Behaviour modification to improve safety: Literature review

Prepared by
The Keil Centre
for the Health and Safety Executive

OFFSHORE TECHNOLOGY REPORT
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Behaviour modification to improve safety: Literature review

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1 About this report

This report is a guide to improving safety by modifying behaviour. It is written for a non-specialist audience, therefore does not provide an exhaustive account of the subject. Instead the main principles are explained, with examples from a range of offshore and onshore industries.

1.1 How to use this report

The reader can use this report to help identify the behaviour modification approach most suitable for their organisation. Thus informed, they can critically assess the services offered by suppliers of behaviour modification programmes, specify any redesign required in an existing programme or design their own programme in-house. Should further details be required, relevant references are provided.

2 Why focus on safe behaviour?

There are good reasons to target safe behaviour as part of an integrated approach to safety management. A significant percentage of accidents can be linked directly to unsafe behaviour which occurred near to the time of the accident. For example, a worker got a metal fragment lodged in his eye because he was not wearing the safety glasses supplied whilst grinding.

The upper part of the accident triangle in Figure 1 demonstrates that as the severity of the accidents and incidents decrease, their frequency increases.

![Figure 1: Accident ratio triangle, extended to include unsafe behaviour](image)

The triangle can be extended downwards to include unsafe behaviours, which presents opportunities to modify unsafe behaviour from unsafe to safe. Since the 1970’s, a variety of behaviour modification techniques have been successfully applied to reduce unsafe behaviour. By reducing unsafe behaviour, it is possible to reduce injuries in the upper part of the accident triangle.

The UK offshore oil and gas industry has recently adopted a variety of behaviour modification techniques to help them achieve a step-change in safety performance. This guide aims to explain behaviour modification as applied to safety, and help the offshore industry
and their workforce choose, implement or improve a behaviour modification approach suited to their circumstances.

2.1 Why not focus on attitudes to safety?

It is often assumed that the most productive place to start when changing behaviour is with attitudes. If only the "right attitude" can be fostered, then the right behaviour is sure to follow. Unfortunately, the casual link between attitude and behaviour is weak. The causal link between behaviour and attitudes is however much stronger. If our behaviour changes and our attitudes don't, we feel uncomfortable, a state known as 'cognitive dissonance'. We tend to resolve this discomfort by changing our attitude to be consistent with the newly-adopted behaviour. For these reasons, proponents of behaviour modification recommend targeting behaviour change first, not attitudinal change.

3 What is behaviour modification?

There are several well-established principles which underpin the modification of human behaviour:

- Behaviour can be measured – and to make measurement possible the behaviour you wish to change must be carefully-defined and observable.

- Behaviour is a function of its consequences – people will continue to behave as they do until either (a) the consequences reinforce behaving in a different way or (b) the consequences (i.e. punishment) no longer reinforce behaving in the established way.

By carefully analysing events prior to a defined behaviour (the Antecedents), the Behaviour itself and the Consequences, it is possible to gain insight into why people behave as they do. Using the results of this "ABC" analysis, a plan is developed to change the antecedents and/or consequences, and thus increase desired behaviours and reduce problem behaviours.

- Behaviour can be changed by providing appropriate reinforcement and feedback – Positive reinforcement, e.g. thanks, praise, support from colleagues and management promotes behaviour change, whereas in an organisational context punishment, e.g. blame, criticism, disciplinary action is often counter-productive. Also, once behaviour has been measured, people need to see the results. Immediate, regular and specific feedback is more effective than feedback which is delayed, infrequent and vague.

- Goal-setting – when people are involved in setting challenging and achievable targets for changing their behaviour, this adds to the positive effects of reinforcement and feedback.

3.1 Table 1: Key terms

<table>
<thead>
<tr>
<th>Key terms</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour</td>
<td>Observable, measurable things that people do, or do not do</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>That which strengthens, supports or encourages behaviour</td>
</tr>
<tr>
<td>Feedback</td>
<td>Information which allows an appreciation of current status or progress. Essential for learning and maintaining motivation</td>
</tr>
<tr>
<td>Goal-setting</td>
<td>Definition of a target level of achievement, typically higher than current performance</td>
</tr>
</tbody>
</table>
Summary

It is possible to define and measure many behaviours you may wish to change. By altering the consequences of a specific behaviour, providing positive reinforcement and immediate, regular and specific feedback, the behaviour occurs more often. If behavioural goals are also set, this adds to the positive effects of feedback and reinforcement.

