Safety Science 161 (2023) 106079

Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/safety

Coping with different system logics of standardization in regulatory regimes. Norwegian offshore experience

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ARTICLE INFO

Keywords:
Risk regulation
Functional regulation
Standards
Tri-partite
Norwegian petroleum industry
Trust

ABSTRACT

This paper addresses the role of standardization in risk governance and explores challenges when unifying different system logics and standardizations in the regulator-regulated relationships in different industrial, political, and cultural contexts. High-risk regulatory regimes have been at the forefront in developing regulations management, founded on function-, purpose- and goal-based regulations. A key perspective in our analysis is to examine the importance of "standardization" as an institutional approach and regulatory mechanism. The new era of free trade and globalization causes constant reorganization in industries that are trying to seize opportunities and increase competitiveness. The high-risk industries today, therefore, are undergoing major changes, due to downsizing and mergers, which inevitably affect and challenge their safety levels. The paper bases its discussion on several empirical studies of industrial dynamics and innovation in petroleum, mainly from the empirical context of the North Sea petroleum region.

1. Introduction

This paper addresses the role of standardization in risk governance and explores challenges when unifying different system logics and standardizations in the regulator-regulated relationships in different industrial, political, and cultural contexts. A key perspective in our analysis is to examine the importance of "standardization" as an institutional approach and regulatory mechanism applying a polycentric perspective on risk governance. While risk governance refers to a complexity of coordinating, steering, and regulatory processes conducted for collective decision-making, standards refer to rules, guidelines, and characteristics for activities or their results, to maintain a high degree of order, compatibility, transparency, and predictability (LeCoze, 2019; Olsen et al., 2019; Baram and Bieder, 2022).

The concept of risk governance comprises a broad picture of risk and looks particularly at risk-related decision-making when a range of actors is involved (Renn, 2008). Such an inclusive governance model has manifested itself in risk regulation regimes in Norway, particularly in the petroleum industry. Regulatory regimes in a global era are a multi-layered phenomenon on both national and international levels. However, national laws, national political objectives, and economic decisions, as well as cultural and social context, are fundamental variables in regulatory regimes and crucial for understanding the relationship between regulatory instruments and the actual safety level (Reason, 1997; Engen, 2019; Engen and Lindøe, 2019; Karlsen and Lindøe, 2006).

The point of reference and empirical basis for our analysis is the development of offshore risk regulation in the North Sea. In the 1970 s and 1980 s, industrial risk was demonstrated by major accidents and disasters that revealed the hazards in certain industries, such as chemical production (Seveso, 1976; Bophal, 1984), energy based on nuclear power (Three Miles, 1979; Chernobyl, 1986), maritime transport (Herald of Free Enterprise, 1987; Exxon Valdez, 1989; Scandinavian Star, 1990) and, finally, the offshore petroleum industry (Alexander Kielland, 1980; Piper Alpha, 1988). Such accidents mobilized public opinion and brought the debate about safety onto the public and political agenda, as well as creating a process of self-reflection and renewed effort within industries (Lindøe et al., 2011). British and Norwegian authorities had to develop regulatory practices that could face the transfer of new organizations and technology into new working operations.

Hence, high-risk regulatory regimes in the North Sea have been at the forefront in developing regulations management based on function-, purpose- and goal-based regulations (Lindøe et al., 2014). Such a regime rests on the assumption that the involved parties have a common interest in maintaining the system, and that the conflicts of interest that

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https://doi.org/10.1016/j.ssci.2023.106079
Received 10 February 2022; Received in revised form 21 November 2022; Accepted 20 January 2023
Available online 28 January 2023

may arise will naturally be solved without threatening the foundation of the trust between the involved parties. While the process and procedures developing standards worldwide to a large extend are initiated and carried out by private actors, in Norway these processes have been governed and facilitated by governmental actors, although in close interaction with private actors. By applying a polycentric perspective on risk governance this paper thus emphasises how governmental influence form and shape standardisation processes, affects legitimacy concerning standard development and visualises the dilemmas governmental actors face playing different roles in a risk regulating regime.

In this paper we take an empirical approach by using the Norwegian petroleum experiences as illustrative examples. The paper explores two important issues: (1) unifying different interests and increasing stakeholder involvement and legitimacy as an integrated part of developing standards in regulatory regimes; (2) developing tripartite regulatory institutions and instruments and relating these such efforts to the role of standardization. In addition to written material, such as scientific papers and administrative reports, we also build our judgements on an interview with two high-level representatives from the Petroleum Safety Authority Norway (PSA-N).

We situate our analysis in research in the risk regulation literature, where standardisation has been given increased attention the last years (see Olsen et al. 2019). First, we introduce the polycentric model, thereafter we link this model to challenges that occur when using standardisation combined with different regulatory logics. Using the Norwegian petroleum history as backcloth we finally discuss how standardisation process can be seen as part of a broader governmental risk regulating programme.

The new era of free trade and globalization causes constant reorganization in industries, as they try to seize opportunities and increase competitiveness. The high-risk industries today, therefore, are undergoing major changes, due to downsizing and mergers, which inevitably affect and challenge their safety levels. The paper thus aims to contribute to the debate on how standard development may be applied as governmental instruments in risk and safety regulation.

