

Chapter 1

Safety and Subcontracting



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Abstract The aim of this introductory chapter is to provide a description of the evolving operating landscape of safety-critical systems (e.g. aviation, chemical and nuclear industries, railway) in the past two to three decades, towards network configurations based on contracting out. The topic of this book is strongly connected to this evolution and our understanding of its consequences for safety. The chapter situates the rise of these network configurations in the context of the advent of what has been described as globalisation, a phenomenon shaped by the liberalisation of trade and finance; privatisation and deregulation and the development of technology (communication, transport). A distinction between occupational safety and process safety is introduced to remain aware of different situations, depending on their nature, and positions within such networks. The chapter then summarises the different contributions to this book by a range of authors who bring unique lenses to this topic from a diversity of angles.

Keywords Safety · Contracting out · Networks · Globalisation · Implications

1.1 Diversity, Ambiguity and Caution

When asked to express and to formulate their views about the relationship between subcontracting and safety, people—with regulatory or managerial roles in various safety-critical industries which employ subcontractors and operate, for some of them, across the world (e.g. aviation, railway, oil and gas, health care, nuclear)—come up with a diversity, sometimes ambiguous but also careful answers. These diversity, ambiguity and caution translate the complexity but also sensitivity of this topic.

Some describe cases of activities in their business which are fully subcontracted while attaining excellent safety performance. They add that they do not need to teach anything to these subcontractors regarding safety (offshore). Others are more cautious about what they depict as concerns associated with subcontracting some

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activities in international contexts, in other countries in which cultural approach of safety is different (aviation). They are cautious, remain suspicious or alert about compliance in these cultural contexts, and what it might mean, for the likelihood of an incident, to be ‘compliant’ in a country with a different approach.

Others mention design projects relying on multiple subcontracted companies which must share information as if they were part of the same organisation. This requires trust in relationships, including the ability to speak up (aircraft manufacturer). They emphasise the difficulty of creating this successful environment because of the existence of contracts. Contracts indeed imply a degree of dependence of the subcontractors or power asymmetry which might impede their ability to express their opinions or views in conflicting situations. Because there is a large consensus about the importance of being able to do so for safety purpose, this situation can become an issue.

Some add in other contexts that they are concerned by the different ways of handling contracts by two branches of their organisation when these two branches must collaborate on the same project (railway). If these two branches subcontract each a portion of the work to be done but with different contractual requirements, what are the implications when the subcontractors, each with their different contracts, meet on site to carry out their tasks? They also wonder about the maturity of the subcontractors who have not yet much experience in the domain and the time and resources it will take for the company to nurture them to reach the expected maturity (railway).

As these few examples show, issues of *contract*, of *trust*, of *standard*, of *compliance*, of *international context*, of *speaking up*, of *supervision*, of *competence*, of *culture*, of *boundaries*, of *asymmetries*, of *power* and of *relationships* play a key role in the link between subcontracting and safety. What these answers express is the deeply organisational realities of subcontracting and their complex operational, managerial, social and political dimension in safety-critical contexts. But, what these views expressed by a handful of people from different organisations also highlight is one key feature of contemporary businesses: their network properties and their range of configurations across industries.

1.2 The Network Organisation: A Brief Description

Considered from a historical point of view, subcontracting comes indeed as a result and as one aspect of some profound transformations of the operating landscape of safety-critical industries in the past two to three decades (Le Coze 2020a, 2020b, 2021). Such companies followed indeed the major changes experienced in many other business areas brought by globalisation, whose consequences were already clearly felt and described at the turn of twenty-first century (Castells 2000; Veltz 2000). These changes were thus translated in the literature into the core notion of networks.

Through the information and communication technology (ICT) and transport revolution (aircrafts, ships), the liberalisation of trade and finance and the privatisation and deregulation of industries (e.g. telecoms, aviation, electricity) of the 1980s and 1990s, businesses and states evolved, adapted to but also created a new operating landscape. Globalisation was not a new phenomenon at the end of the twentieth century, but its intensity, speed, specific nature (e.g. growing significance of finance) and resulting level of interconnectedness across continents clearly were (Osterhammer and Peterson 2005).