4 How does behaviour modification improve safety?

A variety of programmes have been implemented to modify unsafe behaviours in industry, and thus improve safety. A confusing number of terms are used to describe very similar programmes. These terms include:-

- behavioural safety
- behaviourally-based safety
- applied behaviour analysis
- behavioural safety management systems
- safety observation systems.

Taking the general principles of behaviour modification previously outlined, Table 2 overleaf describes how these principles are typically applied to safety.
### 4.1 Table 2: Application of behaviour modification principles to improving safety

<table>
<thead>
<tr>
<th>Behaviour modification principle</th>
<th>How applied to safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour is a function of its consequences</td>
<td>People may behave in an unsafe manner because they are rewarded for doing so, for example rushing to complete a job to meet production targets, which is tacitly encouraged by management. Although rushing is unsafe and may lead to accident or injury, feedback in the form of an accident is very infrequent. Feedback is therefore missed or ignored.</td>
</tr>
<tr>
<td>Behaviour can be measured</td>
<td>Through careful site-specific analysis of past incidents, risk assessments, task analysis and expert judgements, a comprehensive list of the unsafe behaviours preceding accidents is prepared. The desired safe behaviours are also clearly stated, communicated and taught. Trained observers systematically observe the frequency of safe and unsafe acts, using the checklist of safe and unsafe behaviours. A scoring formula is used to calculate a behavioural safety index. Using the behavioural checklist and safety index, a baseline measure of safe behaviour is established.</td>
</tr>
<tr>
<td>Behaviour can be changed by providing immediate, regular and specific feedback and positive reinforcement</td>
<td>Observers provide feedback and reinforcement either • at the time to those observed, and/or • by graphically displaying the frequency of observed safe &amp; unsafe acts. When unsafe acts are observed, positive feedback is maintained by concentrating on encouraging the safe act. Observers may provide immediate face-to-face feedback on their observations at their colleague at the time, via group meetings or posting results in a visible place.</td>
</tr>
<tr>
<td>Goal-setting</td>
<td>Once a baseline measure of safe/unsafe behaviour has been established, groups of employees may be asked to set their own goals for improvement.</td>
</tr>
</tbody>
</table>

Whilst behaviour modification is not always successful in improving safety, often due to poor implementation, an overwhelming amount of research has demonstrated that safer behaviour, reductions in accidents / injuries, cost savings and improvements in employee attitudes to safety can result.

- **Behaviour**

Behavioural modification can lead to significant changes in safety-related behaviour. A wide range of unsafe acts can be reduced or eliminated, and replaced by safe behaviours. These positive effects have been demonstrated across a wide range of industries and company sizes.

- **Accidents**

There is also convincing evidence that the safe behaviour promoted via behaviour modification can have a knock-on positive effect on accidents and injuries.
• **Human and organisational costs**

In addition to the obvious and immediate human benefits of fewer people being injured, favourable cost-benefit analyses have also been reported for behavioural modification programmes.

• **Employee attitudes**

As behaviour is successfully modified from unsafe to safe, improved attitudes to safety can follow.²⁴

• **Other effects**

Many anecdotal reports also exist of positive impacts of behavioural modification programmes on

- employee involvement and commitment to safety
- willingness to take personal responsibility for safety
- integration of safety with production and quality.

5 **Behaviour modification in the UK offshore oil and gas industry**

Behaviour modification is currently being applied in several of the UK offshore oil and gas industry's drilling, exploration and production facilities. The cross-industry Step-Change in Safety initiative has recently published a short guide to safety observation systems, and stated their commitment to achieve use of such systems on 90% of installations and vessels by the end of 1999. Furthermore, offshore safety induction and refresher training will now include basic information on safety observation systems.

