Selection, Training and Development processes to support effective supervisor safety behaviour within the UK Oil & Gas industry

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The main research question for this study was;

"What are the key processes for selection, training and development to support effective supervisor safety behaviour within the UK Oil & Gas industry?"

Cross-Industry studies show that effective safety behaviours by offshore supervisors and their ability to instil such behaviours in their subordinates are both of critical importance for safety climate and accident risk. However, research in the UK oil & gas industry has tended to be narrowly focused on single case studies, especially on the importance of leadership styles, and does not look at the processes in developing effective supervisor behaviours.

A questionnaire to Health and Safety professionals in the UK Oil & Gas industry explored how selection, training and development processes were used. The response rate was 66% (60 responses). The results identified a number of common weaknesses where organisations: fail to define supervision clearly; select supervisors for their technical rather than their non-technical skills (e.g. communication, leadership); provide insufficient training for the role; and do not provide a clear model of desired supervisory behaviour. The organisation's expectations of safety behaviours by supervisor are often not documented, discussed or communicated to the supervisors, and the appraisal process provides inadequate feedback to the supervisor on their safety behaviour.

This study was the first to investigate the core processes used by UK Oil & Gas organisations to: specify the supervisor's role; to select, train and develop supervisors; and to set clear models for effective safety behaviour.

Keywords: Supervisor, safety, behaviours, training.

Introduction and background

This paper is based on a research project and previous development of a supervisor behaviour booklet by the author. The original report was 80 pages long, this paper therefore presents a summary and provides only key or selected references.

Over forty years ago Heinrich (1959, p.22) advised, *"The supervisor or foreman is the key man in industrial accident prevention. His application of the art of supervision to the control of worker performance is the factor of greatest influence in successful accident prevention."* Since then a range of studies have sought to measure the contribution made by supervisors in determining organisational safety outcomes but have generally concentrated on the nature and quality of the interpersonal relationship between supervisors and subordinates and the impact that this has on subordinates' commitment, motivation, carefulness as well as "mindfulness" as in high reliability organisations. One widely-accepted definition of a supervisor is as*; "...the shop-floor face of the organisation, the filter or lens through which management messages and attitudes are transmitted to the workforce and views and feedback from the shop-floor passed back up to line management"* (Lardner and Miles, 1998).

The importance of involving personnel at all levels in implementing the safety management system was emphasised by Lord Cullen in the Piper Alpha public inquiry (Cullen 1990), as detailed in the quote below;

> *"The first-line supervisors are a key link in achieving that as each is personally responsible for ensuring that all employees, whether the company's own or contractors are trained to and do work safely and that they not only know how to perform their jobs safely but are convinced that they have a responsibility to do so. " (Cullen 1990, p. 300-301).*

Supervisors have a significant role in the implementation of the safety management system (SMS) and HSE guidance "Successful health and safety management" (HSE 1997) describes the role of the supervisor in ensuring that the health and safety policy is effectively implemented by ensuring the provision of "information, instruction and training to employees".

Often the role of the supervisor is not well enough defined. Moreover, supervisors are increasingly delegated tasks from management that take them away from the shop floor, e.g. the use of electronic Permit to Work (PTW) systems, e-mails and electronic reporting. Effective supervisors would be able to discharge these administrative duties without diluting their leadership activities. Again, HSE guidance on human factors state; "supervision remains a critical organisational factor and its importance should be duly and proportionately reflected within an organisation's safety management system" (HSE 2011).

Supervision, or lack of adequate supervision, is often cited as a possible root cause in accident investigations, with common statements such as "inadequate supervision", or "supervisor condoned unsafe behaviour", Heinrich (1959), Wilson and Clyde v English (1937), Ward *et al* (2004). Also, the Oil and Gas Producers (OGP) report No 455 (OGP 2011) refers to "inadequate supervision" as one of the main root causes of fatalities and high potential incidents (see Table 1). Equally "inadequate supervision" is likely responsible for other root causes listed (Table 1) e.g. "inadequate hazard identification" or "risk assessment", as supervisors are often responsible for task risk assessments, permit to work and tool box talks as part of identifying hazards and controlling subordinates work. Larkin (2012) presented a direct correlation of supervisor tool box safety talks and serious incidents showing 65% of events could have been avoided by the implementation of better tool box safety talks.