The development of global production networks (GPNs) which characterises the new networked configuration of so many companies today, including some safety-critical ones (e.g. aviation), is one of the most visible economic consequences of globalisation (Baldwin 2016; Dicken 2015). With ICT, affordable transports and liberalisation of trade came indeed the possibility of offshoring tasks in geographic areas with cheaper labour, or wherever expertise was available, creating complex networked configurations of businesses, generating extended supply chains.

After two to three decades of development, GPNs exhibit a diversity of configurations across industries from 'open' markets in which companies compete to deliver services or products to lead firms, to more structured networks of stronger relationships based on specialised organisations which provide unique expertise to each other in joint ventures, partnerships or selective subcontracting schemes opened to only few companies.

Notions of subcontracting along with outsourcing (or sourcing) but also offshoring have been introduced to describe various situations and a continuum of complex options ranging from internalised to externalised activities creating multiple intra- and inter-organisational interfaces now exists in a range of industries across firms. Such GPNs do not thrive in a vacuum and depend on complex relationships with states and geographical regions with various attributes, regulations and dynamics, within geopolitical contexts.

In this highly complex new landscape of the past two to three decades, GPN of the automobile, food, clothing, service, logistics or extractive industries strongly differ in their configurations but many of them being today parts, at the head or in the middle, of 'networks of networks' (Dicken 2015; Veltz 2017). For multinationals, these 'networks of networks' mean regular adaptation of their organisational structure and processes in a world of shifting opportunities and threats (Pananond et al. 2020). One way among others of adapting is to organise their operations by creating business units (BU) operating in different geographic areas.

The range of operational, administrative and legal degree of autonomy of this BU in relation to headquarters varies in this respect across industries and companies (Morgan and Whitley 2014). But these evolutions of businesses in the context of globalisation also reflect the liberalisation of finance and its subsequent growing power and influence in strategic decision-making of firms (Auvray et al. 2016; Lazonick 2006). Thus, previously integrated companies were also pushed to externalise, to subcontract activities considered not to be any longer core to their businesses by a financialisation of their strategies (Weil 2014).

One consequence of globalisation, including subcontracting, outsourcing and offshoring, is also the increase of standards. As businesses operate more and more across borders within networks of contracted activities with an array of other organisations, standardisation followed by audits (of such standards) by third parties brings the assurance that activities are performed according to expectations (Busch 2013). In a world of networks, standards are core dimensions of the ‘glue’ which binds the nodes of the networks together across continents (Sturgeon 2001).

The genesis of these standards is complex and varied, at the crossroads of many different constituents among which the states, civil societies (non-governmental associations) and private companies (including international organisations such as ISO). Standards are one facets of a self-regulated side of businesses which developed with this globalised operating landscape, along with traditional laws of states and regions into hybrid governance practices (Graz 2012) multiplying the number of intermediaries (Abbott et al. 2017).

Moreover, as indicated above regarding main globalisation’s drivers, deregulation and privatisation of different sectors (telecoms, transport, energy) in many countries have led to a breaking down of the old monopolistic state organisations, with the intent to favour consumers. By creating a market for newcomers to compete and with the intention to drive prices down while driving quality of service up, deregulation transformed the operating landscape of core infrastructures which used to be exclusively owned by states.

These are now shared with private organisations, producing a networked, or also sometimes described (more negatively) as fragmented, configurations. The end of this monopolistic era of core infrastructure meant also the creation and a new role for states’ agencies in charge of supervising the tendering process and control of the companies making up this network, including areas such as price, quality of service but also safety.

To this picture, one needs to add the growing importance of consulting and the role it has been increasingly playing in different activities of companies, from legal, financial to engineering, IT, environment or safety domains, many of them acting as support of regulation (Clark and Kipping 2012). This dimension of an increase of prominence of external advice also contributes to the network configuration of businesses. Strongly connected to the trend of standardisation, some consulting firms have developed an activity consisting in auditing companies’ compliance to standards but also developing the standards themselves (Van der Heijden 2017).

But consulting can also be a form of subcontracting which is sometimes an intrinsic feature of safety regulation regimes which require safety cases to be produced by companies (Owen 2021). These safety cases need indeed a level expertise in risk analysis that companies do not possess and must subcontract to consulting organisations specialised in this domain. This leads us back to the topic of safety.