A number of offshore operators also report redesigning existing behavioural modification systems which have fallen into disuse. Conoco UK²⁵ has re-launched Du Pont's STOP behaviour-based approach, to overcome its inconsistent application and uninspiring content. Transocean Offshore Deepwater Drilling Inc. have implemented their own START (See-Think-Act-Reinforce-Track) programme, to replace Du Pont's STOP. START was designed by Transocean employees, a factor they regard as crucial to its success. Finally, Shell UK Exploration and Production's Cormorant Alpha workforce has, with full management backing and the help of a psychologist, designed their own "Care-Plus" behavioural safety programme, tailored to the requirements of offshore operations.

6 **Types of behaviour modification programme**

As behaviour modification has been applied to industrial safety, efforts have been made to improve its effectiveness, and fit the approach to the needs of different industries. Figure 2, shown overleaf, indicates the basic features of behaviour modification as applied to industrial safety, and the related implementation options for each feature.
<table>
<thead>
<tr>
<th>BASICS FEATURES</th>
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<tbody>
<tr>
<td>Ownership</td>
</tr>
<tr>
<td>Definition of safe/unsafe behaviours</td>
</tr>
<tr>
<td>Training</td>
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<tr>
<td>Observation</td>
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<tr>
<td>Establishing baseline</td>
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<tr>
<td>Feedback</td>
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<tr>
<td>Reinforcement</td>
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<tr>
<td>Goal-setting</td>
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<tr>
<td>Review</td>
</tr>
</tbody>
</table>

**By...**
- external specialists
- internal specialists
- involving employees
- multi-disciplinary working party

**Using...**
- analysis of accidents
- analysis of critical incidents
- expert judgements
- observation
- risk assessment

**Of...**
- independent observers
- employees
- safe/unsafe acts

May be extended to include...
- unsafe conditions
- behaviours relevant to productivity, quality or environmental performance

**In the form of...**
- management support
- praise
- encouragement
- public recognition
- financial or non-financial reward, e.g.
- travelling stamps
- vouchers
- meals
drink off

**Set by...**
- management
- participatively with employees

**Ownership...**
- management-driven and implemented
- management led with full employee involvement

**Of...**
- management
- employees
- observers

About...
- behaviour modification principles
- safe/unsafe behaviour
- observations/feedback skills
- data analysis
- programme management

**Using...**
- behavioural safety index

**About...**
- safe/unsafe acts
- reasons for safe/unsafe acts
- unsafe conditions
- removal of any barriers to safe behaviour

**Via...**
- individual, immediate, face-to-face feedback
- regular team meetings
- graphically displayed on charts/posters
- written feedback with suggestions for reducing hazards

**Of...**
- programme implementation
- programme success

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Figure 2: Basic features of behaviour modification programmes, and implementation options
7 The effectiveness of behaviour modification programmes

Since 1978 a large number of studies have been conducted to evaluate the effectiveness of behaviour modification programmes in improving workplace safety. These studies have focused on establishing (a) their ability to increase safe behaviour, (b) their ability to decrease accidents / injuries and (c) which components in a behaviour modification programme are most important in changing unsafe behaviour and reducing accidents and injuries.

7.1 Effects on safe behaviour and injuries

7.1.1 US wholesale bakery

One of the earliest examples of the successful application of behaviour modification to improve safety took place in a US wholesale bakery. Following concerns over increasing plant injury rates, the departmental shift with the highest injury rate was selected for a behaviour modification project. Prior to the project, little or no reinforcement was provided by management or colleagues when people took time to act in a safe manner, and no opportunities were provided for employees to learn how to avoid unsafe practices.

Behavioural analysis of previous accidents led to a clearly-defined behavioural observation checklist describing safe and unsafe behaviours or, where possible, the outcome of the behaviour. Independent, trained observers measured baseline levels of safe behaviour. Following baseline measurement, groups of employees took part in a thirty-minute training session, where they were shown slides demonstrating safe/unsafe behaviour, focusing on behaviours with the lowest baseline level. Baseline performance was graphically displayed, and employees agreed to strive towards a 90% safe behaviour goal.

Over subsequent weeks, behavioural safety performance improved, consistently exceeding goals in one area. Supervisors also deliberately made favourable comments to employees who were behaving safely on key tasks.