Table 1: OGP safety performance indicators 2010, (Hi Po = High Potential incident)

	Causal factor assigned for Incidents 2010	Fatalities	Hi Po
	Inadequate hazard identification or risk assessment	30	47
	Inadequate supervision	18	31
	Improper position (line of fire)	16	
	Lack of awareness / improper decision-making or judgement	14	23
	Inadequate training / competence	13	22
	Procedure violation - intentional	12	
	Procedure violation - un intentional	12	27
	Inadequate communication	12	19
	Inadequate work standards/ procedures	10	37
	Inadequate design / specification / MoC	10	19
	Inadequate maintenance / inspection / testing		21
	totals	147	246

Source: OGP Safety Performance Indicators 2010 (May 2011)

The Confederation of British Industry (CBI, 2005) adduces evidence that some companies had insufficient strategies for developing supervisors and lacked commitment to provide resources to implement these strategies. Support is crucial, as supervisors are often selected on the basis of technical skills and not supervisor competency (Adair 2004). It is noteworthy that managers are often "day creatures" whereby supervisors often work shifts which makes support more challenging and can increase shift communication issues. As discussed by Bergh (2011) sub–safety climates may exist between shift workers and daytime workers, therefore supervisors will be in a more effective position to influence safety climate with their fellow shift workers.

This paper focuses on the UK offshore oil & gas industry in order to investigate the processes in developing positive supervisor safety behaviour. This topic was chosen as this is a high hazard industry where supervisors have to make critical decisions with serious implications for all persons on board the installation.

The industry lacks specific research into the selection, training and development processes that support effective supervisor safety behaviour. The research already carried out does not look at the clarity of the supervisor's role within an organisation, recruitment and selection of supervisors, training and coaching, setting documented supervisor safety behaviour models and effective appraisal systems. The majority of studies focus on a small group of installations and supervisor behaviour from the view of either managers or subordinates e.g Fleming (2000). One study revealed "that a number of the supervisor behaviours had a significant impact on subordinate safety behaviour" and that "confirmed the importance of the first line supervisor in the management of safety", Fleming (2001).

Fleming and Lardner (2002) analysed a number of key studies that looked at supervisor behaviours in Manufacturing, Railway, Offshore oil industry, Construction, Road Maintenance and Coal Mining. These studies identified attitudes and behaviours that differentiate effective and less effective supervisors in managing safety. They also linked these behaviours to the reduction in accident involvement and state that *"these studies have recommended behaviours and actions that supervisors should adopt to reduce accident involvement".*

Lee et al (2007) state that supervisor selection is often based on their trade skills rather than leadership skills. Their credibility with the workforce is cited as one major factor. However, Stein suggested that the selection, hiring and promotion practices for supervisors should incorporate a requirement to look for "specific leadership traits, primarily transformational leadership, in order to foster the current safety culture, attitudes and attributes" Stein (2009).

Fleming (2001) identified a number of implications for the development of supervisor training programs including the interpersonal aspects of supervisor safety management need to be addressed i.e. programs should be practical as opposed to knowledge based, and should focus on the development of positive relationships with subordinates. For example the CBI commented favourably on the supervisor health and safety training given at BP Oil Grangemouth Refinery, CBI (2005 p39). This training included leadership skills, safety and loss training, permit to work courses as well as various specialised courses. Fleming also confirmed the importance of the first line supervisor in the management of safety offshore and the importance of the interpersonal relationship between supervisors and their subordinates (Fleming 2001).

There is limited research available regarding specific supervisor behaviour models. One example of a supervisor behaviour model was pioneered by Wood Group Engineering in conjunction with the Keil Centre (Novatsis *et al* 2010, Hayes *et al* 2007, Lardner *et al* 2011).