1.3 Subcontracting, Occupational (Health) and Safety

One question about this change of operating landscape of safety-critical systems in the past decades is its consequences on safety (Le Coze 2017, 2020b, 2021). It seems important to distinguish two aspects: occupational (health) and safety, and process safety. Clearly, there is an established literature in this domain which correlates subcontracting with degraded occupational (health and) safety conditions (Hasle 2019; Mayhew and Quinlan 2006; Quinlan et al. 2001; Quinlan and Thébaud-Mony 2015; Weil 2014). Two broad contexts can be distinguished. The first one is the exploitation by lead firms in GPN of opportunities to offshore manufacturing in poorly regulated, cheaper geographic areas. The emblematic case is the Rana Plaza disaster in 2013 in Bangladesh, in the garment and fast fashion industry (Anner et al. 2013). In 2013, a building collapsed, and 1200 people died.

In the background of this event is the cheap labour of a developing country working in poor conditions (because insufficiently regulated) which multinationals rely on to produce clothes for markets of developed countries. Reputational consequences for the companies combined with civil society uproar triggered in the aftermath of Rana Plaza reinforced expectations from such multinationals (Anner et al. 2013). Other examples are available, for instance in ship decommissioning, in South Asia, with exposure to (health and) safety risks of workers without sufficient regulation to prevent, for instance, gas explosions (Heidegger et al. 2015). Without generalising, what could be described as a *'dark side of globalisation'* can equate offshoring to countries with degraded working conditions and poor (health) and safety performances as a result.

But Weil also describes a similar pattern, although not to the same extent, in a developed country, the USA, in the context of subcontracting. He illustrates his point in selected cases in mining or telecoms for instance which show higher levels of incidents and accidents in these subcontracted areas (Weil 2014). For this reason, Weil prefers the more negative notion of 'fissured' organisation to the rather widespread and neutral notion of network. This is a second context in which subcontracting has been empirically reported to lead to lower (health and) safety performance.

One reason is that by externalising several of what used to be in-house activities, companies leave to other the role of managing occupational (health and) safety. Because subcontracting can come with several layers of companies with self-employed people at the lowest level, pressures to perform work at the bottom of such subcontracting structures often mean lesser considerations for (health and) safety when work must be performed 'no matter what'. Indeed, when bargaining power against tough or poor working conditions is low in such structural and contractual arrangements, 'job needs to get done' anyway and considerations for (health) and safety not imperative anymore (see the case of labour in the UK in the fast fashion industry, Hammer and Plugor 2019).

Unless regulations are designed to make lead companies accountable for the working constraints that they generate all the way down, whether in the case of offshoring abroad or in the case of subcontracting/outsourcing in national borders of

developed countries, improvements are limited. Of course, it is always contentious to overly generalise, and there is a diversity of situations which must be acknowledged, more virtuous than others, depending on sectors and companies involved. Yet, as established in the literature, the business structure relying on externalising work is intrinsically unfavourable if strong legal requirements are not in place (Anner et al. 2013; Weil 2014). Occupational (health and) safety performance in the context of subcontracting is clearly a question of power asymmetries between lead firms and smaller ones (sometimes all the way down to self-employed individuals) in diverse industries across and within countries.

Such asymmetries can create unfavourable working conditions if not corrected through regulation, and this could hardly be missed in a book on safety and subcontracting and should not be left unaddressed. But, at the same time, although very real, subcontracting is not only and necessarily about asymmetry, degraded working conditions and exploitation of small companies by bigger ones, so nuanced descriptions should also be granted (Tillement and Leuridan 2022). When it comes to process safety for instance, there seems to be a range of other situations which limit some of the drawback of the relationship between occupational (health and) safety and subcontracting. Because of their hazardous processes and their (regulatory) environment, such as in nuclear, aviation or chemical industries, subcontracted activities directly connected to such hazardous processes appear to be tightly managed (and regulated), perhaps more than in the case of tasks unconnected to them, as it is the case with occupational (health and) safety in other domains (garment or construction industries for instance). Let us further develop this comment.

1.4 Safety-Critical Systems, Networks and Process Safety

Designing, assembling, flying or maintaining aircrafts are tasks which require a high level of commitment to quality, time schedule and safety, among other aspects. Drilling, operating and securing a well in an oil and gas exploration also entail a high commitment to process safety, time schedule and quality. The same could be said about trains or nuclear power plants, from design to operation through inspection and maintenance. Yet, many of these activities are performed while being subcontracted, outsourced or offshored to many different organisations. In other words, if one considers aviation, nuclear, oil and gas or railways as examples of safety-critical systems to be relatively successful, the network properties of such systems including subcontracting (outsourcing, or offshoring) show a positive correlation with process safety.