2. Polycentric risk governance

A risk governance regime of a hazardous industrial sector can be framed polycentric in that it involves multiple independent entities in the public and private sectors (Carlisle and Gruby, 2017). The regime is shaped by the interaction of harmful accidents, laws, traditions and norms, economic, societal, institutional, and political contexts. Industrial policies and practices co-exist with many other entities – national, sub-national, and international – in developing standards based on their mandates, motives, and interests.

Accordingly, a variety of risk management frameworks have been developed, based on system thinking (Rasmussen, 1997; Cassano-Piche et al., 2009). Within the economic system, new products and services are introduced in the market, where investors take a financial risk. Civil society includes vulnerable individuals, groups, organizations, societies – local as well as global; they may include common beings reconciled through a joint effort and as a counterforce to authorities and market interests. However, such groups may represent conflicting interests and different alliances to authorities and the market. Our focus within the polycentric risk governance regime is the new and influential role of "standardization".

For our purpose, we have grouped the polycentric regime into a framework of four "systems" with main groups of actors as presented in Fig. 1.

(A) The political system includes state authorities with various forms of management and control through legislation, control and supervisory activities. Legislation and sanctions are rooted in political processes, and they must be secured through democratic legitimacy. In this picture, supranational bodies such as the EU play an increasingly important role. In many sectors, international institutions and supranational laws and regulations form the most important framework conditions for national laws and regulations.

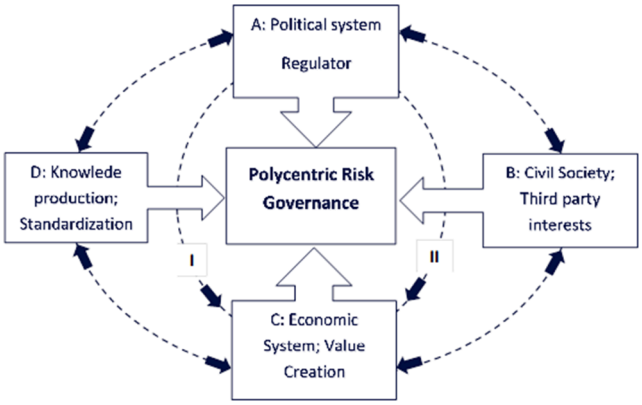

Fig. 1. A model of Polycentric Risk Governance.
Adapted from Renn, (2008).

(B) Civil society, voluntary sector or the "third sector" represents a relationship between governmental entities and the economic actors in the market. Within this area many different relationships and power struggles arise. Civil society has played an important role in the emergence of the global environmental movement that emerged from the 1960s and into what has gradually come to be known as "the green shift".

(C) The economic system includes actors developing products and services designed, both in a private market and public service production. Investor sand and entrepreneur are players willing to take financial risks, while the production system and product may entail threat towards health, material assets and environment.

(D) The system of "knowledge production" includes universities, research institutions, as well as institutions developing international, national and sector-oriented standards. This includes many different types of organization; industrial and professional associations, certification organizations, insurers, investors as well as regulator themselves. Brunsson and Jacobsson (2000) denote the emergence of standardization the "third mechanism" of steering, between state and the market.

The dashed circles connecting the four groups indicates the many possible relations and interactions within a system of Polycentric Risk Governance. The inner circle indicates a division of roles between the state as regulator and actors within the economic system. On one hand the state has a role of promoting innovation and economic activities (I), on the other hand it should protect the citizen and environment from harmful consequences (II). This dilemma will be further developed in the following section. The outer circle indicates possible relationship and shifting alliances among actors within the groups.

In promoting value-creation and innovation, non-public or private sector norming is necessary in a complex society with rapid technological, cultural, and economic changes. With authorities not adequately equipped, either with resources or expertise, to cover safety management and standardization, interaction between public and non-public norms is necessary. Left to itself, this polycentric condition can lead to diversity, not necessarily adding up to provide a coherent regulatory regime. However, it does afford the regulator the opportunity to adopt and enforce any such standards or to propose the development of new standards to fill gaps and link non-legally binding rules to laws and regulations (Ref. Fig. 3).

Standards contribute to coordination and cooperation between people, organizations, and countries. They are instruments of control, as well as guidelines for acceptable and ethical behaviour. Standardization is normally a product of institutional work (Slager et al., 2012). Used here, the term could be regarded as subsets of shared social norms, written and unwritten within a professional community or explicitly

defined directives and agreements (Brunsson and Jacobsson, 2000; Brunsson et al., 2012; Sandholtz, 2012). Standards appear in different shapes and often in disguise; they define routines and contribute to the development of a common "language" for production and consumption.

As a pervasive instrument, "standardization" can be described as a global faceless regime without a centre and periphery (Gustafsson, 2016). Consequently, it is difficult to find actors who can be held responsible and accountable for the consequences arising from the use and misuse of standards (Verbruggen, 2018). This may result in normative governance taking place without public awareness, without necessarily taking collective interests into consideration, and where special interests can play an important role. Industrial actors participate in standardization efforts based on a desire to influence technical and other standards, thus enhancing and protecting their own market segments and promoting their own interests (Mattli and Buthe, 2003).

