and safety is generally underdeveloped.

Looking back over the last three sections, a prominent theme emerges that concerns the importance of determining more precisely what research tells us about the factors and conditions of client–contractor and supplier–user relationships that either support improved health and safety management or are a hindrance to it. In this respect it would seem that combining wider understandings concerning the nature of supply chain relations and what drives them with more detailed analysis of the specific issues relating to health and safety effects could lead to a better overall understanding of the strengths and limitations of intervention in supply chain management to achieve improved health and safety for workers involved.

6 Conclusions

The analysis offered in this report has revealed a remarkable lack of systematic and rigorous evidence for how the internal dynamics of supply chains affect health and safety management and performance. In doing so, it has therefore also revealed a marked disjunction between official policy pronouncements on how they can be used to improve health and safety standards and the evidence base that exists to support them.

Insofar as relevant evidence does exist, the review provided in Section 4 revealed that, in broad terms, it comprises three main types:

- analyses that have explored, conceptually and on the basis of secondary evidence, the potential for outsourcing, and hence supply chains, to have adverse health and safety effects
- findings from studies centred on shedding light on the propensity for workers employed in subcontracting organisations or on types of employment commonly associated with the growing use of outsourcing to experience work-related ill health and injuries
- empirical explorations of how the operation of supply chains in particular sectors affects the working conditions of employees of supplier organisations.

The key conclusions that emerge from this evidence base will now be summarised. These conclusions are then considered in the context of the review provided in Section 5 regarding what is known about the nature and impact of initiatives that have been undertaken, nationally and internationally, to improve health and safety standards in supply chains, and the central points which emerged from the examination provided in Section 3 of the wider, non-health and safety-related supply chain literature. Finally, attention is paid to the regulatory and policy problems associated with the weaknesses and gaps that exist in the current evidence concerning the health and safety effects of supply chains, and some suggestions are made concerning the nature and focus of the further research required to address these weaknesses.

Health and safety effects of supply chains – what the evidence tells us

At the general level, a central feature of the growing importance of supply chains in the production and delivery of goods and services, and hence the outsourcing on which this growth has been built, is that it has involved a move by organisations to rely less on ‘management through hierarchy’ and more on ‘management by market-based contracts’. In effect, therefore, this growth has involved a move towards the wider adoption of decentred and fragmented forms of management control that are more directly based on, and informed by, market logics and dynamics.

Broad-based analyses of the implications of these shifts for standards of health and safety management and performance have noted that they are neither inevitably positive nor negative in nature. It has been noted, for example, that outsourcing may involve the subcontracting of previously internally undertaken work activities to more specialist organisations which have a better understanding of associated health and safety risks and how they can be managed effectively. Such analyses, however, have also highlighted that any positive effects of this type may well be offset by negative ones associated with:

- the transference of work by relatively larger organisations to smaller ones that have less sophisticated and well-resourced health and safety arrangements and lower levels of relevant expertise
- a parallel shift of work to non-unionised environments that are thereby marked by an absence of mechanisms of worker representation that can act to challenge unsatisfactory working conditions
- the introduction of more fragmented systems of health and safety management in situations where subcontracting involves personnel from two or more organisations working alongside each other
- cost pressures on suppliers which act both to reduce the scope they have to make health and safety-related expenditure and to prompt them to cut labour costs through such means as introducing more intensified work regimes, changing terms and conditions of employment and relying more on ‘non-standard’ forms of employment, including the use of employment agencies.

Several studies were identified which support the assertion that these characteristics are potential sources of negative health and safety consequences. For example, union-based worker representation has been found to be associated with lower injury rates, accident rates have been found to be higher

in small firms, and work-related ill health and injuries have been found to be proportionately more common among various categories of 'non-standard' workers. Such evidence, though, is in terms of its nature essentially indirect in that it is mostly not based on findings from studies that have included a detailed and systematic examination of the operation and effects of supply chains. As a result, while strongly indicative of these effects being negative, it essentially supports such an interpretation through a process of 'logical implication' rather than via well-rooted and direct empirical findings.

These latter findings, as already noted, were found to be in surprisingly short supply. They are also largely limited to studies in a limited range of sectoral contexts, notably in construction, food processing and supply, and the rail, road and maritime transport industries.

Overall, these more directly focused empirical studies provide substantial support for a picture of negative supply chain effects. They also add weight to the already identified sources of these effects, especially in relation to the adverse consequences of downward cost pressures, intensified and more casualised employment regimes, and fragmented and poor quality health and safety management arrangements.

