

Changed parameters and consequences for safety and the working environment in the petroleum industry

Published on 13 March 2023, the study was commissioned by the Petroleum Safety Authority Norway (PSA) from the Safetec Nordic consultancy. An English translation of the introduction, summary and conclusions of main report from this project is presented below.

References are not included in the translation, but can be found in the Norwegian report. The full list of contents is also appended to this summary in English, and the complete Norwegian report with appendices can be found at the PSA website.

1 Introduction

This report presents the results of the research project on changed parameters and consequences for safety and the working environment in the petroleum industry, which has been commissioned by the Petroleum Safety Authority Norway (PSA).

The purpose of the project has been to investigate the consequences of changed operating parameters for suppliers in the [Norwegian] petroleum industry with regard to employment terms, employee participation, the working environment and safety. Areas covered include drilling, well service, maintenance and modifications (M&M), and the insulation, scaffolding and surface treatment (ISS) trades.

The study places particular emphasis on changes related to contractual relations, operational and collaboration models, forms of affiliation, employee participation, the working environment and safety. It represents a contribution to updating the knowledge base, with the PSA's earlier work related to operating parameters in the petroleum sector as its starting point.

The background for the research project is that the industry has undergone a number of structural alterations and efficiency enhancement processes over a long period. The most important changes relate to operational and production models, contract forms, compensation formats and incentive schemes, the division of labour between operators and suppliers, manning levels, employment terms, new work processes, and working methods supported by technological advances.

Responsibility for the research assignment has rested with Safetec Nordic in collaboration with researchers from the technology management department at Sintef, the department for industrial economics and technology at the Norwegian University of Science and Technology (NTNU), NTNU Samfunnsforskning AS and Oslo Economics.

1.1 The issue and research questions

The key issue addressed by the study is the consequences of changes to contractual relations as well as operational/collaboration models with regard to forms of affiliation

(employment terms), employee participation, the working environment and safety. This issue has been further operationalised in the following research questions.

Contractual relations, operational/collaboration models

- Which contract forms are in use on the Norwegian continental shelf (NCS)?
- Which compensation formats and incentive schemes are in use in different areas of activity (drilling, drilling and well service, M&M and ISS)?
- What perceptions do the players have of the consequences of the new contract forms and associated contractual terms for organisational adaptations by the supplier companies?
- What new operational/collaboration models have been adopted on the NCS?
- What significance does the new operational/collaboration models have for the supplier companies with regard to organisational adaptations as well as strategic, tactical and operational management?
- What significance does the new operational/collaboration models have for operational practice?
- What perceptions do the players have of the consequences of new operational/collaboration models for the working environment and safety?

Forms of affiliation

- How do contractual forms, contractual terms, and operational/collaboration models affect the use of different forms of affiliation (permanent employment directly in the enterprise, temporary hire, temporary employment, use of consultants and so forth)?
- To what extent have changed operating parameters been significant for the use of atypical forms of affiliation in the petroleum sector?
- What perceptions do the players have of changes to forms of affiliation and their significance for the working environment and safety?

Employee participation

- What consequences do new operational/collaboration models have for employee participation and collaboration?
- What consequences do looser forms of affiliation have for employee participation and collaboration?

1.2 Scope of work and boundaries

The report is confined to dealing with the extent to which changed operating parameters for supplier companies have been significant for forms of affiliation, employee participation, the working environment and safety. This means that changes to operating parameters for operator companies and for workers directly affiliated with them do not form part of the study. Furthermore, the study is confined to supplier companies in drilling, drilling/well service, M&M and ISS.

It has not been the purpose of the study to investigate whether the empirical findings indicate breaches of the health, safety and environmental (HSE) regulations and the Norwegian Working Environment Act (WEA).

The analysis of parameters for employee participation does not include tripartite (employers, unions and government) and bipartite (employers and unions) collaboration, but is confined to bilateral collaboration through the safety delegate service and direct participation by employees integrated as part of daily interaction at company level. No mapping has been conducted of the extent of various forms of affiliation (permanent or temporary employment, temporary hire, self-employed contractors/freelancers and contracting in the industry as a whole).

Various data sources form the empirical basis for the study. These include:

- presentations given by selected operator companies on contract strategy and operational/production models
- interviews with executives and employees in supplier companies
- PSA audit and investigation reports

- summary of issues raised by whistleblowers (prepared by the PSA)
- minutes from meeting series held by the PSA with players in the industry
- indicators from the trends in risk level in the petroleum activity (RNNP) surveys (including RNNP questionnaire data)
- a questionnaire-based survey among employees in supplier companies.

1.3 Theoretical framework

The study is based on a theoretical framework developed by Sintef in connection with earlier research assignments for the PSA related to the issue of operating parameters. In this context, such parameters are defined as conditions which influence the practical opportunities possessed by an organisational unit, group or individual to keep major accident and working environment risk under control.