A major challenge is therefore to link "standardization" to collective interests and democratic processes with transparency in case preparation, ensuring that decisions take place in a legitimate manner. In this context, an ideal role of regulators could be described as "orchestrating" (Lindøe and Baram, 2020). However, there may be pitfalls.

Firstly, when authorities engage in the process of developing standards, they will face some challenges in performing their role. Within the standardization process, strong competing interests are involved, and there may be uncertainty and disagreement about the knowledge base on which assessments and decisions are based. The fact that the regulators themselves are participants but also have the responsibility to have the final say as to what is actually going to be legally sufficient makes the regulatory regime more prescriptive.

Secondly, in a landscape with different interests and where great economic values are at stake, different forms of "politicization" can occur when parties bring different interests into the decision-making. Engen et al. (2017) point to fields like health, environment, and safety, which develop political content where different groups have different interests. The risk of politicization is further illustrated by Engen, (2019) in his analysis of tripartite involvement in revising NORSOK standards in the fragile balance between consensus and conflict. If such politicization takes place, this can again have consequences for the norms' legitimacy and effectiveness, especially if the results are not perceived to have sufficient empirical or academic/scientific support.

Thirdly, a threat towards standardization as an institutional framework is the conflict of interest between economic and market-based goals among standard development organizations (such as the International Standardization Organization [ISO]) and the knowledge and scientific base behind the standards. In their analysis of *ISO standard 31000* on risk management and its use within the Norwegian offshore regime, Aven and Ylönen (2019) argue that the standard provides no guidance on core issues on risk management and contributes to confusion with its notes on likelihood.

Finally, Nyvik et al. (2021) add more evidence on how strict adherence to specification-based standards may limit the risk management by reducing flexibility, creativity, and innovation. With quite different examples from permanent plugged and abandoned oil wells, tunnel safety, and building codes, they show how binding to specific standards in soft laws limits the search for alternative solutions with greater risk-reducing potential than described in the standards. This innovation dilemma may be solved if the government enable to establish a mechanism for "self-regulating" or internal control i.e., an arena which constitute an intersection between standards and procedures and command and control (Ref. Fig. 4). If the companies act as responsible actors, assessing their actual risk, implementing safety barriers, and adapting management systems, the different system logics can be unified in a polycentric model of "enforced self-regulation", where legally binding norms are combined with "self-regulation" based on industrial standards and best practices in the industry.

3. Two system logics in risk regulation

The governmental challenge in a polycentric regime is thus to develop a legal framework by legally binding rules and self-regulation based on non-legally binding rules and standards. According to the legality principle, the state is a protector of law and order, whose primary task is – using legitimate authority – to force citizens to fulfil their obligation to follow laws and regulations within legally binding norms. Anyone violating laws and orders can be sanctioned and punished. A "clear-cut" risk regulation regime tends to follow a "Command & Control" approach", with detailed and prescriptive legally binding laws and regulations. Due to the power of sanctioning and punishment, the role of the state and the regulating agencies implies an asymmetrical relationship between the state and the citizen or the regulator and the regulated (Lindøe and Baram, 2020; Paterson, 2014; Baldwin and Cave, 2012, Hood et al., 2001).

3.1. *Different principles and priorities*

The division of roles between the state and industry is constantly in motion. Hence, it involves, on one hand, a policy-driven process with legally binding laws as an outcome, and, on the other, value- and knowledge-creation, securing products and services for markets and people (Engen and Lindøe, 2019; Engen, 2014). Within modern industrial societies, developing and funding programmes for industrial innovation, as well as promotion and stimulating progress and growth in society, are important goals. Industry standards and best practices are instruments for industrial activities. Industrial actors develop internal principles for best practices and control-mechanisms (self-regulation) focused on financial risks, ensuring quality and the pace of technological innovation and the incorporation of occupational health, technical integrity, and the environment (Noteboom, 2000). In the interest of better cooperation between public institutions/agencies and industrial sectors, the relationship between the state and stakeholders has thus become more symmetrical. From such perspectives, the state can be considered a "service provider", where the use of repressive means and "Command & Control" is less effective and sometimes even contra productive. Fig. 2 below presents how these two different "system logics" interact.

Legally binding rules (laws and regulations) are laid down and bind the government, citizens, economic enterprises, etc. In an open and democratic society, many actors with different preferences and interests influence this process. The left side of Fig. 2 describes control mechanisms driven by legislation and the administrative and regulatory control agencies which are based on societal values, preferences, and a common understanding of politics and risk acceptance in society. The right side of the figure describes how the industrial control mechanism, which primarily focuses on financial and technological risks, ensuring

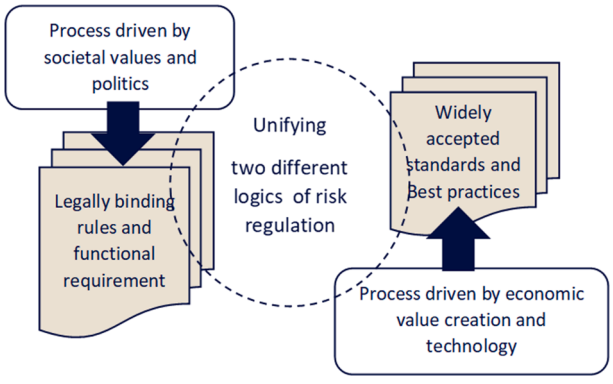

Fig. 2. Unifying different system logics: Societal values and policy vs technology and value creation.

quality and the pace of technological innovation. At the same time actors complies with the authorities' rules, by incorporating wifely accepted standards concerning occupational health, technical performance, and the environment.