The major players of the aviation industry (e.g. Airbus, Boeing) are classic examples of a ‘network of networks’ described by Dicken (Dicken 2015). Airbus’ activities rely on the contribution of a myriad of companies with different roles (from designing to assembling) across the world. A list of the number of key partners contributing to the design of core features of an Airbus aircraft is a testimony of such ‘*network of networks*’. These include Latécoère, Thales Avionics, Liebherr Aerospace and

Rockwell Collins France (Mazaud and Lagasse 2006). These key partners themselves outsource, subcontract or offshore to other companies, and this shortlist represents only a fraction of those other subcontracted companies which work for Airbus (see for instance the case of the provider Axon, in Bourginat 2015). Indeed, beyond the design of aircraft, which is considered to be the core business activity of Airbus, an array of other activities is outsourced, subcontracted or offshored to other companies.

Offshore exploration of oil and gas companies can be equally described as a 'network of networks' (Bridge 2008). Key partners of major multinationals of this industry (e.g. TotalEnergies, Exxon, Shell) are also well-established companies worldwide such as Transocean, Halliburton, Schlumberger, Parker Drilling or Baker Hughes to name a few. These international companies play major roles in operating offshore platforms. Refineries in this industry also rely heavily on subcontractors which provide the workforce in maintenance activities for instance, an example of which, among others, is Jacobs Engineering. In fact, from a safety point of view, we know little, empirically, about the details of the many practices associated with these complex achievements in their operational, managerial, social and political realities. We can however comment on the fact that, most of the time, they appear to manage successfully, namely they achieve a relative level of success. However, they sometimes also fail.

When they do, these '*networks of networks*' and their operational, managerial, social and political dimensions are exposed through investigations of presidential, parliamentary or agency commissions which produce reports and through other studies by journalists or scholars. Examples which come to mind are the BP Deep-Water Horizon event (Bergin 2012; Hopkins 2012; National Commission 2011) and the Boeing 737 MAX (Rodgers 2020, Final Committee Report 2022). These events can all be interpreted as *network failure accidents*, as argued by Le Coze (Le Coze 2020a). Analysis of these events reveals indeed the many inter- and intra-organisational interactions on which companies depend (Milch and Laumann 2016). They also reveal traditional issues found in disasters in the past thirty to forty years.

Why did these events happen? Are they the unavoidable products, from time to time, of these sociotechnical systems' sheer complexity or, instead, the results of blatant lack of emphasis on safety by their leaders combined with weak regulations? Events are always a mix of operational, managerial, cultural, social, strategic and regulatory issues in now global contexts (Le Coze 2020b). In the absence of detailed descriptions of these realities in daily operations, and not only in the aftermath of exceptional events, it is not always easy to appraise the extent of an organisational failure. One problem is that these systems are so extended, complex and vast and represent so many people that it remains a challenge to produce empirical studies of practices while maintaining a big picture of the diversity of artefacts, actors, organisations and institutions involved (see Vaughan 1996 on NASA).

But research on daily operations, such as high reliability organisations, has started to pay attention to what they defined as '*virtual organisations*' (Garbowski and Roberts 2019), an expression which stresses the digital dimension of these networks, while other authors have also started to acknowledge the issue of subcontracting in relation to process safety (see in the domain of pipelines, McDermott and Hayes

2017, for a collection of empirical studies, see Hayes and Tillement 2022). Research on safety regulation is also scarce on the relationship between ‘networks of networks’ and safety (Drahoš 2017).

In this area, we however know that a topic such as subcontracting has a different status and treatment across safety-critical industries. Regulators are aware of the need to manage accordingly the breaking down of operations implied by subcontracting when process safety is involved. Strategies however differ between safety-critical systems in terms of legal requirement (some, as in the nuclear domain, restrict the number of subcontractors) but also inspection practices (in the nuclear domain, inspectors to do not talk directly to subcontractors during inspections). Quinlan describes how it took several years for the federal aviation administration (FAA) to realise then regulate the consequences on aircraft safety of offshoring maintenance (Quinlan et al. 2013).