Flin et al noted that 360 degree appraisals are widely used in assessment of business performance (Flin et al 2002) but found that this process did not generally include supervision. Another example of a process used by many oil and gas organisations is "The Just

Culture" Model (e.g. Hudson et al 2008). Again this process could be extended to identify when supervisors know of or condone unsafe behaviour or when they have themselves violated procedures.

In summary, the hypothesis developed from the review was that many organisations do not clearly identify the role of supervision, select supervisors due to their technical skills without considering leadership or other non-technical skills, provided insufficient training for the role and do not provide a clear behaviour model for supervisors to follow.

Research Approach

The research concentrated on compiling a structured set of questions for the purpose of analysing the processes in developing effective supervisor behaviours. Questionnaires were distributed by the researcher to appropriate organisations likely to employ supervisors in order to look at the processes within these organisations to develop effective supervisor safety behaviours.

In order to receive an effective response and data for the study, a questionnaire was sent to 91 Health and Safety professionals within the UK oil & gas industry. The sample group was identified within the 82 members of Step Change member organisations as this is the safety group set up within the industry body "Oil and Gas UK". Oil and Gas UK (OGUK) represents the oil and gas exploration and production companies as well as contractors and supply chain organisations. The sample group was further reduced to 62 as 20 of the organisations within Step Change do not have traditional supervisor positions. A total of 60 Health and Safety professionals responded to the questionnaire, a response rate of 66%. Due to the diverse geographical distribution of the organisations within the UK oil & gas industry a link to the online questionnaire "Survey Monkey" was sent via e-mail to the respondents. The high return rate from the responses (66 %) has been an endorsement of this decision and is similar to the response rate of returns as identified by Cox and Cheyne (2000), when carrying out a study on offshore safety culture. The sample group involving Health and Safety professionals was chosen, as they are thought likely to have an unbiased view on the supervisor processes and would most likely have exposure of "positive/negative" supervisor behaviours (and the reasons behind this behaviour) through offshore visits and their involvement in audits and incident investigations.

Questionnaires

The questions issued via the survey were designed to gather data for the following sections;

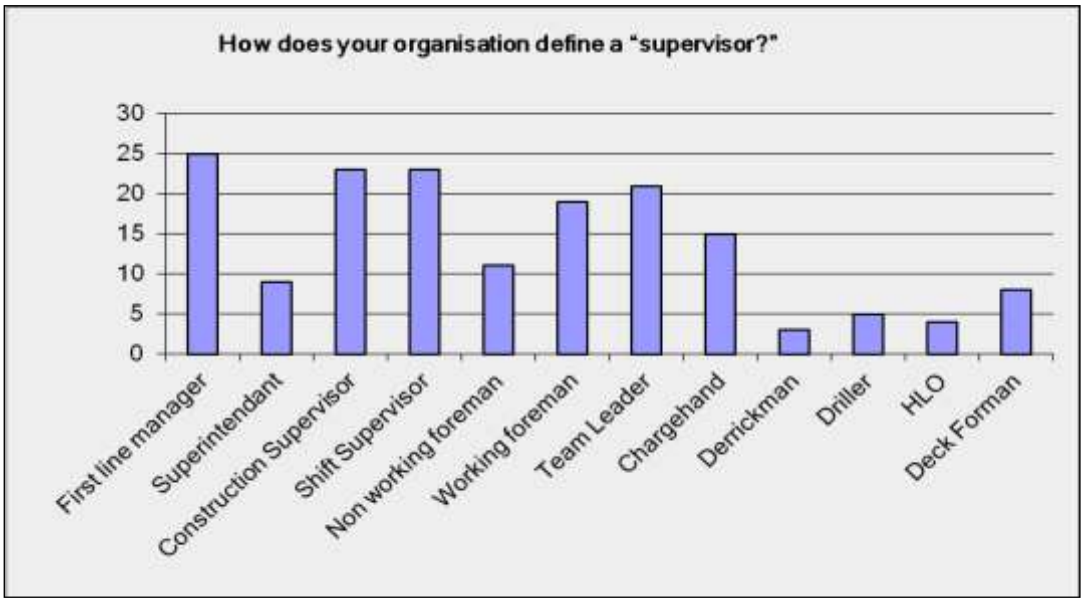
- What are the present processes in their organisation, contract or project, to determine if "supervision" is clearly defined i.e. organisation charts?
- What processes are set up to recruit and select supervisors?
- What training or coaching is given to supervisors?
- Has their organisation set behaviour models for supervisors, for supervisor involvement in developing the behaviour model, and how is the effectiveness measured?
- How are supervisors appraised?
- What improvements do they suggest to improve supervisor behaviours?