3.2. Legal and institutional frameworks

Acts of Parliament and subsidiary regulations, prescribing anything under the Acts to better carry into effect the provisions of the Acts, are legally binding. Being referred to in regulator-developed guidelines, such rules are considered authoritative and therefore constitute de jure or de facto requirements that must be heeded by the targeted set of private actors. Regulators frequently prompt and participate in the development of such standards, to improve the technical quality of the regime's requirements. Subsequently, such standards are adopted as prescriptive rules or used in other ways to provide more technical detail for industry and reduce uncertainties about compliance with vaguely defined performance or goal-based rules.

Further rules are comprised of other relevant companywide HSE (Health, Safety and Environment) standards and guidance. Application of these rules is left to the discretion of the regulated entity, including those developed by each industrial actor for its operational purposes (e.g., quality control, efficiency, interchangeability of operations, training levels, equipment specifications, supplier qualifications, management functions, etc.). They also include the many methodological and behavioural guidelines (individual and organizational) that infuse and shape regulatory regimes (e.g., court decisions, professional codes, societal norms, and moral principles).

In addition, there are numerous behavioural guidelines, stemming from court decisions and liability doctrines, contractual commitments, professional codes of ethics, and prevailing societal norms and moral principles, that need to be heeded to build and maintain trust.

Function-based regulation thus needs some form of discretionary criteria linking functional requirements in the law to guidance notes, industrial standards, and codes of practice. Such criteria could be denoted *legal standards*, referring to norms and practices existing alongside the law that change over time, such as the consequences of new technology, organizational procedures, as well as their historical and social contexts (Fig. 3).

Legal standards act as "lining pins" that bind together legally and non-legally binding rules. One example is the ALARP-principle, meaning "as low as reasonably practicable". Legal standards tie the unchanging word of the law to the ever-changing implementation of the norms and ideas embedded in that law. The use of legal standards aims to achieve an appropriate level of regulation in highly dynamic industries and to ensure safety and quality in key areas of society in changing circumstances. They unify different interests and stakeholders and increase legitimacy as an integrated part of developing regulating regimes.

A political system with state authorities develops various new forms of governance and control through legislation, internal control, and supervisory activities rooted in political processes, in which the EU (European Union) is playing an increasingly important role. In many sectors, international institutions and supranational laws and regulations constitute the most important framework conditions for national laws and regulations.

The concept of polycentric governance includes multiple centers of decision-making, or multiple authorities, where no one has ultimate authority for making collective decisions, and the decision centers, to some extent, take each other into account. Polycentric governance can be seen as an intrinsic feature of democracy and western capitalism, that often leads to adversarial, fragmented or abandoned decision-processes when the key decision centres fail to engage or compromise or reach consensus. To address this concern about the polycentricity of governance without compromising its democratic value, it is useful to focus on the need for structuring the engagement of key decision centres and managing their engagement.

4. The Norwegian experience

The polycentric model applied on the Norwegian case illustrates two main features: the ambition of designing and building strong risk regulating institutions, and the forming and shaping of legitimate standardisation processes. The former addresses the legislative processes and the design of governmental institutions, while the latter refers to how new Norwegian standards (NORSOK standards) were introduced, and standard institutions (Standard Norway) developed. Both processes accompanied by an overarching tri-partite framework.

4.1. Introduction

The institutional foundation of Norway's oil industry was created in the seventies with the establishment of Statoil, the Norwegian Petroleum Directorate (NPD) and the Ministry of Oil and Energy (MOE). When the Norwegian petroleum exploration activities were initiated in the 1960s, neither politicians nor administrators were prepared to meet the safety challenges posed by the upcoming industry. A couple of incidents, though, became reminders of the risk connected with offshore activities. Parallel with the increase in exploration and development activities on the Norwegian continental shelf, following the discovery of the resources at the Ekofisk field, in the 1970s, one also observed an increase in minor and major incidents, leading to loss of life.

At the end of the 1970s, the Norwegian petroleum industry experienced the Bravo blow-out (1977) and the capsizing of Alexander Kielland (1980). Politicians, regulators, industry and unions acknowledged that to reduce risk of similar accidents, an enhanced and systematic approach to continuous improvement of safety in the sector was required. These major accidents led to the implementation of a paradigm shift in the regulatory regime-based functional regulation, with "internal control" (enforced self-regulation) and strong tripartite involvement.

During the last part of the 1970s, there had been scarce development of the safety regulations related to petroleum activities. The regulations

Hierarchy of rules	Sub categories	
Laws and regulation as legally binding rules	• Laws	
	• Regulation authorized by the laws	
Legal standards as "linking pin" (example ALARP-principle)		
Non-legally binding rules	• Guidelines to the regulation	• Recognized global industry standards
	• Non-statutory instruments	• Company specific requirements and guidance

Fig. 3. Legal standards linking legal and not legally binding rules.

were more or less "blueprints" of regulations adopted by the maritime authorities. However, at their establishment in 1974, the Petroleum Directorate (NPD; Oljedirektoratet) was already a little uncomfortable with the situation. It was in favour of public, governmental authorities, politically governed, as controllers and auditors of safety. They actively promoted this position and managed to include the well-established Norwegian tripartite relationship between employers, employees, and public regulators in their argumentation.