What are to be regarded as operating parameters depends on the defined object of the analysis – in other words, what/who are the object(s) for which different conditions are significant. According to Rosness et al, the analysis object is various players who are hierarchically related to each other. One example of such a hierarchy of players is:

- political authorities
- regulatory/supervisory agencies
- companies
- management
- employees.

As an analytic concept, operational parameters designate conditions which define the opportunity space for taking action by different players. This means that the activities performed can be regarded as adaptations or “choices”, rather than causes in the form of “determining” factors. Using operational parameters as an analytic concept involves an integrated open-system perspective on safety and the working environment. This means that the analysis, in addition to investigating intra-organisational conditions, includes conditions external to the organisation. That perspective is not only inspired by existing literature concerning safety, but also draws on organisation-science literature on resource dependence and discourse analysis.

Operational parameters can be described at different levels of abstraction – ranging, for example, from specific terms in employment contracts, regulatory requirements or a particular type of technological solution, to more general concepts such as “contractual terms”, “legislation and statutory regulations”, or “technology”. At the overall level, Rosness et al opt to distinguish between operational parameters related to:

1. resources (including financial, time, manning)
2. knowledge, information
3. organisation
4. terms of interaction
5. incentives
6. explicit norms (including legislation and statutory regulations, procedures and so forth)
7. ideology, values, cultural context, interpretative frameworks (such as political ideology and conventions for communication and information sharing)
8. latitude, power, influence (contractual terms, for example)
9. technology, physical shaping of the workplace
10. explicit norms (such as legislation and statutory regulations).

A distinction is made between operating parameters which some players take as given and adapt to, and those which some players can influence (intentionally or unintentionally). These are designated “recipients” and “givers” respectively. An example of a recipient relationship could be an employee’s adaptation to changed employment terms. Union efforts to influence regulations and employment terms can be regarded as a giver relationship. It follows from this that an individual player can be both giver and recipient of operational parameters. Conceptualisation of recipients and givers contributes to the treatment of operational parameters as a dynamic system.

Mapping operational parameters related to a defined player is inappropriate without a clarification of what activities the player performs. Which operational parameters are significant for the latitude available to players will vary in line with the activities they perform. Furthermore, both the *activity* in itself and the *result of the activity* will be operational parameters for other activities (and other players).

In order to clarify this condition, we have opted to regard the analysis object as *players who perform defined activities*. To rephrase this, a perspective is adopted where we place the activities and the players performing them “centre stage” and try to identify conditions (operational parameters) which are significant for the latitude available to the players when the activities are performed.

What is defined as activities (and players) will depend on which issues form the basis for the analysis. Given the issues and research questions involved, we have opted to define the following overarching activities.

- contract formation between operator and supplier
- contract follow-up
- strategic/tactical leadership and organisational adaptations by supplier companies
- operational management and day-to-day operational activity
- employee participation and safety work.

These activities are related to the following defined players:

- operator company (strategic and tactical management)
- supplier company (strategic and tactical management)
- local operational management (supplier)
- groups (operational executors)
- workers (the individual employee)
- safety delegates (organised safety work).

On the basis of the research questions, the analysis will emphasise possible relevant operating parameters, such as market conditions, compensation format and incentive schemes, contract follow-up, operational/production models and the use of contract personnel.

1.4 Structure of the report

The report is divided into three parts. Part I describes the theoretical framework for the study (chapter 1), summary (chapter 2), research design and methodology (chapter 3),

discussion of contracts viewed as operating parameters (chapter 4), description of central development features in the Norwegian petroleum industry with regard to contractual terms and enterprise models, use of temporary hires, and major accident and working environment risk (chapter 5). This chapter also describes underlying development features, such as political and regulatory conditions, climate and environmental factors, the economics of the industry, and new developments on the NCS.

Part II comprises chapters which present various sub-analyses of the different data sources utilised in the work:

- chapter 6 presents results from the analysis of documents concerning the PSA's supervisory activities (audit and investigation reports and minutes from meeting series with players in the industry)
- chapter 7 presents results from the analysis of the PSA's summary of issues raised by whistleblowers
- chapter 8 presents the main findings from the analysis of RNNP questionnaire data
- chapter 9 presents findings from the interview survey of employees and managers in supplier companies
- chapter 10 presents results from the questionnaire survey of employees in supplier companies.

Part III comprises an aggregated analysis based on the sub-analyses in part II, and discusses the main issues addressed in the report.

2 Summary

Purpose, scope, boundaries and sub-studies performed are described in the introductory chapter. The summary in this chapter does not collate the sub-studies, but concentrates on the conclusions which can be drawn when their findings are compared in the manner documented in chapter 11.

Substantial differences emerge from the findings and conclusions between drilling and drilling/well service on the one hand and M&M and ISS on the other. Separate conclusions are therefore presented for these two main groups.