A related area worth mentioning is the contribution of these ‘*networks or networks*’ to the proceduralisation, standardisation and bureaucratisation of safety (Almklov et al. 2014; Bieder and Bourrier 2013; Dekker 2014). As mentioned earlier, with global operations came standards. Standards came with auditing. Auditing came with paperwork. But with networks and subcontracting came also legal and commercial contracts. With contracts came control. With control came paperwork. In safety-critical systems, regulation also added its layer of expectations regarding the visibility of safety management processes, which are translated in additional paperwork. So with inspection by control authorities came paperwork too. This inflation of proceduralisation, standardisation and bureaucratisation is one characteristic of current practices in safety which derives partly from these networked properties of businesses and self-organisation schemes (Størkersen et al. 2020).

1.5 Advancing Knowledge

It is no surprise in relation to what has been sketched in the previous sections that people dealing with subcontracting in safety-critical companies come up with a range of formulations about the relationship between safety and subcontracting. Between caution, ambiguity and diversity, they reflect the complexity of the topic. For instance, occupational safety is not the same as process safety; offshoring simple tasks in low-wage countries is not the same as outsourcing tasks to world-class players in engineering; outsourcing design of an aircraft is not the same as subcontracting maintenance in a refinery; nuclear regulatory strategy when it comes to oversight over subcontracting is not the same as in the chemical industry.

Questioning the relationship between safety and subcontracting cannot be explored without a recognition of such profound transformations of businesses in the past two to three decades into ‘networks of networks’ (Dicken 2015) or into ‘fragmented’ or ‘fissured’ configurations (Weil 2014). Such configurations exist in many different shapes, scales and durations (e.g. temporary projects). Safety cannot simply be understood without a view, even sketched, of this context. The fact that

people refer to issues such as contract, trust, standard, compliance, competence, supervision, international context, speaking up, culture, boundaries, asymmetries and power concretely translates these realities of the operating landscape of safety-critical systems.

In this respect, the chapters of this book constitute a unique contribution to this topic. Authors bring a multitude of insightful angles of analysis on many of these issues, from theoretical, empirical and practical perspectives. They span a range of themes, practices and solutions found in companies involved in subcontracting within wider networked configurations. They address core dimensions to be considered when thinking about subcontracting and can be distinguished in two groups. The first addresses issues of organisational configurations, discussing asymmetries, power and safety; the second elaborating on boundaries, contracts, trust and ambiguities at the heart of subcontracting.

1. *Asymmetries, power and safety*

- Petter Almklov: *Work, Organisational Fragmentation and Safety*.
- Michael Quinlan: *Subcontracting, Repeat Latent Failures and Workplace Disasters*.
- Jean Pariès: *Organisational Lucidity and the Impact of Subcontracting*.
- Jorge Walter: *How to Break the Silence of Subcontractors*.
- Jean-Christophe Le Coze: *Subcontracting Safety (Cases)*.

2. *Contracts, trust, boundaries and ambiguities:*

- Bruce Pinnington: *Complementarity: Ensuring that Contracts Are Compatible with Collaborative Relationships*.
- Colin Pilbeam: *Boundaries: Their Influence on Managing Safety in Outsourcing*.
- Nadezhda Gotcheva: *Sfumato as a Metaphor for Creating a Common Understanding in Complex Projects*.
- Nicolas Lot/Benoît Journée: *The Unsung Virtues of Ambiguity in Subcontracted Work*.

1.6 Asymmetries, Power and Safety

In *Work, Organisational Fragmentation and Safety*, Almklov conceptualises the emergence of three organisational models and discusses their implications for safety brought by their power configuration: the monolithic organisation, with in-house workforce (1), outsourcing of operational work (2) and platform work (3). The three configurations exhibit different relationships of workforce and management but also different approaches to work rationalisation and standardisation, with the presence of increasingly pervasive informational infrastructures (II) in the three models. This evolution towards greater digital potentialities has led to platform configurations, the third model, a specific case of II. Almklov discusses, for the three models, the

mechanisms of work invisibility and labour relations associated and their influence on safety.