4.2. Different interests inside a developing regime

The discovery of the Ekofisk field in the North Sea in 1969 created pressure on the newly established "Oil office" within the Ministry of Industry. The office neither had the resources nor competence to handle and control the fast-developing industry. The ministry turned to the maritime classification society, Det Norske Veritas (DNV), and asked for assistance. DNV saw this as an opportunity to establish themselves as a major player in the new expanding and profitable industry. In the first years, DNV became a major factor, as "certifying authority", in developing the Ekofisk field, a position they used to convince Norwegian politicians and authorities to adhere to a certification system, in parallel with what was well known from the maritime industry. A major issue in the discussion was the possible conflict of interest inherent in the institutional setup of DNV as a "certifying authority". How could DNV avoid mixing roles, if they on one hand acted on behalf of the industry and on the other hand on behalf of the authorities? (Paulsen, et al., 2014).

Hence, during the seventies and eighties and in the wake of incidents the governmental policy shifted, and NPD was given by a leading partner among other authorities. Control functions established by several laws and ministries were delegated to NPD, as was the case with the broader Health and Safety Executive in the UK. Further, NPD took a role in the development and harmonization of legal rules, regulations, and guidelines on offshore safety, health, and environment. Through the legal framework the NPD also were assigned the role as a "verifier" of standards. Those standards were referred to in the guidelines became officially governmental approved standards. The de-emphasizing of DNV was thus part of the general Norwegian policy petroleum policy of the seventies and eighties where governmental petroleum institutions built up competence and was given prominent roles in the polycentric risk regulating regime (Hanisch and Nerheim, 1993). In 2004, as part of a comprehensive restructuring of the regulatory system in Norway, safety regulation was transferred from the NPD to a new agency, the Petroleum Safety Authority (PSA), leaving resource management administration with the NPD (Hovden, 2004; Lindøe and Olsen, 2009). Responsibility for several petroleum-related land facilities was transferred to the PSA as part of the deal.

4.3. The NORSOK standards

In 1993, the Norwegian petroleum industry started NORSOK (abbreviation for Norsk Sokkels Konkurranseposisjon), an industrial program for technological development, new standards, new contractual relations and regulations. The main reason for the programme was the high cost level, and where the objective was to reduce average costs by as much as 50 %. The program was inspired by the similar initiative taken by the British, CRINE (Cost Reductions in a New Era) (Engen 2009). The NORSOK programme mirrored the Norwegian cooperation model, with the key actors, that is, oil companies, suppliers, and the main trade unions, acting as partners. The first NORSOK standards were developed in cooperation with all involved parties and based on the common experience from the Norwegian Continental Shelves (NCS). The working form was thus 'the Norwegian cooperation model' and the standards were available to all. Today, Standard Norway and the Sector Board Petroleum takes care of the tripartite cooperation. There are clear links to the tripartite institutions of the petroleum industry and the organization of standardization processes, and there are clear links to government in the sense that standard development in the NORSOK committees is under surveillance of government representatives. Persons from the PSA participate as observers in the committees and may thus secure that the standards qualify to be referred in the governmental guidelines.

It is, however, of equal importance to emphasize that there are several other key actors involved, primarily from industry and from the research sector – that is, experts responsible for the technical and quality aspects of the standardization process not bound by interest constellations from the tripartite arenas. A sector-controlled oil standardization committee is appointed by Standards Norway's board of directors and is intended to ensure the relationship between Standards Norway, the owners, and users of the oil standards. Responsibilities of the Sector Board are to lead standardization activity in the Norwegian oil industry, including the strategic work programme and budget; contribute to securing finance; help to facilitate necessary company contributions/voluntary resources; allocate personnel resources; approve new and revised NORSOK standards; and propose new, or contribute suggestions for revisions of, international standards (Engen, 2019).

Still, authorities must be prepared to face formal as well practical challenges when taking part in the development of standards in the private sector. The public, as well as private actors, must realize that different types of interests may be posed and come into conflict. When defining "hard" law, such conflicts will emerge through hearings and consultations, often in written form, easily accessible to the public and easy to close or determine. In standardization processes with consensus-oriented procedures, there is no guarantee of developing high quality, for instance in accordance with approaches from risk analysis. This may have negative consequences for the legitimacy, not least outside the sector-based actors themselves. So, including more experts, where experts are seen as rationalizing agents who lend legitimacy and authority to the content of a standard, may decrease conflicts in the long run (Brunsson et al., 2012).

Conflicts of interest among tripartite actors, regarding the use of legal standards and multitudes of possible interpretations of regulatory practice, are challenging when using "soft" laws. Further adoption of consensus standards and practices that set precise and quantified safety objectives and, at the same time, instruct how to achieve such objectives may thus result in proceduralization (Engen, 2019). The tripartite cooperation of authorities, operators, and labour unions in problem-solving has therefore created a PSA-N managed, non-adversarial approach to building such safety systems within each company on the Norwegian shelf (Bang and Thuestad, 2014).