2.1 Drilling and drilling/well service

Contractual terms

Where formats are concerned, traditional relational contracts are the most widespread on the NCS but alliance types are also in use. Regardless of contract type (relational or alliance), interaction is based on various forms of “three-player” model between operator, drilling contractor and drilling/well service provider, with the suppliers having turnkey responsibility for the deliveries. Both alliance and the more traditional relational contracts specify detailed requirements for cost allocation and compensation format (financial domain), operational models (enterprise-model domain) and contract follow-up (jurisprudence domain).

Drilling contractors and drilling/well service providers appear to have experienced higher costs and greater cost risk as a result of changes to the division of labour between operator and supplier (enterprise domain) and to the compensation format (increased use of performance-based compensation formats). The relationship between total remuneration for the services provided and the supplier’s cost has resulted in narrower margins. It appears that this can be related to such factors as weakened negotiating power for the suppliers when agreeing contracts. Changes to negotiating power can be related to:

- long-term frame agreements were entered into (some without index adjustment) at a time when demand in the market was low

- changes in the player composition on the NCS in the direction of monopsony (monopoly buyer).

Indications are that fairly substantial differences exist between operators with regard to the models utilised for performance-based compensation. Operators also practise contract follow-up in different ways. Viewed overall, these differences contribute to variations in cost and income risk for the suppliers.

Operation and collaboration models

The introduction of the three-player model and various integrated operation (IO) models have resulted in fairly radical changes to working practices. Key elements in the various models include:

- early involvement of suppliers in the planning process ahead of the operation
- contractors are turnkey suppliers of services in their business areas
- suppliers take over assignments previously performed by operators
- operators, drilling contractors and drilling/well service providers collaborate in an integrated manner for the planning and execution phase
- moving assignments to land
- reduced manning levels offshore
- new demands for expertise
- cross-trained personnel
- changes to the division of labour offshore.

Where the supplier companies are concerned, the new contractual terms have imposed a need to emphasise cost savings and measures to ensure the realisation of performance-based compensation.

Cost savings appear to be sought through approaches like optimising expertise and manning management as well as maintenance. Changes to maintenance routines can also be related to the emphasis on ensuring the realisation of performance-based compensation (maintain progress and avoid downtime).

Temporary hire/forms of affiliation

Use of internal company expertise pools and temporary hire is a key element in manning and competence strategies at the supplier companies.

Temporary personnel permit adapting to changes in the portfolio of assignments (numerical flexibility). They are also used to meet additional expertise requirements arising from new operational models (functional flexibility).

In addition, it appears that temporary hires provide a means of handling a scarcity of skilled personnel in the labour market. Expertise shortages can be related in part to workers whose capabilities are in demand opting for forms of affiliation (temporary work agencies and one-person businesses) other than direct employment in the supplier companies.

Employee participation

The introduction of the three-player model in drilling/well service seems to have contributed to strengthening participation by employee representatives (safety delegates) in terms of collaboration across organisational interfaces. However, it appears that safety delegates are experiencing a number of challenges in local bilateral collaboration with their employer. They find that they are less involved in cases affecting the safety service's areas of responsibility. That applies particularly to early involvement in change processes and the introduction of new operational models as well as the use of contract personnel. In addition, safety delegates find that the companies are less active in following up cases being addressed and that insufficient time is being allocated to safety work. Furthermore, big differences are said to exist between the operator companies over the extent to which they involve safety delegates at contractor companies (in coordinating working environment committees (K-AMU), for example, and PSA audits).

Safety delegates also find they face challenges in looking after temporary hires. This appears to reflect uncertainties about their responsibility for temporary hires in supplier companies and to the fact that temporary hires seldom contact the delegates.

Several indications suggest that *direct* employee participation has been weakened. Employees find that managers are less willing to listen to concerns and suggestions for improvement.

Consequences for the working environment and safety

Changes to operational models and organisational adjustments by the supplier companies have been significant for a number of factors related to the organisational, psychosocial and physical working environment. Organisational and psychosocial factors include increased workloads, greater pressure of time, less employee control of their own work, a higher work tempo, the need to pay attention to several simultaneous tasks (in part as a consequence of more jobs and uncertainties related to replaced/new personnel) and a limited degree of expertise-enhancing measures when allocating new assignments.

Moving jobs to land-based operational centres, combined with downsizing offshore, has increased workloads for certain skill categories – particularly in drilling/well service (cementers, for example). The extra work burden can be related partly to a weakening in skilled expertise on board, and finds expression in increased use of overtime and broken shifts (waking at night).

Employees also find that social integration has been weakened by more transitory work relationships (temporary hires and unfamiliar personnel from expertise pools). However, indications are that use of the three-player model has helped to promote social integration across companies.

Among physical working environment factors, indications suggest challenges concerning ergonomics and exposure to noise and vibration.

A number of factors related to the organisational and physical working environment may contribute to increased risk of errors (faulty decisions, slip-ups and forgetfulness) and the associated risk of both personal injuries and major accidents. Some of these factors could also reasonably be assumed to have implications for risk related to worker health.