Employee reactions to the project were favourable, however management and supervisory support was patchy. Employees subsequently took responsibility for observing and providing feedback. Over the first year of implementation, the injury frequency rate dropped from 53.8 to 10 per million man hours worked.

7.1.2 US sugar-cane machinery manufacturing plant

This study was conducted in those parts of the plant which accounted for 95% of all recorded injuries. An observational checklist of safe/unsafe behaviours was developed, based on accident analyses, supervisor's comments and published industry data. Observations of employee behaviour were conducted by independent external observers and a company safety supervisor. Following collection of baseline data, training was provided in which the checklist, observation method and safe/unsafe behaviours were explained. Over subsequent weeks, a 90% safe behaviour goal was introduced and reinforced by supervisors, however no feedback about actual performance was given. Finally, regular feedback on safety performance was displayed, which included current performance against the 90% goal.

Average behavioural safety performance improved from 62 to 95%, with a corresponding decrease in accident rates. The estimated cost-benefit ratio for this safety programme was at least 1:8.
7.1.3 US metal fabrication site

At a US metal fabrication facility, a six-phase programme was implemented to improve safety. In phase one, a behavioural measure of safe/unsafe behaviour was developed, and baseline observations made by independent, trained observers. Phase two consisted of a period of employee training, during which safe and unsafe behaviours were explained and demonstrated. A 95% safe behaviour goal was set by management. The third phase involved weekly feedback of safe behaviour performance against goals at a group safety meeting. In phase four, once the 95% goal had been achieved, the frequency of feedback was reduced to once per fortnight. No drop in safety performance occurred when the frequency of feedback was reduced. In phase five, training, feedback and goal-setting were discontinued, and behavioural safety performance dropped. Finally phase six involved the reintroduction of fortnightly feedback, which led to a recovery of behavioural safety performance. This six-phase programme confirmed the essential role of feedback in improving safety performance. Effects on accident/injury rates were not reported.

7.1.4 US review of 24 behaviour modification studies

Twenty-four studies which had used positive reinforcement and/or feedback to improve safety-related behaviours in industry were examined. The major finding was that in every published study positive reinforcement and/or feedback enhanced safe behaviour and/or reduced accidents. However, not all categories of behaviour improved, and examples were found where equipment design prevented the adoption of safe behaviours.

7.1.5 UK cellophane manufacturing site

Following year-on-year reductions in accidents, this site retained a base level of behaviourally-caused accidents which resisted improvement. Departmental checklists of safe/unsafe behaviours were derived, based on accident analyses. Management briefings were held, and their specific assistance in supporting the programme was sought. Employee observers were recruited from the site, and each was provided with two days of theoretical and practical training.

The trained observers established a baseline of safe behaviour, and used group goal-setting meetings to establish and agree target levels of safe behaviour. Over a sixteen-week period, a significant improvement in safe behaviour was found in nine of the fourteen departments involved. A 21% reduction in the plant’s overall accident rate, and a 74% reduction in those accidents directly linked to the safe behaviours was noted, when pre- and post-programme accident rates were compared. Estimated annual savings due to reduced accidents costs and insurance premiums ranged from £180,000 to £360,000.

Unusually, this study extended the analysis of accident causation beyond purely individual behavioural factors, and found a strong association between activity levels, unplanned absences and accidents. In other words, accidents were more likely to occur when manufacturing activity was high, and was combined with lower than usual manning levels due to unplanned sickness or absenteeism.

This study also measured site safety climate before and after the goal-setting and feedback safety improvement programme was implemented. Over this one-year period, significant positive changes in the plant’s safety climate occurred, suggesting the programme’s impact extended beyond its initial focus on behaviour.
7.1.6 UK construction industry

A two-phase behaviour modification programme was conducted on a number of UK construction sites to reduce accidents16. A construction-specific list of unsafe behaviours was prepared, based on accident and injury records and construction industry expertise. Independent, external observers were trained, and established a baseline measure of behavioural safety performance. At group goal-setting meetings, site staff set goals for improvement against baseline performance. Feedback of weekly behavioural safety performance was posted graphically at a highly-visible location. Significant increases in safe behaviour occurred, however no data on the knock-on effect on accident and injury rates was presented.