4.4. New arenas for cooperation

At the end of the 1990 s, the tripartite governance was strengthened and expanded by new arenas for cooperation (see Fig. 4). The tripartite group was extended by the Pollution Control Authority and the health authorities and labelled the Regulatory Forum. As part of the tripartite cooperation, a monitoring programme, covering all risk aspects within the PSÁs jurisdiction, has been developed (Vinnem, 2010). Since 2000, annual update reports have been produced, in cooperation with the industry and unions and with support from the researcher community. The programme uses statistical, engineering, and social science methods, including risk perception and cultural factors.

In the context of offshore safety, an initiative taken by the authority was to create a safety forum, where the most important actors meet regularly. The industry initiated two programmes: (1) Working together for Safety, addressing activities with high-risk potential, and making improvements on installations, industrial standards, and procedures, and (2) the training programme for offshore workers, Competence in Rules and Regulations for the Petroleum Industry. The interpretation and the practising of the legal standards are facilitated using the tripartite arenas presented above and reinforced by the regulatory

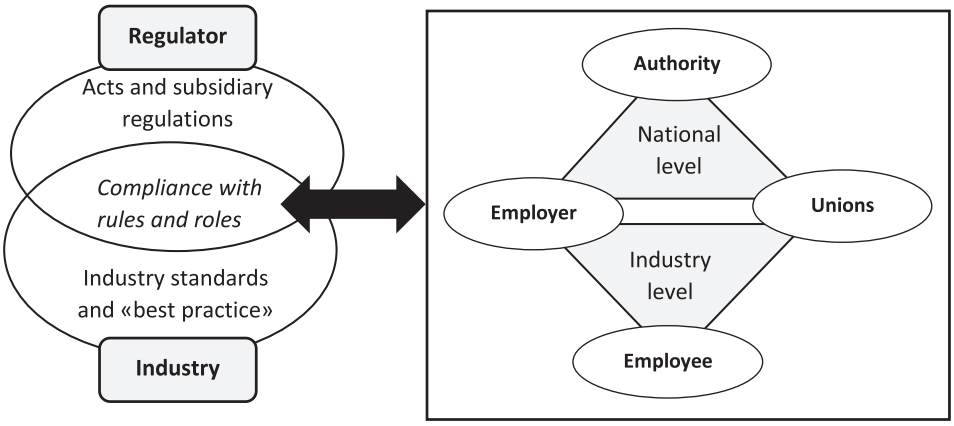

Fig. 4. Tripartite cooperation embedded in the polycentric model.

oversight of the PSA.

4.5. The tripartite system

After some fierce labour conflicts in Norway in the 1920s, the main agreement between the National Organization in Norway (LO) and the Norwegian Confederation of Business (NHO), often referred to as "the constitution of working life", was established. This agreement institutionalised working life in the private sector, between employers and employees, including discussions with the authorities when preparing negotiations, e.g., relating to wages and working conditions. Although the government is not a formal part in such negotiations, the benefit was soon seen – to the negotiating parties, as well as to society at large – of being able to build a "picture" of the challenges to be met in the negotiations on a basic set of common values and expectations.

The Norwegian Working Environment Act of 1977 played an instrumental role in framing both the tripartite system and the principles of internal control (Karlsen and Lindøe, 2006).

The Alpha accident in 1975 initiated a process that eventually led to the implementation of the Working Environment Act in the offshore regime. The later major accident on Bravo (1977) and the capsizing of the Alexander L. Kielland (1980) provided momentum and strengthened the principles embedded in the Act, as well as the position of the NPD, starting the process of the new rules concerning licences' *internal control* (1981), followed in 1985 by the Regulation of *Internal Control* (IC).

The adoption of these new principles was implemented and based on a "three-pillar system": stringent labour legislation, embedded in the Norwegian Work Environment Act – a densely unionized offshore industry with extensive collective bargaining rights, and a comprehensive network of safety representatives. The relatively strong and autonomous NPD and a Quality Assurance system put in place by the companies also played a vital role (Beck et al., 1998).

This governmental role, promoted by the ministry, was also applied to the cooperation between employers and employees in the petroleum sector. The foreign-based employers soon seemed to accept this, mostly smooth, intervention by the government. Relating to safety issues, the governmental role was mostly played by NPD (after 2004, PSA).

In Fig. 4, the left side illustrates the polycentric regime, combining "hard" and "soft" approaches to regulation (Lindøe and Baram, 2020). The overlap of the "top-down" and "bottom-up" systems represents arenas where compliance with the hierarchy of rules (ref. Fig. 3) and the roles of stakeholders takes place. The tri-partite institutions (right part of the figure) represent an institutional framework that has been instrumental in coping with the two different system logics.

The model highlights how the regulator is empowered to develop and enforce rules to protect the public and workers, and, together with inspectorates, to oversee and enforce compliance by issuing orders and imposing sanctions. In taking this instrumental approach, the regulator can reference or incorporate selected voluntary standards and technical guidance developed by industrial and professional organizations, recommend best practices, provide instructive materials to facilitate compliance, and determine the acceptability of each company's self-regulatory efforts.