Where major accident risk and loss of well control are concerned, indications suggest several conditions which could undermine robustness. In addition to working environment

factors which may increase the likelihood of making errors (see above), this includes weaknesses related to communication between offshore personnel and operation centres on land (technical reliability, poorer information exchange, misunderstandings), less skilled expertise as a result of downsizing and cross-training, and weakening of facility-specific expertise from using expertise pools and temporary hires.

2.2 M&M and ISS

Contractual terms

Contract forms have not caused significant changes for M&M and ISS suppliers. The biggest impact is a result of most contracts having been renegotiated following the 2013-14 slump in oil prices, in circumstances where suppliers appear to have accepted poorer terms and earnings.

A change has occurred in the use of compensation formats, from unit prices based on time taken towards such prices being based on a normalised time for a defined delivery (building a certain number of cubic metres of scaffolding, so many running metres of pipe coated or square metres of surface treated, and so forth).

Variations appear to exist between operator companies in the way contracts are practised and over their attitude towards suppliers being given sensible terms and financial results.

Nevertheless, these differences appear to have narrowed over the past couple of years since full capacity utilisation now prevails – particularly for M&M suppliers. All operator companies are therefore devoting more attention to a long-term approach, dialogue and integration.

Operation and collaboration models

The transition to campaign maintenance on the facilities has led to substantial changes in organisation, management and operational practice at M&M suppliers. They have a commitment to deliver, without a concomitant commitment to purchase for the operator

companies. Where the suppliers are concerned, this means less predictability in assignments and more extensive competitive tendering for them.

Permanent manning is being reduced to a minimum, and the level of personnel is dictated by maintenance activities and campaigns. Increased temporary hiring is necessitated by variations in manning levels (numerical flexibility).

Shortages of skilled workers in the Scandinavian labour market have created a need to recruit/hire personnel from other parts of Europe. This has contributed to communication challenges with workers unable to speak either English or a Scandinavian language. Varying levels of familiarity with conventions in the Nordic labour market and the offshore sector also appear to be adding to communication difficulties.

A growing problem is that personnel from temporary work agencies have part-time jobs with several of these, and can during their free period in one company take work in another with only a few days of rest between assignments.

The reduced status of ISS trades also presents recruitment challenges.

Temporary hire/forms of affiliation

Increased use of campaign maintenance and reduced predictability have prompted M&M contractors to make greater use of temporary hires, with reduced facility-specific expertise as a result. Employees are fearful of a rise in the number of errors and undesirable incidents.

Where ISS suppliers are concerned, more use of unit rates and less predictability have increased reliance on temporary hires, with reduced facility-specific expertise as a result. A danger exists that such personnel may be inadequately rested, since they have frequent spells of work without rest periods of sufficient length through holding part-time jobs with several temporary work agencies. Employees are fearful of a rise in the number of errors and undesirable incidents.

Employee participation

A widespread perception among safety delegates in both ISS and M&M sectors is that their collaboration across different companies functions well. The majority of workers are satisfied with the job done by the delegates.

Indications are that challenges exist in relation to resources for safety delegate work, taking care of campaign personnel and temporary hires, and general involvement with and influence on cases falling within their area of responsibility. One example is a failure to involve delegates in all cases which have/could have implications for HSE. This appears to apply particularly to the preparatory stages which determine the basis of employees' working environment. A case in point is the lack of involvement by safety delegates in tendering processes.

Resources allocated for safety work appear to vary from company to company. Those who feel that insufficient resources are being provided relate this to the company's compensation agreements with the operator companies.

Findings indicate that some safety delegates feel they have too little time for performing the duties of their office, but this does not seem to be a widespread challenge.

Challenges in following up temporary hires relate to ignorance of the safety delegate system among foreign hires, uncertainty by delegates about how far the supplier company's delegate system can represent contract personnel, and more transitory relationships between delegates and temporary hires.

Where *direct* employee participation is concerned, indications are that personnel in the ISS trades feel they have become more involved and have greater opportunities to exert influence than before. In the M&M sector, however, the trend here has been negative.

It is possible to interpret challenges related to involvement and resources for safety work as implications of the adaptations made by supplier companies to changes in their contractual terms, but findings from the study do not provide a sufficient empirical basis for deducing such a relationship.

Consequences for the working environment and safety

Clear indications are that the use of unit rates, campaign-based maintenance and manning practices at the supplier companies have been significant for several working environment factors at the operational level, with pressure of time and stress rising and ISS employees working more overtime. Inadequate training in and customisation of the work, particularly for temporary hires, have been reported, along with a degraded social environment (more transitory relationships) because greater use is being made of temporary hires. Pressure of time give rise to unfavourable work postures because the right lifting equipment is not being used.

These conditions could contribute to increased risk of both personal injury and major accidents as a result of regulatory breaches and making errors (faulty decisions, slip-ups and forgetfulness). A number of these factors will also have implications for occupational health risk.