This piece of research was extended to examine the effects of management commitment and the use of internal company personnel to observe, facilitate goal-setting and provide graphical feedback. Similar improvements in safe behaviours were found, which were moderated by the degree of management commitment shown.

On those sites where management supported behavioural feedback; allowed workers to stop work to attend goal-setting sessions; attended and supported goal-setting sessions and allowed observers time to conduct observations, the safe behaviour improvements were markedly better.

7.1.7 Long-term evaluation of US consulting firm's behaviour-based safety interventions

A US safety-consulting firm recently published an evaluation of changes to injury rates across 73 sites where their firm had implemented behaviour-based safety interventions17. Over a third of these sites were in the petroleum and chemical industries. Each of the seventy-three interventions shared several common features, including development of a site-specific checklist of critical behaviours, training of employee observers, and provision of feedback to employees.

Taken as a whole, the 73 sites showed significant progressive reductions in injury rates from baseline levels over a five year period. Alternative explanations for the improvement being due to other unmeasured organisational changes, the effect of the global trend in safety improvements, or the specific features of this consulting firm’s approach cannot be entirely ruled out. However, it seems probable that a proportion of the reductions in injury rates are attributable to the generic principles underlying the application of behaviour modification to improve safety.

7.1.8 Australian industrial safety behaviour modification trial

Many of the successful safety improvements reported in the behaviour modification literature have occurred when programmes are implemented by academic researchers or specialist consultants. In such circumstances, control over how rigorously the programme is implemented does not rest wholly with company employees. This may limit the effectiveness of company-driven schemes, when implemented under sub-optimal conditions by personnel subject to many other organisational demands.

An Australian study explored the effectiveness of behaviour modification programmes which were largely implemented by company personnel18. Nine programmes were implemented on different sites, each with the main aim of improving safe behaviour and housekeeping. Only three of the sites achieved improvements in both safe behaviour and housekeeping. A further three sites found improvements in housekeeping only. Further analyses19 concluded that
failures were not due to fundamental flaws in the techniques of behaviour modification, but aspects of site management behaviour and programme implementation.

7.1.9 Summary

Evidence exists from a range of industries on three continents that behaviour modification techniques can lead to safer behaviour, and reductions in accident / injury rates. As programme components have been combined in different ways across studies, how best to combine programme components, and their relative importance became key research questions. Management’s commitment to supporting programme implementation was also identified as a critical success factor.

7.2 Effects of programme components

The following studies sought to understand the relative contributions of behaviour modification programme components.

7.2.1 US farm machinery manufacturing plant

Due to concern about high accident rates, a behaviourally-based programme was instituted to (a) reduce accidents and (b) determine the relative contributions of the programme’s principal components, namely (1) safety training (2) goal-setting and (3) feedback of results.

A behavioural checklist of safe/unsafe behaviours was developed, and trained observers established baseline behavioural safety performance. Safety training was then provided, which focused on examples of safe/unsafe behaviour. Following completion of the training component, groups of employees were asked to endorse a management-defined 90% safe behaviour goal, and the goal was posted prominently. The final component was provision of graphical feedback during safety meetings on observed safe behaviour performance against the 90% goal.

Improvements in safe behaviours were noted following the introduction of each of the three components. The 90% goal was only attained once feedback was provided. In other words, goal setting plus training, and training alone, had positive effects on behavioural safety performance, but the addition of feedback resulted in a further increase. A corresponding decrease in overall and lost-time injury rates was observed following the programme’s introduction.

7.2.2 US automotive industry

A US automobile manufacturing plant developed a similar programme to assess three components: (1) training only (2) training and feedback and (3) training, feedback and goal-setting. An independent observer was used. Training alone did not produce any significant change in safe behaviour or accidents / injury rates. The introduction of group feedback via public posting of results led to measurably safer behaviour. When a 95% safe behaviour goal was set by a union representative, employees exceed the goal. In this study, it was concluded that safety training alone was not sufficient to change unsafe behaviour, whereas group feedback did lead to change, and this effect was enhanced by goal-setting.