Combining "hard" and "soft" law approaches by using standards may turn up conflicts on many issues. When enacting or modifying binding legal rules ("hard" law), there are several substantial or procedural requirements to be met. When it comes to "soft" law, for example portrayed through industry standards, such procedures are described and decided upon by the society that elaborates them. Thus, the "hard" law and the "soft" law diverge in relation to their foundation in a public regime. However, there is no doubt that "soft" instruments may have strong social benefits and facilitate development, communication, and cooperation – often across sectors and national borders – much more efficiently than "hard" law.

In his reflection on lessons learnt in advancing a robust regulatory regime, Andrew Hale (2014) concludes that the robustness of the Norwegian regime "has only happened because the regulator in particular, but also the other parties to the tripartite approach, have consciously managed that robustness in response to the challenges and made it a learning system" (Hale 2014, p. 421). A crucial factor in developing a mechanism for adaption has been the tripartite arenas, providing new opportunities for behaviour modification where the parties have challenged each other with informal and pragmatic styles of interaction. Thereby, the regime has developed its capacity and standards to enrol new actors and to redefine their roles and behaviour in the face of internal disturbance, new technology and changes in the socio-economic environment.

5. Discussion

Common to all arenas in the polycentric model, especially on the tripartite level, is the fact that the authorities play a significant role. The authorities' role is not always formal and can switch between that of passive observer to that of a more active participant. Often the authorities take the initiative to establish the arena but subsequently retire later in the process.

Standards are a core part of risk regulation, and this paper contributes to the literature by focusing on the political and social aspects of standard formation. In a recent published article Hayes et al (2022) launch the ideas of 'input' and 'output' legitimacy and address justification of the national standard, committee membership and the interests it reflects, and views about standard effectiveness. Input and output legitimacy, together, underlie standard compliance and where links between industry culture and standards is determined on how regulators are involved in standard development.

Illustrated with examples from the Norwegian petroleum industry,

we further emphasise the government role in creating input and output legitimacy by contributing to (1) unifying different interests and increasing stakeholder involvement and legitimacy as an integrated part of the developing regime, (2) increasing stakeholder involvement by developing tripartite regulatory instruments, and (3) enhancing legitimate roles in standardization and relating such efforts to the role of standardization.

5.1. Unify different interests and increase stakeholder involvement and legitimacy

The risk polycentric model and experiences from Norwegian petroleum history show how actors, different interests, and changing alliances interact on standardization through legitimate function-based legislation, and how civil society influences legislation and standardization through participation and democratic processes. The strengths of regulatory regimes are a strong stakeholder involvement, as well as an adopted capability building among the industry and regulatory body. The tripartite system is tailor-made to ensure large stakeholder involvement in safety discussions. However, there are vulnerabilities in such a function and trust-based regime. For instance, global political and economic issues can easily weaken the trust between parties and undermine cooperation and involvement. Similarly, the win–win principles between safety and the economy during economically difficult times are challenging to maintain. When continuously confronted with global challenges, small economies may have to adjust to safety regulations and standardizations, which are less adaptable to national styles and traditions; they will be forced to change and harmonize their regulatory regimes. This may threaten the balance between trust and distrust. Balancing trust and distrust seems to be one of the most important factors for promoting and unifying a polycentric risk-regulation regime. Collaboration within a tripartite system, along with an institutional framework in place, promotes a fruitful balance between confidence givers and trust beneficiaries. On the other hand, a range of conflicting interests among the involved actors ultimately has an eroding effect. If the context and conditions for the fruitful balance of trust and distrust are lacking, a regime based on distrust, with prescriptive rules and "command & control", seems to be the most reasonable option.

5.2. Stakeholder involvement by developing tripartite regulatory instruments

Stakeholder involvement within the safety field increases through the tripartite institutions, where authorities, companies, and unions together contribute to the regulatory development. This work basically takes place in formal arenas, where the stakeholders meet, discuss, and eventually reach consensus on how standards should be designed and developed. The challenge is to successfully maintain a unifying process of standardization, while simultaneously upholding legitimacy and balancing power and trust between powerful stakeholders with diverging interests. The historical strong position of NPD/PSA-N, given by the authorities, control functions established by several laws and ministries that were delegated to NPD, together with the frame of internal controls, principles, and enforced self-regulation, gave the regulators' legitimacy significant momentum. However, at the same time, these positions created a space where different roles could be played out and where the risk of misinterpretations of roles and responsibilities were likely. In this paper however we highlight the successful conditions for standardisation in the Nordic model including a tripartite arrangement balancing power between employers, employees and the state, and a consensus orientation from all parties which supports the building of trust.

In the Norwegian social democracy, the tripartite system is a constructive and creative way to organize and balance the interests of the main stakeholders. The strength of the unions can be crucial in maintaining balance among the three parties, and tripartism allows shifting alliances when developing the regime. Safety representatives may see themselves in alliance with the regulator when safety is threatened, but the unions may ally themselves with employers' cases where too-intensive enforcement threatens the industry's future. Hale (2014) summarizes the tripartite system by using the metaphor of the stability of a three-legged stool: a stool with three legs of equal length compares favourably with a stool with only two legs or three uneven legs.