At the same time, it is clear from the research reviewed that there is also evidence that the precise effects of supply chains, even in the same sector of activity, vary as a result of such factors as the attitudes and objectives of buyers and clients, how suppliers respond to the demands made on them, and the more general dynamics of buyer–supplier relationships. In other words, even where the effects of supply chains are negative, their nature and degree can differ.

However, it also emerged that such effects can occur alongside attempts by those at the head of supply chains to influence how health and safety is managed by suppliers. This demonstrates that their occurrence can, at times, be a product of an imbalance between indirect, often cost-based pressures that have harmful consequences for worker health and safety, and more positive, direct attempts to ensure that health and safety is managed appropriately by suppliers, whereby the effects of the former pressures outweigh those associated with the latter.

These observations, taken together, appear to suggest that where negative health and safety effects flow from the operation of supply chains, it would be wrong simply to assume that this reflects a complete disregard of the issue on the part of buyers. Rather, it seems that there are situations in which attention is paid to the issue but either it is too narrowly focused – for example by being concentrated on 'traditional' health and safety risks – and/or it is insufficient effectively to challenge countervailing pressures flowing from the wider business objectives of buyers and suppliers.

Some support for this last point, in fact, emerges from the discussion on the supply of hazardous substances. Here, the potentially important contribution that suppliers can play in ensuring that their products are used appropriately and with adequate protective arrangements was noted. At the same time, however, the research literature also highlights the formidable challenges to this contribution in terms of both ensuring that suppliers take adequate actions in this regard and that customers respond to them in a positive and appropriate way. The challenges in the second of these areas were found to be particularly pronounced where supply occurred outside relatively tightly knit sectoral contexts such as the chemical industry and where the organisations being supplied are small.

Initiatives to improve health and safety in supply chains

In the literature reviewed, a range of initiatives were identified that had been undertaken both internationally and domestically to improve health and safety in supply chains. They were found to include regulatory initiatives, such as the Construction (Design and Management) Regulations in the UK, statutory requirements on procurement in some European countries, Australian provisions in the clothing industry and the EU's REACH regulatory regime, as well as market-based or private initiatives implemented by businesses and industry, usually as a consequence of concerted pressure from the public or specific interest groups.

The resulting efforts to manage health and safety in supply chains take a number of different forms and embody varying foci. For example, they encompass procurement strategies that use health and safety standards to select contractors, certification schemes aimed at ensuring the competence of contracting organisations and those working for them, and the imposition of requirements relating to the more general management of health and safety, including the use of risk assessment and communication in multicontractor or subcontractor work sites.

Such arrangements were also found to differ in terms of their level of operation. Some operate on an industry or sector basis, while others focus on the level of individual contracting organisations or, notably in the case of construction, are project-based.

Few of the initiatives identified have been subjected to any systematic evaluation of their effects. In the case of those that have been evaluated, albeit often in a fairly limited way, some positive outcomes were reported. This is true, for example, of those reported in relation to several large-scale construction projects, such as the building of a new Renault car plant and the construction of Terminal 5 at Heathrow Airport. It was also apparent that a common feature of these positive examples was that they incorporate clear and fairly extensive arrangements relating to the auditing and monitoring of suppliers, or in the case of upward supply chains involving the provision of hazardous substances, buyer compliance with prescribed standards.

More generally, the existing literature was found to shed relatively little light on the wider contextual factors that contribute not only to undertaking supply chain initiatives, but also to the shaping of both their design and operation in practice. What evidence did exist on this issue, however, tended to suggest that such initiatives were frequently the product of a number of different types of external influence that raise the profile of health and safety as an issue meriting attention. These sources of influence include the rising societal importance of environmental concerns surrounding the use of hazardous substances, the potential reputational risks associated with large and consequently high-profile construction projects, and regulatory and other pressures exerted by government agencies. This last source of influence is clearly illustrated by the emergence of the British construction industry's passport system from a health and safety summit convened by the HSE against a backdrop of government concern about accident levels in the industry.

In this sense, the evidence reviewed was found to echo the wider literature, also reviewed in Section 5, on international attempts to regulate global supply chains via codes of practice and similar arrangements. A key message from this was that the effectiveness of these initiatives is intimately connected to:

- the provisions they make for compliance to be monitored
- the degree to which signatory companies themselves put in place effective internal mentoring and audit arrangements
- the extent to which these are in turn subject to external scrutiny.