Results

From the data available, an approximate number of supervisory positions can be given although it is noted that a few respondents gave approximate or "greater than" answers. The data provided gave an overall total of approximately **11,178** supervisors.

Definition of a supervisor: In order to better understand the number of supervisors not included in organisation charts, the total number was examined for each organisation and analysed.

Graph 1- Definition of a supervisor



There are a large number of "supervisory" job titles within the UK oil & gas industry depending on the type of organisation. As mentioned in Table 1 inadequate supervision is one of the highest causal factors in fatalities and Hi Po (high potential) incidents (OGP 2011). However it appears from the study that approximately 13% of supervisors are not identified on company organisation charts and therefore may not be fully understood by the organisation. If this role is not understood it could further be argued that these supervisors may not be fully engaged in the training and competency system. As discussed by Flin et al (2000) it can be difficult to discern which level of management are being discussed (senior managers, plant managers, or supervisors) and if these roles are not clearly defined the supervisors role can be perceived differently by the workforce.

Supervisor recruitment

Graph 2 indicates that the highest criteria used by organisations are trade skills (86%), with 60% using leadership skills and 49% using Behaviours as a criterion.

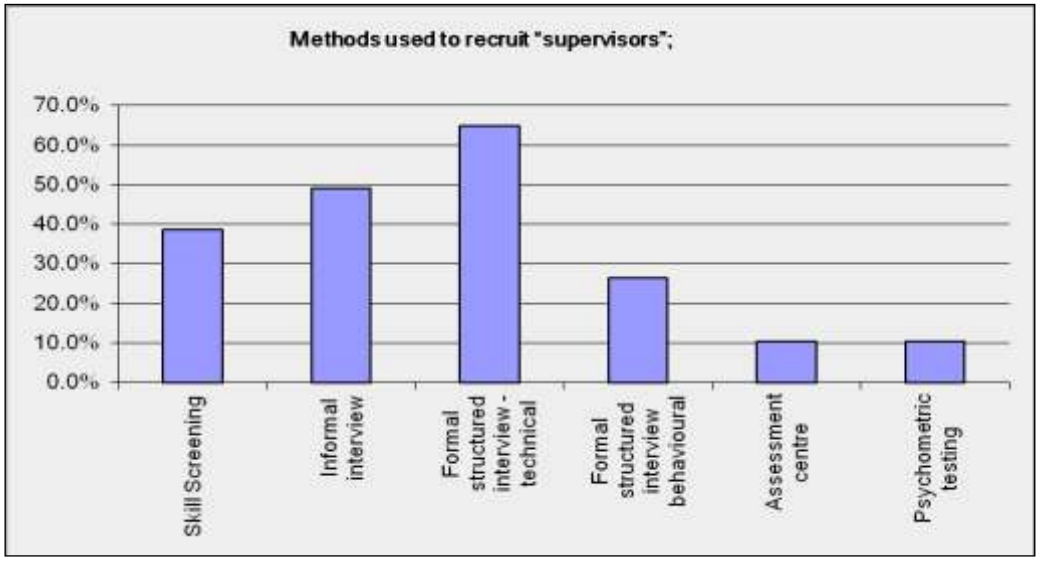
Graph 2 – Criteria for recruiting and selecting supervisors.