5.3. Legitimate roles in standardization

The standardization processes in the Norwegian petroleum industry illustrate a functional but vulnerable and complex system, consisting of trust and power relations and inconsistent processes, characterized by consensus orientation and conflicts. In some standardization processes, this is expressed by conflicts between employers and the state actors. The employers' side does not always want to be dominated by state actors and, to some extent, is striving to release the standardization work from other regulatory developments – among others, to be able to independently evaluate the cost-benefit aspects of all standards – including HSE standards. The authorities argue for involvement in the standardization work, based on their competence and responsibility as the supreme quality controller of the regulatory framework. From a governmental point of view, it is important to use the inspection role strategically when discussing individual standards, to ensure that they are designed to be in line with the regulatory framework. In principle, the industry is responsible for the quality of industry standards. The authorities' role is to contribute to the design so that they can link the standards to the general regulations and guidelines (Engen and Lindøe, 2019).

Role mixing is a general risk in governance, also in the polycentric perspective. On several occasions, the employers' side in the Norwegian petroleum industry has pointed out that relations between union representatives and the authorities are too close. On the other hand, there are several cases where the employees' side claims that the authority is not listening to them. The authority has a challenging role when facilitating a well-functioning tripartite partnership, in which they must navigate between the requirements of employers and employees, simultaneously exercising the role of authority. The task of government in the risk governance model is to establish a dialogue with the different parties, to both set the leeway and develop the rules. In such contexts, the authorities must walk a thin line when developing trust relationships, on the one hand, and exercising legitimate power, on the other. Consequently, there is reason to assert that the regulated regime's functional nature provides autonomy for both the employers and the employees. For the employers, the advantage is the ability to determine the NORSOK - standards and thus successfully link them to international standards.

6. The bottom line: Politics as a trade-off between core societal values

Hence, characteristic conditions for standardization in the Norwegian petroleum regulatory regime have been stakeholder involvement, legitimacy, and trust significantly orchestrated by governmental actors. As shown in this paper, risk regulation represents the challenges of combining different "system logics". On one hand, regulation is a policy-driven process with legally binding laws as an outcome. On the other hand, the industry is a system driven by knowledge and developing technology. The former tends to produce a 'top-down' strategy of regulation and enforcement, while the latter produces a "bottom-up" strategy of self-regulation. This challenge is embedded in the dilemma of innovation and change within industries in general to balance "top-down" and "bottom-up" strategies of risk regulation that inhibit a reflexive learning system, combined with multiple learning and control

loops, which is critical for its performance, structure, and functioning.

Hence, the risk regulating polycentric model relates standardization processes to "politicization" (Engen et al., 2017). Politicization refers to situations in which one strives for neutrality, but professionally motivated decision-making processes are rife with political content. This happens because different groups that have different interests in the field also have the power to secure their interests and use this power in the decision-making processes.

Politicization impacts the legitimacy and effectiveness of the standards and the standardization process. Politicization becomes problematic when decisions become random and populistic interventions, instead of decisions based on knowledge and normative reasons. However, politicization also arises when the individual parties seek power to secure their roles and positions. Ideally, standard development should be a harmonious and exclusively professionally based process, where conflicts of interest and alliance-building are absent. In practice, however, there is significant evidence of value conflicts occurring in all standardization bodies – even where the committees consist exclusively of independent experts.

Standards are supposed to avoid politicization, solve the innovation dilemma, and balance exploitation and exploration, which is a challenge for both the industry, in developing technological policy, and regulators. The political, administrative, and legal structures play a major role in creating robustness in the regimes. It becomes obvious that the tripartite system of cooperation and balancing\interests among authority, industry, and the workforce/unions may inhibit the flexibility to adjust to external requirements. One core element is the trust developed between the regulator and the regulated industry, as well as their recognition of the legitimate role of the workforce as a basis for industrial relations. This enables the regulator to implement a strategy in which some of the major responsibilities for control are shifted over to the industry, and there is a presumption that there is both willingness and capability to collaborate on the continuous development of accepted norms and standards.

The Norwegian variant of a polycentric risk model included an intervening strategy which implied building up institutions and enhancing a policy which included risk management and standardisation. In this context the Norwegian tripartite system became a fundamental driving force. The risk regulation regime involved thus multiple independent entities in the public and private sectors, including regulators, industry and professional associations, labour unions, insurers, standardization organizations, interest groups in civil society (Riksrevisjonen, 2019).

Despite relying upon clearly defined international and national standards, the actual function and effectiveness of a regulatory system was thus highly dependent upon the constituencies of the system of democratic control and public governance, as well as social structures and processes in the specific society where the standards are applied. Transferring regulatory experiences from Norway to other nations, therefore, must be done carefully and with respect for the need to fine-tune them with the system, values, and norms where the experiences are to be used.

CRediT authorship contribution statement

Ole Andreas Engen: Project administration, Conceptualisation, Investigation, Funding, Writing – original draft, Writing – review & editing. **Preben H. Lindøe:** Visualization, Writing – original draft. **Geir Sverre Braut:** Writing – original draft, Methodology.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The work with the paper has been supported by "Health and Regulatory Structure in Kenya's petroleum sector"; a program under OFU - Oil for Development and PSA-N. It has also received funding from the Norwegian Research Council, Risky - Consequences of fundamental changes in risk regulation (Project number 315302).

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