In summary, then, examples were found of supply chain initiatives that have been demonstrated to have positive effects on standards of health and safety management and performance and which therefore lend weight to the view that such chains can be used to secure improvements in these areas. Nevertheless, the number of such examples was fairly limited and those concerned were generally found to incorporate internal regulatory features that bind suppliers (or buyers, in the case of supply chains involving the provision of hazardous substances) to processes of supervision and control. In addition, the literature suggests that many of the supply chain initiatives identified have not emerged purely out of narrow, market-based business considerations, but through a process whereby such considerations are mediated and shaped by external pressures stemming from wider social, political and regulatory sources. Insofar as this suggestion is correct, the evidence seems to imply that it cannot simply be assumed that the potential which exists to use supply chains as a source of improved health and safety can be harnessed through business-based considerations alone.

Health and safety and the wider supply chain literature

On the basis of the literature reviewed on the health and safety effects of supply chains and the dynamics that act to shape them, it is clear that further research in the area is needed. It is similarly clear that there is a need for additional research focused on understanding the impact of proactive initiatives to improve the management of health and safety in supply chains and the factors that influence their development and outcomes.

This said, the generally pessimistic nature of existing evidence regarding the impact of the operation of supply chains on standards of health and safety within them does accord reasonably well with that examined in the review of the wider supply chain literature provided in Section 3. As a result, whatever its limitations, it should not be lightly dismissed.

It emerged from this review of the wider supply chain literature that the growth in outsourcing that has occurred in recent decades has to a substantial degree been driven by business logics centred on a

desire to reduce costs and improve quality, acquire greater flexibility (perhaps through avoiding internal rigidities), draw on external sources of knowledge and expertise and, more generally, focus internally on core activities and divest businesses of more peripheral ones. It also emerged that the business objectives of buyers, and the complexity and criticality of the goods and services to be supplied, had potentially important implications for the types of relationship that they sought to establish with suppliers.

Where the goods and services to be supplied are relatively complex and critical, the existing evidence suggests that buyers are more likely to take an active interest in the internal management of suppliers and hence to place less reliance on distant arm's-length contracting. At the same time, however, as all outsourcing relations have a market-based, and hence price-based, component, it does not always follow that collaborative and high-trust relationships with suppliers will be sought or be achievable. Indeed, at a general level, the evidence suggests that the nature of the institutional context in which outsourcing takes place in Britain militates against the establishment of relationships of this sort, perhaps most notably because it does not legally restrict the ability of dominant buyers to exploit their position and does not facilitate wider, industry-based, contacts between buying and supplying firms.

Against this backdrop, the evidence suggests that it is relatively uncommon for buyers to intervene to influence directly how suppliers are internally managed and that where they do make such interventions, these typically focus on issues that are central to the core business interests which underlie the supply relationship. Further, there is also some evidence to suggest that more trust-based relationships in such situations evolve over time rather than being a characteristic of those established initially; this in turn implies that relationships of this type will tend to be more common in longer-term supply relationships. Even then, however, it cannot be safely assumed that a desire by a buyer to establish trust-based collaborative relationships will be reciprocated by suppliers, unless it is seen as according with their own business interests, or that suppliers will, as a result of these interests, necessarily co-operate fully with the internal management arrangements that buyers wish them to put in place, unless additional monitoring and auditing is also carried out.

More generally, it seems clear from the literature reviewed that all supply chain relationships will embody an 'adversarial' element stemming from market-based conflicts of interest between buyers and suppliers, with the outcome of such conflicts being strongly shaped by the distribution of dependency or power between them. It also seems clear that the substantive issues underlying these conflicts are in the main shaped by buyers and that they will often encompass not only price-related matters but also ones relating to a number of other considerations, including the quality and reliability of supply.

Some of these substantive issues may encourage buyers, albeit relatively rarely as noted above, to seek to intervene in the internal management of suppliers and to seek co-operative relationships with them. However, the effects of these direct interventions will exist alongside the inevitable presence of indirect cost-based pressures. In such situations, therefore, co-operation will exist alongside conflict. As a result, the actions of buyers may lead to contradictory employment-related effects in supplier organisations, with positives existing alongside negatives.