This data does not fully describe the organisations that use more than one criterion when selecting supervision; e.g. some organisations use all 3 methods detailed above. Organisations who appear to use all 3 critieria (trade skills, leadership and behaviours) sometimes use academic qualifications, with only one organisation using behaviours as a criterion. 28% of organisations use all 3 criteria (trade skills, leadership and behaviours) with 47% of these organisations using trade skills and leadership as criterion for selecting and recruiting supervisors. 28% of organisations appear to use trade skills as the only criterion for selecting and

recruiting supervisors, 3 organisations appear to use leadership as the only criterion for selecting and recruiting supervisors , leaving 4 organisations using Leadership and Behaviours as selection criteria.

The highest number of organisations (65%) used formal structured interview – technical, as the main method of recruiting supervisors (see Graph 3 below).

Graph 3 – Method used for recruiting supervisors.



The methods used for selection of supervisors again focus on the technical aspects with a "formal structured interview – technical" to be the most widely used. There appears to be a focus by the majority of organisations on the technical/trade skills as selection criteria and technical skills are used as the structure for a formal interview. It also seems to show that behaviours are used less widely as criteria for recruiting or promoting supervisors. When further analysing the data by looking at the type of organisation, it suggests that there are differing methods used for selecting supervisors. The main difference is between engineering and construction organisations which tend to use informal interviews above technical interview. Oil and gas operating organisations use technical interview as their main method.

Supervisor training and coaching

Table 2 - Training provided to supervisors.

What training does your organisation provide for "supervisors" (other than trade or technical skills)?		
Answer Options	**Response Percent**	**Response Count**
NEBOSH Certificate	1.9%	1
Certificate in Occupational H&S	0.0%	0
IOSH Managing Safely	18.9%	10
Supervisor Management Training and Development Course	30.2%	16
Internal (e.g. Advanced Safety Leadership)	17.0%	9
Accident Investigation	7.5%	4
Soft skills – (time management, interventions, communication skills, basic IT skills etc)	24.5%	13
Other (please specify)		14
	answered question	**53**
	skipped question	**7**

Supervisor Management Training and Development Course (SMTD) is used widely across the offshore oil and gas industry for supervisor training and as seen in Table 2, just over 30% of organisations use this training method, Other courses used are IOSH Managing Safety, internal courses and soft skills but it can be noted that Accident Investigation training and NEBOSH Certificate are not widely used, with only 7.5% of organisations providing accident investigation training and only one organisation educating supervisors to the NEBOSH Certificate level. As supervisors are often heavily involved in (or in some instances leading) accident

investigation, these companies have identified that it would be beneficial for supervisors to receive training especially in dealing with an incident, injured party, preserving the incident area and ensuring that it is made safe.

The study found that over half the organisations in the sample group had no systems in place to provide supervisors with coaching and mentoring. When looking at the data it appears that only 12% of supervisors receive any coaching and mentoring for their role. When the data is broken down into type of organisation oil and gas operating companies have the smallest percentage (61%) of supervisors who receive coaching and mentoring. This is quite surprising as these companies have a more stable work force than , for example engineering and construction which have a more transient workforce and can be affected by contractual changes.

Supervisor behaviours

The study found that 46% of the organisations taking part have a formal behaviour model for supervisors. The study found that oil and gas operating companies and production services companies have either not implemented or only partially implemented a behaviour model for supervision. Maintenance and drilling organisations have a behavioural standard that is almost fully implemented across the whole organisation. Manufacturing, engineering and construction organisations have partially implemented systems (73% and 60%) respectively.

When reviewing the supervisor input into the behaviour models previously discussed it is of note that only 8 out of 24 organisations, involved supervision when implementing the supervisor behaviour model. Only 12 % organisations have a fully implemented supervision behaviour model that had supervisor input that was communicated effectively, was measured and verified.