Quinlan summarises several decades of empirical research regarding the implications of the second of Almklov's organisation models, outsourcing of operational work. In *Subcontracting, Repeat Latent Failures and Workplace Disasters*, consistently with the argument of the preceding chapter, he shows that the contractual relationships and their imbalances are not favourable, across many industries, to the occupational health and safety of workers. With the help of an analytical model distinguishing Pressure, Disorganisation and Regulatory Failure (PDR), Quinlan illustrates how this situation came to be. He also indicates that this model applies, beyond OHS, to safety-critical industries, with an example of subcontracted maintenance of aircraft in the USA that degraded safety.

A similar argument is developed by Pariès with the help of an empirical study. Following a strategic decision to subcontract work considered to be outside the company's core business (in aviation), several changes were witnessed in operations. Pariès introduces the notion of organisational lucidity to address the implication of these changes from a safety management point of view. Consistent with Quinlan's PDR model and Almklov's argument, increased invisibility of work and loss of bargaining power through the asymmetrical, contractual and commercial relationships (in contrast to in-house operational work) leads to degraded work conditions for the subcontractor. To improve the situation, Pariès suggests partnership rather than domination, joint learning and interfaces at the highest levels on both sides.

It is the same topic that Walter addresses, in *How to Break the Silence of Subcontractors*, showing how the power imbalances can be corrected by structural, organisational and regulatory measures, contrasting two cases of subcontracting, one in the construction industry concerning a high-profile project for the 2012 Olympic Games and the other in the oil and gas sector.

In the last chapter of this group, Le Coze explores another facet of subcontracting and safety not addressed in the other chapters of this book. *Subcontracting Safety (Cases)* is an empirical contribution to the topic of subcontracting and safety in the context of the regulations of hazardous installations and risk analysis (process safety). Consistently with the perspective followed in the other chapters of this first group, it discusses the relationships between companies, consulting firms and the regulator. These relationships are mediated by contracts which define the conditions under which a safety case is produced, a service very often provided under time, financial and competitive pressures which characterise a market created by regulations.

1.7 Contracts, Trust, Boundaries and Ambiguities

It is precisely this core notion of contract in the context of subcontracting which is the topic of Pinnington's chapter *Complementarity: Ensuring that Contracts Are Compatible with Collaborative Relationships*. Following a definition and an explanation of the reason for contracts' centrality in subcontracting, Pinnington conceptually and empirically discusses the conditions for trust, collaboration and cooperation to develop despite their legal and commercial nature. Examples of vicious and virtuous cycles of distrust and trust illustrate his argument, situating the possibilities of increased and smooth cooperation in the presence of adequate governance processes between buyers and suppliers.

Beyond contracts, Pilbeam is further interested in a characterisation of what is happening at the level of the boundaries between organisations created by subcontracting. Reviewing several analytical frameworks, he insists on the multifaceted nature of boundaries in his chapter *Boundaries: Their Influence on Managing Safety in Outsourcing*. Over the past decades, several authors have shown how cultural, organisational and cognitive dimensions shape the quality of cooperation across boundaries. Management should therefore pay attention to these multiple aspects to facilitate interactions at the boundaries of organisations, with an important role for boundary spanners.

Temporary organisations, such as construction projects, which bring together diverse organisations for a limited period, represent specific types of subcontracting situations. Boundaries greatly matter in this case too, particularly when organisations multiply. In *Sfumato as a Metaphor for Creating a Common Understanding in Complex Projects*, Gotcheva discusses the importance of maintaining a shared understanding of operations, particularly when safety is concerned. When differences embedded in cultural assumptions collide, mutual positive distinctiveness is needed to soften sharp boundaries. She proposes the metaphor of Sfumato, borrowed from Da Vinci's painting technique, to emphasise the need for adequate handling of the boundaries in this respect.

In their chapter *The Unsung Virtues of Ambiguity in Subcontracted Work*, Lot and Journé exemplify the operational, managerial and structural conditions at the boundaries favouring the resolution of problems in practice, for safe task completion. Starting with the premise of the impossibility of covering every situation through procedures and anticipation (which characterises the ongoing, recurrent and permanent situation of ambiguity), they show the need for collaboration, in discussion spaces, between actors from the multiple organisations involved. They stress the importance of soft skills when it comes to dealing with unexpected situations, contradictions or new constraints in such spaces but also the importance of adequate structural–organisational arrangements for these discussion spaces to provide the conditions needed.