Overall, however, what emerges from the evidence reviewed – in part, perhaps, because of the relative rarity of direct buyer interventions – is that the main way in which buyers affect how suppliers are internally managed is indirectly through the requirements they impose in relation to such matters as price, quality, demand responsiveness and just-in-time delivery. These requirements have been found to have potentially important implications for the extent and nature of staff training, the use made of temporary staff, staff levels, workloads and shift patterns. All of these characteristics are clearly relevant to health and safety management but, as the literature reviewed in Section 4 makes clear, tend in particular to have indirect negative effects on health and safety.

In short, the health and safety-related evidence examined in Sections 4 and 5 fits well with that relating to supply chains more generally. This latter evidence points to the potential for such chains to increase workloads and intensity and to engender more casualised and fragmented forms of employment in supplying organisations. It also indicates that proactive, voluntary attempts on the part of buyers to protect and improve health and safety standards in their suppliers are likely to be relatively uncommon, and to be concentrated in supply relationships where these standards are of high relevance to the satisfactory delivery of the required goods and services, or where there are regulatory or other external pressures that prompt them (or where both apply). In addition, the

evidence suggests that such interventions will inevitably exist alongside cost-based considerations which may lead indirectly to the types of employment-related change mentioned above, and therefore have a negative impact on workers' health and safety. In other words, they exist alongside supply chain dynamics that are, overall, detrimental to and unsupportive of improved health and safety standards and performance.

Towards a future research agenda

The research evidence reviewed in this report does not, as a whole, lend much support to the view that modern supply chains have a benign or positive impact on health and safety management and performance within them. Rather, it suggests that they will commonly embody dynamics that have the potential to adversely affect the health, safety and wellbeing of workers in supplying organisations and that these adverse dynamics will only relatively rarely be mitigated or addressed by proactive actions on the part of buyers. On the basis of existing evidence, therefore, it seems that if supply chains are to play a valuable role in protecting and enhancing standards of health and safety, the market dynamics on which they are based will need to be mediated by initiatives developed at a level above that of individual buyers and suppliers, which embody appropriate auditing, monitoring and enforcement mechanisms. These features, it can be noted, are found in rightly lauded examples of large-scale construction projects, such as that at Terminal 5, where health and safety was managed effectively.

In the sectors where initiatives of this type are most common, they have largely been brought about because for one reason or another the profile of the negative effects of supply chain-oriented business practices in them have received wider public attention. Thus, the high incidence of serious accidents and fatalities in construction, the sweatshop conditions present in the domestic and international clothing industries and the poor labour conditions in food supply to major retailers have all been variously subject to high-profile media attention, parliamentary inquiry and public concern. Similarly, awareness of the potential reputational risks resulting from such exposés in the clothing and food industries, or from ship-level pollution incidents in the maritime transport of oil, have all been significant determinants of intervention by customers in the health and safety management practices of their suppliers.

It is apparent that it is in some of these same sectors that regulatory frameworks relating to supply chains have been introduced – the UK CDM Regulations and the measures established in the Australian textiles industry are good examples in this respect. It is also clear that it is in such sectors that not only has the issue of health and safety featured more in business-related arguments for customer interventions and led to more frequent attempts to influence its internal management by suppliers, but also that external monitoring arrangements have been more widely used to support such interventions, as is demonstrated especially by the discussion in Section 5 concerning global supply chains in the clothing and food sectors. In these sectors, not only do customers implement their own audit and monitoring schemes, but various alliances of local and international interest groups, including trade unions, NGOs and labour inspectorates, also scrutinise these arrangements, which researchers agree are particularly important in achieving improved compliance with the labour standards sought.

This last point consequently suggests that the introduction of a regulatory framework is on its own insufficient to ensure improved practice. In the case of the CDM Regulations, for example, their presence in the construction industry has led to widespread concerns about excessive bureaucracy and lack of effective implementation. At the same time, as various observers of the UK construction industry have noted, the regulations themselves do little to fundamentally change the business practices of an industry in which outsourcing, contracting and subcontracting, false self-employment, agency work and so on pose huge challenges for health and safety management. This view once again points to the importance of putting in place adequate arrangements to monitor (and enforce) compliance with such legislative requirements externally.

All this said, it also has to be acknowledged that these conclusions are advanced on the basis of a far from perfect evidence base, which:

- is heavily reliant on relatively indirect evidence drawn from 'logical propositions' based on injury and ill health data obtained in relation to categories of 'nonstandard' workers that are likely to have increased in importance as a result of modern outsourcing
- contains few studies that have focussed detailed and systematic attention on the health and safety-related dynamics of supply chains.