Supervisor appraisals

The study found that 70% of organisations had a probation period for new supervisors, with the majority of these organisations validating that probation period. The most common approaches for validating the probation period were appraisal and line manager feedback, mentors assessing training progress and feedback from colleagues. This would suggest that 55% of supervisors within the study group have no probation period to verify whether the supervisor is suitable for the role, whether they had received the required training and coaching and whether their behaviours are suitable for the organisation's requirements. The nominal probation period appeared to be 3 months with a performance review that was sometimes linked to a pay increase.

From analysis of the comments given by respondents in the open text question, a number of common themes emerged, e.g. a more detailed structure of the role of a supervisor within some organisations is required. This may support the literature review for the HSE by Ward, Brazier and Lancaster (2004) where they conclude that due to "changing work practices means that it is no longer so easy to identify the Supervisor". Many of the respondents suggested that effective training standards were required as a minimum and with further coaching/support later when the supervisor is established in their role. A number of respondents said that organisations should "set standards for expectations of supervision behaviour" and that this could form part of a formal appraisal process.

Discussion

The study identified a large number of "supervisory" job titles within the UK oil & gas industry, varying according to the type of organisation. It also found that approximately 13% of supervisors were not part of organisation charts. It could be argued that in turn the role of supervisor may not be fully understood by themselves, management or subordinates. Berman and Goodall (2011) found that supervisors within the National Grid lacked clarity on the company's expectations on key priorities and activities. The HSE Human Factors web page (HSE 2012), mention that supervision is an important "Performance Influencing Factor" in a number of major incidents, e.g. Texas City 2005 and Texaco Milford Haven 1994. The HSE also highlight that problems can occur because of poorly defined supervisory responsibilities, (HSE 2011).

In relation to the selection and recruitment of supervision, the study found that the majority of organisations use Trade skills (86%) as the main criterion with less than 50% of organisations focused on behaviours. It can be noted that many organisations use more than one criterion e.g. one organisation appeared to use all of the 3 criteria as well as academic qualifications. The methods used for recruitment of supervisors appear to focus on the technical aspects with a "formal structured interview – technical" being the most widely used. It is noted that behaviours are used less widely as criterion and as a method in recruiting or promoting supervisors. Further analysis, looking at the type of organisation reveals that there are differing methods used for selecting supervisors.

The main difference appears when looking at engineering and construction organisations which prefer informal interviews rather than technical interviews, whilst operating organisations use technical interviews as their main method.

The study found that the most popular training system is SMTD. This course is used by the main organisations in this study i.e. oil and gas operating companies and engineering and construction organisations. Note: the 2012 update of the SMTD course now includes accident investigation training, this would address the gap in this type of training found during the study. The subjects covered by SMTD also reinforce the conclusions from the Offshore Technology Report carried out for the HSE by Mearns et al (1997). This study suggested that supervisors need to be trained in key man-management skills related to leadership, communication, understanding and respect of others' opinions to improve their "effectiveness". A study commissioned by the HSE; *"RR156, Causal factors in construction accidents"*, found that very little evidence was found of any health and safety education for those at supervisory levels within the study, HSE (2003).

Although SMTD is beneficial and is often linked to the IOSH managing safety certificate there is no recognised qualification for supervision from SMTD. When looking out-with the UK, a good example can be found with the VOL-VCA system that has a "safety for operational supervisors SOS-SCC" diploma. This system has recognized qualifications through SCC examination centres across

the Netherlands and linked to qualifications in Belgium and Germany. In a number of Oil & Gas organisations, operating across the Netherlands, the VOL-VCA qualification is mandatory and is part of the personal safety log book.

The study found that approximately 1/3 of organisations had no system in place to measure how effective the courses were in delivering the required objectives. Therefore, they may have very little visibility on whether the training courses provided are effective in supporting supervisors in their role.