It is acknowledged that a substantial number of major accidents are related to maintenance. The RNNP has demonstrated reduced reliability in a number of barriers over several years. Given the way maintenance is organised, the possibility that the reliability of barrier elements may be reduced cannot be excluded. However, the study does not provide a sufficient empirical basis for deducing such a relationship with certainty.

Where major accident risk is concerned, it has also been argued that temporary hires who have short work periods because of unpredictability (particularly for the ISS trades) must be expected to seek compensation through a larger number of such sessions. That increases their helicopter flight hours above the level corresponding to a full work-year with a fixed rotation of two weeks on/four off. This means that exposure to helicopter risk could rise substantially for the employees concerned.

12 Conclusions

This chapter provides an aggregation of the study's findings and discussions related to the main research questions. Drilling operations plus drilling/well services and M&M plus ISS will be treated in separate sub-chapters.

12.1 Drilling and drilling/well service

12.1.1. What significance do the new contractual forms and operational models have for the supplier companies with regard to organisation, strategic, tactical and operational management, and operational practice?

The significance of new contractual terms and collaboration models for supplier companies with regard to organisation, strategic, tactical and operational management, and operational practice is discussed in sections 11.1, 11.3.1 and 11.4.1.

Contractual forms and contract formation

Regardless of contract type (relational or alliance), negotiating them is based on various forms of "three-player" model between operator, drilling contractor and drilling/well service provider, with the suppliers having turnkey responsibility for the deliveries. Both alliance and the more traditional relational contracts specify detailed requirements for cost allocation and compensation format (financial domain), operational models (enterprise-model domain) and contract follow-up (jurisprudence domain).

Key findings related to contractual requirements include the following.

- Increased use of prescriptive requirements with regard to operational models related to such aspects as:
 - use of IO models
 - work processes and division of labour (roles)
 - manning
 - expertise requirements
 - interaction between operator and supplier.
- Transfer of assignments and associated cost risk to the suppliers.

- Increased cost risk related to downtime (because of delays at sub-suppliers:
 - deductions from day rates related to downtime
 - deductions from day rates because expertise is unavailable.
- Incentive schemes/performance-based compensation formats are relatively more significant for supplier compensation.
- Use of key performance indicators (KPIs) as a basis for performance-based compensation.
- Changes to threshold values for performance-based compensation.
- Variations between contracts with different operator companies relating to the use of incentive schemes, performance indicators and division of cost risk.
- Operators with a contract strategy based on the alliance type appear to take a larger share of the cost risk.

Fairly substantial differences exist between the various operator companies with regard to the division of cost risk, use of incentive schemes/performance-based compensation formats, and coupling to KPIs.

A number of drilling contracts were renegotiated in the wake of the 2014 oil price slump. Low demand in the market helped to strengthen the negotiating power of the operator companies. Contracts entered into run for up to 15-20 years. However, the suppliers lack a work guarantee and are dependent on the operator companies' activity plans.

Negotiating power in contract formation differs between operators. That can be related to the player picture on the NCS, with a trend towards monopsony.

Organisational adaptations by suppliers

Changes in contractual terms have led to organisational adaptations at the suppliers. These include the following.

- Strengthening tactical management on land as a result of increased responsibility for administering, paying for and coordinating deliveries from sub-suppliers.

- Strengthening capacity related to the operator's contract follow-up, including handling issues of commercial law.
- An emphasis on meeting KPI targets when exercising management at strategic, tactical and operational levels, because incentive schemes/performance-based compensation have relatively greater significance for company earnings.
- Optimising maintenance as a result of changes in operating models and handling cost risk.
- Optimising manning and expertise management with regard to handing new assignments, operator company requirements for expertise and reducing cost risk:
 - periodic upsizing and downsizing processes
 - increased use of internal expertise pools and transferring skilled personnel between assignments
 - use of temporary hires
 - giving increased emphasis to on-the-job training for new skilled personnel
 - a restrictive strategy for activities to enhance employee expertise.

Activities at the operational level

The introduction of new operational (enterprise) models has meant:

- closer collaboration between operator and supplier in planning processes
- closer collaboration between drilling operations and drilling/well service
- realisation of economies of scale (central planning entity at some operators)
- transferring assignments to land
- changing the division of labour offshore between job categories across drilling and drilling/well service
 - need for multiskilling/cross-training
- establishing operation centres on land
- reduced manning offshore
- more efficient drilling operations (time).

The changes imposed by the operational models on executing personnel have presented challenges related to:

- availability of expertise on board to avoid making errors and being able to handle undesirable incidents
- handling workload
 - amount of work in relation to manning
 - division of labour with regard to expertise basis
 - incompatible assignments (cannot do two different jobs at once)
- high work tempo (with the risk of making errors)
- high workload for personnel
- pressure of time
 - new work processes and associated workload
 - types of KPIs and method of communicating them
 - coupling between micro-KPIs and incentive schemes/performance-based compensation formats
- allocation of time for inspection and ongoing equipment maintenance
- interaction with operation centres on land
 - poorer information sharing through a lack of daily face-to-face dialogue in different collaboration arenas
 - quality of connection to land
- overtime use and opportunities for restitution.