Admittedly, as has already been noted, such conclusions seem to receive support from, and to be broadly compatible with, the evidence that exists in the wider, non-health and safety-related supply chain literature. Nevertheless, overall, the current evidence base must be viewed as both unsatisfactory and insufficient to provide a sound and rounded understanding with regard to:

- how far the operation of modern supply chains should be viewed as problematic in health and safety terms
- which types of supply chain are more or less supportive of the effective management of health and safety in them
- the factors that influence standards of health and safety management and performance in such chains
- the need that exists for policy initiatives to improve how health and safety issues are addressed within supply chains
- in which parts of the economy initiatives of this type should be focused
- how far such initiatives should be legally, as opposed to voluntarily, based
- more generally, how initiatives in the area can be best designed and most effectively implemented.

The first three of the above-listed issues can be viewed as ‘first order’ ones, in that the development of further, and more direct, evidence on them will clearly provide a firmer base from which to explore the remaining questions. It is therefore viewed as highly desirable that more research be undertaken to gather evidence on them.

It also seems clear that in designing such research, notice should be taken of the evidence reviewed in this report, especially that which indicates that the characteristics of the goods and services provided through supply chains, the objectives and wider business interests of buyers and sellers, the distribution of power between them, and the institutional – including regulatory – context within which buyer–supplier relations are developed, should be viewed as the crucial factors influencing the nature of supply chain relationships and the behavioural dynamics within them.

Such further research could encompass a number of different types of study and it is beyond the objectives of this report to provide a detailed exploration of options and their relative desirability. It does, though, seem clear that a vital strand of such future research should include detailed case studies that address the need for more detailed and systematic empirical evidence on the health and safety-related dynamics of supply chains, as well as the factors that shape them.

In exploring these dynamics, the authors consider that the following concluding propositions drawn from the evidence reviewed in this report could usefully form the basis for further study:

- attention accorded to health and safety-related issues by supply chain buyers is likely to vary
- this variation in attention is likely reflect differences in the extent to which:
 - the management of health and safety by suppliers has implications for the effective supply of required goods and services to buyers
 - relevant pressures are exerted by legislative provisions, regulatory agencies and others
- the health and safety consequences of supply chains are influenced both directly and indirectly by buyers
- the nature of these direct and indirect influences can vary; for example, the former exert a positive effect and the latter a negative one
- attempts by buyers to influence supplier health and safety management will be more effective where:
 - they are supported by adequate monitoring and penalty regimes
 - they occur in a supply relationship which is relatively collaborative and trust based
- such collaborative and trust based relations are more likely to exist where:
 - buyers and suppliers have worked together, satisfactorily, for a relatively long period
 - the wider institutional context is supportive of them
 - there is some form of regulatory scrutiny in place
- buyer attempts to influence supplier health and safety management will be less successful where:
 - they are seen to clash with the business interests of suppliers
 - the risks associated with failing to comply with them are seen by suppliers to be relatively low
- regulation of supply chain relations can take various forms but regardless of form, there are implications for both internal and external inspection and auditing of compliance that are likely to present challenges for traditional strategies.

These propositions, in turn, point to the need for future case study research to investigate:

- types of supply chain activities that differ significantly in terms of the likely business criticality of health and safety issues within them
- buyer–supplier relationships that vary by length, the distribution of power within them and the degree of mutual dependency they embody
- buyer demands on suppliers that vary in terms of the intensity and relative importance attached to price
- buyer–supplier relationships that differ according to the presence or absence of buyer attempts to influence supplier health and safety management and the nature of such attempts
- the role of regulatory scrutiny in all these relationships.

The importance and desirability of research along these lines merits emphasis. There is no doubt, for example, that the operation of supply chains has important implications for standards of health and safety management and performance within them. It is also clear that while these implications are often of a negative nature, there is evidence to suggest that these outcomes are not inevitable. Indeed, they can potentially be positive.

Given this, supply chains may well, as official rhetoric suggests, provide an important avenue through which important improvements in health and safety standards could be achieved. The mere advancing of rhetorical statements to this effect, and related assertions that there is a ‘business case for health and safety’, however, seems, on the basis of the evidence in this report, to be unlikely to lead to an outcome of this type. Instead, what is needed is a better understanding of how supply chains can be best used to secure such improvements and hence act as a force for good rather than bad, and the related development of policy developments that are adequately informed by such an understanding.

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