References

- K.W. Abbott, D. Levi-Faur, D. Snidal, Theorizing regulatory intermediaries: the RIT model. *Ann. Am. Acad. Pol. Soc. Sci.* **670**(1), 14–35 (2017)
- P.G. Almklov, R. Rosness, K. Størksen, When safety science meets the practitioners: does safety science contribute to marginalization of practical knowledge? *Saf. Sci.* **67**, 25–36 (2014)
- M. Anner, J. Bair, J. Blasi, Towards joint liability in global supply chains: addressing the root causes of labor violations in international subcontracting networks. *Comp. Labour Law Policy J.* **35**(1), 1–43 (2013)
- T. Auvray, O. Brossard, French connection: interlocking directorates and ownership network in an insider governance system, *Revue d'économie industrielle*, **154** (2016). <https://doi.org/10.4000/rei.6377>
- R. Baldwin, *The Great Convergence: Information Technology and the New Globalization* (Harvard University Press, 2016)
- T. Bergin, *Spin and Spill. The inside story of BP* (Random House Business, London, 2012)
- C. Bieder, M. Bourrier (eds), *Trapping Safety into Rules: How Desirable or Avoidable is Proceduralization?* (CRC Press, 2013)
- E. Bourguinat, *Réinventer l'industrie, les aventures de Joseph Puzo*, Ateliers Henry Dougier, (2015). ISBN: 9791093594873.
- G. Bridge, Global production networks and the extractive sector: governing resource-based development. *J. Econ. Geogr.* **8**, 389–419 (2008)
- L. Busch, *Standards: Recipes for Reality* (The MIT Press, Cambridge, MA and London, 2013)
- M. Castells, *The Power of Identity, the Information Age: Economy, Society and Culture*, vol. II, 2nd edn. (Blackwell, Cambridge, UK, 2000)
- T. Clark, M. Kipping (eds.), *The Oxford Handbook of Management Consulting* (Oxford, Oxford University Press, 2012)
- S. Dekker, The bureaucratization of safety. *Saf. Sci.* **70**, 348–357 (2014)
- P. Dicken, *Global Shifts. Mapping the Changing Contours of the World Economy*, 7th edn. (Sage, Los Angeles, California, 2015)
- P. Drahos (ed.), *Regulatory Theory: Foundations and Applications*. ANU Press (2017)
- Final committee report, The design, development & certification of the Boeing 737 MAX. US House Committee on Transportation and Infrastructure, (2022)
- M. Grabowski, K. H. Roberts, Reliability seeking virtual organizations: challenges for high reliability organizations and resilience engineering, *Safety Science*, **117**, 512–522 (2019). <https://doi.org/10.1016/j.ssci.2016.02.016>
- J.C. Graz, *La Gouvernance de la Mondialisation* (La Découverte, Paris, 2012)
- N. Hammer, R. Plugor, Disconnecting labour? The labour process in the UK fast fashion value chain. *Work Employ. Soc.* **33**(6), 913–928 (2019)
- P. Hasle, Safety and Health in Small Businesses—Between a Rock and a Hard Place (2019). https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/genericdocument/wcms_681839.pdf
- J. Hayes, S. Tillement (Eds), *Contracting and safety—exploring outsourcing practices in high-hazard industries*, SpringerBriefs in Safety Management (2022). ISBN: 978-3-030-89791-8.
- P. Heidegger, I. Jenssen, D. Reuter, *Le démantèlement des navires en Asie du Sud. Une externalisation des coûts organisée* (2015)
- J. van der Heijden, Brighter and darker sides of intermediation: target-oriented and self-interested intermediaries in the regulatory governance of buildings. *Ann. Am. Acad. Polit. Soc. Sci.* **670**(1), 207–224 (2017). <https://doi.org/10.1177/0002716217693583>
- A. Hopkins, *Disastrous Decisions: The Human and Organisational Causes of the Gulf of Mexico Blowout* (CCH, 2012)
- W. Lazonick, Corporate restructuring, in *The Oxford Handbook of Work and Organization*. ed. by S. Ackroyd, R. Batt, P. Thompson, P.S. Tolbert (Oxford University Press, New York (NY), 2006), pp. 577–601