Adaptations by supplier companies to new contractual terms have presented operational personnel with challenges related to:

- new personnel on board (temporary hires or from expertise pools)
 - more tasks related to training and familiarisation
 - poorly harmonised drilling teams and reduced operational efficiency
 - lack of expertise among new personnel on board
- interaction with operation centres on land
 - personnel at the centres lack offshore experience (expertise support and risk of misunderstandings)
 - employees at centres who work with several rigs simultaneously (risk of misunderstandings)

- using personnel without Norwegian/English skills and experience from the NCS (risk of misunderstanding and errors).

To meet challenges related to new operational models and supplier adaptations, indications are that operational personnel adopt various adaptation strategies to meet requirements for efficiency and safety. These may include:

- doing work which belongs to roles/positions held by new personnel on board who lack the ability to do the job (on the basis of assessments made on board)
- deprioritising work which does not affect KPIs tied to the incentive system
- under-reporting costs which might have a negative effect on KPIs tied to the incentive system and could thereby lead to possible deductions from day rates
- regulatory breaches and workarounds (temporary solutions to problems) in order to handle the volume of work
 - deprioritising operational preparations
 - deprioritising planning for intended changes
 - postponing ongoing maintenance
 - deprioritising inspections (dropped objects, for example)
 - postponing repairs of damaged equipment

12.1.2 How do demands for cost savings and changes to organisation/contractual terms affect the need for looser forms of affiliation?

Optimisation of manning and expertise management appears to be an adaptive strategy at the supplier companies for handling contractual terms related to operational models, compensation schemes and the distribution of cost risk, contract follow-up, and changes to the portfolio of assignments (section 11.1.2). Key features of supplier company manning and expertise strategies appear to include various combinations of:

- using temporary hires for adapting to the portfolio of assignments, possibly in combination with periodic downsizing and upsizing processes (numerical flexibility)
- using temporary hires for adapting to new expertise requirements resulting from the division of responsibility between operator and supplier, and to new operational models (functional flexibility)

- using temporary hires as a means of handling shortages of skilled personnel in the labour market.

From an overall perspective, the methods used by the supplier companies to obtain numerical flexibility (using temporary hires and periodic down- and upsizing processes) appear to help strengthen shortages of relevant expertise among job-seekers in the labour market. Such shortages can be related to the way employees handle greater job insecurity (resulting from periodic downsizing and upsizing processes and the use of temporary hires) by seeking employment with temporary work agencies or in other business areas or industries. That appears to help reinforce the dependence of suppliers on using temporary hires.

12.1.3 What consequences do contractual terms and new enterprise models have for employee participation?

Where representative participation through the safety delegate service is concerned, findings suggest that collaboration between delegates across supplier companies has been strengthened. This can possibly be attributed to the introduction of various forms of three-player models, which both brings shared challenges to the fore and supports opportunities for collaboration. However, the safety delegates appear to experience challenges related to:

- involvement in and influence on cases affecting the safety delegate service's areas of responsibility
- time for safety work
- taking care of temporary hires.

Where involvement is concerned, claims are made that cases raised by safety delegates do not always get followed up by the companies. Reference has also been made to delegates being little involved in connection with using temporary hires. Big differences are said to exist between the operator companies over the extent to which they involve safety delegates at the contractor companies (in the AMU, for example, and in connection with PSA audits).

Indications are that safety delegates find they have little time to follow up safety cases. This appears to be related to increased assignments and workloads, in part as a consequence of changes to operational models and the emphasis on progress in drilling operations. Reference is also made to the companies providing limited funds for safety work, and that such activities must be conducted in the delegates' own time.

Challenges related to taking care of and involving temporary hires can be related to:

- no on-site safety delegate from their own company/agency
- lack of clarity about which safety delegate in the hiring company is responsible for the temporary hires
- transitory work relationships
- temporary hires seldom contacting the safety delegates.

The challenges related to sufficient time for safety work can perhaps be regarded as a consequence of changed operational models. Where looking after temporary hires is concerned, the challenge can be related to the organisational adaptations made by the supplier companies in respect of contractual terms and the labour market. However, the empirical basis for this study is insufficient to conclude whether and to what extent the challenges associated with involvement and influence relate to changes in enterprise models and/or supplier company adaptations.

Indications are that *direct* employee participation has been weakened. This finds expression in employees experiencing that managers are less attentive than before to expressions of concern and proposals for improvements. It also appears that changes in the direction of more decisions being taken by the land organisation have contributed to reducing the latitude for direct participation on board.

Findings could suggest more employees feel that displaying a concern for HSE is a career disadvantage, and some verge on expressing a feeling of powerlessness. A reasonable assumption is that such conditions could help to reduce employee motivation to seek participation.