Over 50% of the organisations lack systems to provide supervisors with coaching and mentoring for their role. The breakdown of the data into type of organisation suggests that oil and gas operating companies have the smallest percentage (61%) of supervisors who receive coaching and mentoring regardless of their stable workforce. For example, engineering and construction may have a more transient workforce and can be affected by changes in contracts. There is a wide ranging difference in the system for coaching and mentoring with some very structured systems and others being ad hoc, with some organisation developing additional systems such as secondment, rotation of functions and stand in roles.

As discussed in the results section the data suggests that oil and gas operating companies and production service organisations have either not implemented or have only partially implemented a behaviour model for supervision. Only 6 organisations have a fully implemented behaviour model for supervision that was developed with supervisor input, that has been communicated effectively and that has been measured and verified. This is surprising as studies such as Ismail et al (2009) reinforce the importance of supervisor behaviours. This study said that training programmes must be focused on supervisor behaviour and communication in order to maximise the benefits of their support for the effectiveness of employee training programmes. Lardner (2011) analysed role specific safety behaviours in a study across six different offshore oil and gas installations in 2009 and found that the study demonstrated a strong relationship between the levels of role specific behaviours and occupational and process safety incident rates.

Despite the evidence provided by Ismail et al (2009) and Lardner (2011), there are a significant amount of organisations who have not fully implemented a behaviour model for supervision.

This study found that 55% of supervisors within the study group have no probation period to verify if the supervisor is suitable for the role, if they had received the required training and coaching and if their behaviours are suitable for the organisation's requirements. This aligns with the challenges faced by Carnagie (1998), where he faced an absence of dependable supervisory performance measures throughout his research as the companies surveyed were unable to produce valid or reliable appraisal data for supervisors. Of the organisations who had a probation period in place, 94% responded as having verified the process with the most common approaches for validating the probation period involved appraisals and line manager feedback, mentors assessing training progress and feedback from colleagues.

Conclusions

It is noted that there is limited research into supervisor development of safety behaviour in the context of this study and across the wider UK oil & gas industry. The literature sourced focused on one organisation or one offshore installation and did not fully look into the development of a supervisor but on the feedback from managers or subordinates on the supervisor's behaviour or competency, as seen in Mearns et al (2003). The oil & gas industry could look at other similar industry groups to see what they are implementing to support supervisor behaviours. An example of this is the Centre for Chemical Process safety (CCPS) who are considering the role of supervision within the process safety management "Project 225: Process Safety Management for Front Line Supervisors" .This project is intended to increase the "understanding and buy-in for process safety management (PSM) at the first-line supervisory level through better understanding of PSM, its benefits and the interactions of the various elements" and can be seen at the following website; http://www.aiche.org/ccps/community/projects/project-225-process-safety-management-front-line-supervisors

Based on the literature review and the findings of the research, this study has identified that there are significant differences between organisations in respect to how they set up the supervisor's role, the methods used to recruit supervisors, effective training, coaching and mentoring, suitable behaviour models for supervisors developed with supervision and the appraisal process.

While this study has produced some interesting results that have implications for recruitment, training and supervisor behaviour models, there are a number of limitations with these findings. The main limitation with this research is that the responses are subjective and cannot be independently validated. Another limitation is that the respondents may have had preconceptions of possible gaps in their organization but in fact may not have been able to determine the exact status of the processes within their organization. In order to address these limitations it is necessary to carry out a more detailed intervention study for each aspect of the study. This study would require a more qualitative approach to verify the results of this study and should involve human resources, training departments together with health and safety to ensure that the required data is gathered correctly.

Although the study found gaps within a number of processes for selecting, training and developing behaviour models for supervisors, a small number of organisations had very effective processes for the development of supervisor safety behaviours. For example, some organisations had recruitment processes using multiple methods that included leadership behaviours, one drilling company trained supervisors to a high standard (NEBOSH certificate level) and six organisations had a fully implemented behaviour model for supervision.

Despite the clear link between good supervision, safety climate and accident rates, some organisations have significant gaps in many of their internal management systems that may have a detrimental effect on supervisor's behaviour and their effectiveness in managing their teams offshore.

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