- J.C. Le Coze, Globalisation and high risk systems. *Policy Pract. Health Saf.* **15**(1), 57–81 (2017)
- J.C. Le Coze, *Post Normal Accident. Revisiting Perrow's Classic* (CRC Press, Boca Raton, FL, Taylor & Francis, 2020a)
- J.C. Le Coze, Ideas for the future of safety science. *Saf. Sci.* **132**, 104966 (2020b)
- J.C. Le Coze, Globalisation and safety-critical systems in Europe, in *Identifying and Managing Risk at Work. Emerging Issues in the Context of Globalisation*, ed. by C.L. Peterson (Routledge, Advances in Sociology, 2021)
- C. Mayhew, M. Quinlan, Economic pressure, multi-tiered subcontracting and occupational health and safety in the Australian long haul trucking industry. *Empl. Relat.* **28**(3), 212–229 (2006)
- F. Mazaud, M. Lagasse, Externalisation et coordination stratégique des relations de sous-traitance: le cas d'Airbus., in *Analyses Et Transformations De La Firme*, ed. by Bernard Baudry, Dans (La Découverte 2009)
- V. McDermott, J. Hayes, Risk shifting and disorganization in multi-tier contracting chains: the implications for public safety. *Saf. Sci.* **106**, 263–272 (2017)
- V. Milch, K. Laumann, Interorganizational complexity and organizational accident risk: a literature review. *Saf. Sci.* **82**, 9–17 (2016)
- G. Morgan, R. Whitley, *Capitalisms and Capitalism in the Twenty-First Century* (Oxford University Press, Oxford, 2014)
- J. Osterhammer, N.P. Peterson, *Globalization: A Short History* (Princeton University Press, Princeton, 2005)
- D. Owen, Private facilitators of public regulation: a study of the environmental consulting industry. *Regul. Gov.* **15**(1), 226–242 (2021)
- P. Pananond, G. Gereffi, T. Pedersen, An integrative typology of global strategy and global value chains: the management and organization of cross-border activities. *Glob. Strateg. J.* **10**(3), 421–443 (2020)
- M. Quinlan, C. Mayhew, P. Bohle, The global expansion of precarious employment, work disorganization, and consequences for occupational health: a review of recent research. *Int. J. Health Serv.* **31**(2), 335–414 (2001)
- M. Quinlan, I. Hampson, S. Gregson, Outsourcing and offshoring aircraft maintenance in the US: implications for safety. *Saf. Sci.* **57**, 283–292 (2013)
- M. Quinlan and A. Thébaud-Mony, La soustraitance: un outil majeur de la transformation du système productif. In: A. Thébaud-Mony (Ed.), *Les risques du travail: Pour ne pas perdre sa vie à la gagner* (pp. 44–52), La Découverte, (2015)
- Report to the President. National Commission, *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling* (2011). <http://www.oilspillcommission.gov/final-report>
- G. Rodgers, *Fall From the Sky. The Descent of Boeing and the 737 MAX* (Cambridge Learning House, 2020)
- K. Størkersen et al., How deregulation can become overregulation: An empirical study into the growth of internal bureaucracy when governments take a step back, *Saf. Sci.* **128** (2020). <https://doi.org/10.1016/j.ssci.2020.104772>
- T.J. Sturgeon, How do we define value chains and production networks? *IDS Bull.* **32**, 9–18 (2001). <https://doi.org/10.1111/j.1759-5436.2001.mp32003002.x>
- S. Tillement, G. Leuridan, Contracting and safety: lessons from observing an outsourcing process “in the making”. In: J. Hayes and S. Tillement (Eds), *Contracting and Safety—Exploring Outsourcing practices in High-hazard Industries*, pp. 9–17, SpringerBriefs in Safety Management, (2022). https://doi.org/10.1007/978-3-030-89792-5_2
- D. Vaughan, *The Challenger Launch Decision: Risky Technology, Culture and Deviance at NASA* (University of Chicago Press, Chicago, 1996)
- P. Veltz, *Le Nouveau Monde Industriel* (Gallimard, Paris, 2000)
- P. Veltz, *La Société Hyper-Industrielle. Le Nouveau Capitalisme Productif* (Le Seuil, Paris, 2017)
- D. Weil, *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done to Improve it* (Harvard University Press, Cambridge, MA, 2014)

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