The findings related to bipartite collaboration in this study coincide with those in another recent survey commissioned by the Ministry of Labour and Social Inclusion, which notes that such interaction has been weakened.

12.1.4 Consequences for working environment risk

There are indications that employee adaptation to new operational models (including organisational adaptations by the supplier companies) is significant for a number of factors related to the organisational, psychosocial and physical working environment. Where organisational and psychosocial factors are concerned, these include:

- more demanding job requirements as a consequence of such aspects as new work composition and new types of assignments, a higher work tempo, and a greater need to concentrate because of crew changes
- less control over own work (tempo, prioritising tasks)
- increased workload (number of assignments, working time, time for restitution)
- increased pressure of time
- limited degree of expertise-enhancing measures when being allocated to new tasks
- weakened social integration because of more transitory work relationships (use of temporary hires and unfamiliar personnel from the expertise pool).

Among physical working environment factors, indications suggest challenges related to:

- ergonomics (working posture, work tempo, access opportunities, use of damaged or unsuitable equipment)
- exposure to noise and vibration (longer exposure times and lack of equipment upgrading/improvement).

Several of these conditions could help to enhance the risk of error (faulty decisions, slip-ups and forgetfulness) and the associated risk of both personal injuries and major accidents. A number of them will also have implications for risk associated with occupational health.

12.1.5 Consequences for major accident risk

The significance of the implications of contractual and collaboration conditions for major accident risk in connection with drilling and drilling/well service operations is discussed in section 11.4.1. Work operations and activities in drilling and drilling/well service exercise direct influence on well control and the robustness and quality of well barriers, and thereby decisive influence on the risk of losing well control (including blowout risk), which in turn has a big effect on personal and environmental risk in the event of a blowout. They also have a crucial influence on field economics. The RNNP report reveals a clear potential for risk reduction related to well-control incidents, but the trend for the frequency of such events has been constant for more than 10 years.

Personnel in drilling operations and drilling/well service observe the operator's overall governing documentation for safety, the working environment and emergency preparedness, but also have separate governing documentation for their discipline areas. This means that significant parts of operational safety for drilling/well operations depend to a great extent on the qualifications and expertise of the personnel in their own disciplines.

The findings of the study discussed in section 11.4.1 are therefore crucial for controlling risk related to drilling operations and drilling/well service activities. Clear indications suggest weakened capacity and expertise in the drilling and drilling/well service disciplines which could be significant for major accident risk related to well incidents. The interviews refer to a number of conditions which could weaken robustness, such as uncertainty and concern related to equipment controlled from land, lack of continuity in execution, reduced facility-specific expertise as a result of hiring temporaries, reduced ability to avoid undesirable incidents, an excessive concentration on penalties (in other words, negative bonus) in the event of undesirable incidents, challenges with cross-training, reduced specialist expertise, increased pressure of work and responsibility, and using KPIs as the basis for financial penalties. These conditions relate primarily to the companies utilising One Team contracts, including the IO collaboration model.

Weakened robustness could in the longer term mean greater risk for loss of well control and blowouts. In that context, findings from the study are serious – and particularly so in a regulatory regime which emphasises continuous improvement.

It seems that the One Team contracts (including the IO collaboration model) have purely negative effects where major accident risk is concerned. The alternative is alliance contracts, where one company in particular earns plaudits from a number of commentators for creating a good climate of collaboration and high-quality drilling and drilling/well service operations. Some people have pointed to improved collaboration between operator and drilling contractor with the One Team contracts, but this is not considered to outweigh the negative aspects.

12.2 M&M and ISS

12.2.1 What significance do the new contractual forms and operational models have for the supplier companies with regard to organisation, strategic, tactical and operational management, and operational practice?

Contractual forms and contract formation

The significance of contractual terms and collaboration models is discussed in section 11.2. The following conclusions can be drawn.

Contract forms have not resulted in significant changes for M&M and ISS suppliers. The biggest impact is attributable to the renegotiation of most contracts in the period after the oil price slump in 2013-14, a time when suppliers accepted poorer terms and reduced earnings.

There seems to have been a shift in the industry towards greater utilisation of basing unit prices on the normalised time taken for a defined type of work, compared with the use of hour by hour.

Variations appear to exist between operator companies in the way contracts are practised and over their attitude towards suppliers being given sensible terms and financial results.

- One operator company earns plaudits for creating a good climate of collaboration and sensible terms.

- Another is highlighted as an example of the opposite, where attention appears to be concentrated on following up contractual terms which help to limit contractor earnings.
- The differences appear to have narrowed over the past couple of years thanks to full capacity utilisation, particularly for M&M suppliers. All the operator companies are therefore more concerned with a long-term approach and integration.

Where M&M suppliers are concerned, the transition to campaign maintenance on the facilities has led to substantial changes in organisation, management and operational practice, with such consequences as:

- less predictability
- more competitive tendering for work
- commitment to deliver, without a concomitant commitment to purchase for the operator companies
- reduced permanent workforce, level of manning governed by activities/campaigns
- increased use of temporary hires
- reduced facility-specific expertise since the number of permanent personnel on the facilities has been cut.

The ISS suppliers have seen a substantial increase in the use of unit rates, with such consequences as:

- less predictability
- increased pressure on costs
- more temporary hires
- more communication problems with personnel who speak neither English nor a Scandinavian language
- a growing problem with personnel from temporary work agencies having part-time jobs with several of these, and being able during their free period in one company to take work in another with only a few days of rest between assignments.
- increasing challenges with recruitment because of reduced status.

A clear perception prevails that the threat of errors and undesirable incidents is growing:

- facility-specific expertise in particular is being substantially weakened through increased use of temporary hires
- cost pressures mean that people take short cuts, which increases risk.

Considerable concern prevails among personnel in M&M and ISS trades working on the facilities that errors and accidents could rise with increased use of temporary hires.

12.2.2 How do demands for cost savings and changes to organisation/contractual terms affect the need for looser forms of affiliation?

These aspects are discussed in section 11.2. The following conclusions can be drawn:

- Where M&M contractors are concerned, increased use of campaign maintenance and reduced predictability have led to greater utilisation of temporary hires, with such consequences as:
 - reduced facility-specific expertise
 - fears of an increase in the threat of errors and undesirable incidents.
- Where ISO contractors are concerned, increased use of unit rates and reduced predictability have led to greater utilisation of temporary hires, with such consequences as:
 - reduced facility-specific expertise
 - personnel have frequent work sessions without rest periods of adequate length if they hold part-time jobs with different temporary work agencies
 - fears of an increase in the threat of errors and undesirable incidents.

12.2.3 What consequences do contractual terms and new enterprise models have for employee participation?

The study reveals a widespread perception among safety delegates in both ISS and M&M trades that collaboration between delegates from different companies functions well.

Furthermore, the studies show that the majority of employees are happy with the work of the delegates.

However, indications suggest some challenges. These include:

- involvement in and exerting influence on cases affecting the safety delegate service's areas of responsibility
- resources for safety work
- taking care of campaign personnel
- taking care of temporary hires.

Indications suggest that safety delegates are not involved in all cases which have/could have implications for HSE. This appears to apply particularly to the preparatory stages which determine the basis of employees' working environment. A case in point is the lack of involvement by safety delegates in tendering processes.

Resources allocated for safety work appear to vary between the companies. Those who feel that insufficient resources are allocated relate this to the company's compensation agreement with the operator companies.

Findings indicate that safety delegates find they have too little time available to perform their duties, but this does not appear to be a widespread challenge.

Discharging safety duties comes across as particularly challenging in connection with campaign maintenance, as a consequence of more transitory relationships between safety delegates and campaign personnel.

Challenges faced in following up temporary hires relate to:

- knowledge of the safety delegate system among foreign employees
- uncertainty among safety delegates about the extent to which the supplier company's safety delegate service can represent temporary hires
- transitory relationships between safety delegates and temporary hires.

Where *direct* employee participation is concerned, indications are that personnel in the ISS trades find they have become more involved and have greater opportunities to exercise influence than before. However, opportunities for participation in the M&M sector are showing a negative trend.

The ability of safety delegates to look after campaign personnel and temporary hires can be seen as direct and indirect implications respectively of the enterprise models.

It is possible to interpret the challenges related to involvement in and resources for safety work as implications of the supplier companies' adaptation to changes in contractual terms, but the findings from the study do not provide a sufficient empirical basis for deducing such a connection.

12.2.4 Consequences for working environment risk

Clear indications are that the use of unit rates, campaign-based maintenance and manning practice at the supplier companies have been significant for several working environment factors at the operational level:

- pressure of time and stress
- working time, particularly the burden imposed by increased use of overtime for ISS employees
- a poor social environment (more transient relationships) resulting from increased use of temporary hires
- unfavourable work postures because the right lifting equipment is not being used as a result of time pressures.

These conditions could contribute to increased risk of both personal injury and major accidents as a result of regulatory breaches and errors (faulty decisions, slip-ups and forgetfulness). A number of these factors will also have implications for occupational health risk.

12.2.5 Consequences for major accident risk

The significance of the implications of contractual and collaboration conditions for major accident risk is discussed in section 11.4.2, where a substantial number of major accidents are shown to be related to maintenance. RNNP reports have identified reduced reliability in a number of barriers in recent years. See section 5.5. The possibility that reduced reliability of barrier elements could be a consequence of the way maintenance is organised cannot be

excluded, but the study does not provide a sufficient empirical basis for deducing that with certainty.

Where major accident risk is concerned, it has also been argued that temporary hires who have short work periods because of unpredictability (particularly for the ISS trades) must be expected to seek compensation through a larger number of such sessions. That increases their helicopter flight hours above the level corresponding to a full work-year with a fixed rotation of two weeks on/four off. This means that exposure to helicopter risk could rise substantially for the employees concerned.

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