7.2.3 US retail distribution warehouse

Two similar studies were conducted by the US National Institute of Occupational Safety and Health. Observation, training, group and individual feedback and goal-setting led to improvements in most categories of behaviour. These studies concluded that whilst their well-designed training component has produced measurably safer behaviour, the addition of goal-
setting and feedback combined with informal management and peer support led to additional, enduring improvements.

7.2.4 Additional programme components

Other proprietary behaviour modification programmes, for example SUSA (Safe and Unsafe Acts Auditing)\textsuperscript{3}, also emphasise the provision of face-to-face individual discussion and positive feedback at the time of observation. Observers are trained to elicit suggestions on how to improve safety, gain individual commitment to corrective actions and provide assurances of any management support required. Provision of immediate face-to-face feedback is another potentially important programme component, however its relative importance has not been systematically assessed.

7.2.5 Application of behavioural modification in oil and gas industry

A behavioural modification programme was implemented on two mobile offshore drilling rigs in the Gulf of Mexico\textsuperscript{29}. A third rig was used as a control, and no behavioural modification programme was implemented there. A list of unsafe behaviours was developed, baseline performance measured, crew training provided and feedback and goal-setting was introduced. On the two rigs using behavioural modification, safe behaviour increased and injury and incident rates showed a statistically significant decline. During the same time period, the control rig’s injury rate increased. Logistical limitations necessitated the use of on-site supervisors as observers, which helped to embed the technique into normal working practices at an early stage. Significant cost-benefits were reported, alongside an enhancement of the rig operators’ safety reputation.

Another US drilling contractor first implemented Du Pont’s STOP programme, a form of behaviour modification\textsuperscript{7}. The STOP programme encourages supervisors and other employees to observe unsafe acts and take immediate corrective action, for example by pointing out in a positive and constructive manner how safer methods of working can be achieved. STOP also requires the observer to record their observations and preventative actions on a pre-printed card, which are collected and reviewed by management. The STOP system does not typically involve prior definition of safe/unsafe behaviours, or the graphical display and feedback of behavioural safety scores and goals. Following the use of STOP, this drilling contractor decided to adopt a more focused, employee-driven approach. An inventory of safe/unsafe acts was developed, a baseline established and the observation feedback cycle commenced. Over the period in which behaviour-based safety was introduced to land and offshore drilling operations, a decrease on LTA incident rates of 53% and 33% respectively was recorded. Recordable injury rates were also halved.

A somewhat different behaviour-based safety approach was introduced at a US Shell Western oil and gas drilling operation\textsuperscript{21}. Observation and feedback focused on only three unsafe behaviours at a time. Daily feedback and reinforcement was provided until these behaviours were being consistently applied, and had therefore become a habit. Over an eleven-month period, a total of nine behaviours became habits. Behaviours included correctly using a lock-out tag procedure and giving a handover briefing at crew change. During the first six months of implementation the accident rate fell by two-thirds.

These three examples demonstrate that behaviour modification techniques can be successfully, applied in the oil and gas exploration and production industry. Unsafe behaviour can be reduced, and accidents and injury rates driven down.
7.2.5 Summary

The training-only component achieved mixed results, and where successful only modest improvements. The addition of graphical feedback, goal-setting and support from management and peers produced significant additional gains. Although theoretically and intuitively important, the added impact of immediate face-to-face feedback has not been systematically demonstrated.

8 Alternative types of behaviour modification programme

Another behaviour modification method is the "token economy". This involves the provision of reinforcement for desired behaviours in the form of token rewards, in proportion to the effort expended to produce the desired behaviour.

Over a period of 11 years, a token economy was established at two US opencast mines²³. All employees were included, and each was entitled to a pre-determined number of trading stamps redeemable for consumer goods in proportion to the workplace hazards they were exposed to. At the end of each month, individual workers received stamps with their salary if they had not suffered an injury or required first aid that month. In addition, teams of workers reporting to a single supervisor received additional trading stamps if all team members had avoided injury or medical treatment that month. Further special payments of stamps could be made for safety improvement suggestions adopted by the mine. Negative reinforcement also existed as any employee responsible for an accident involving damaged equipment, or who failed to report an accident or injury, and their fellow team members could lose their entitlement to trading stamps for up to six months.

Prior to the establishment of the token economy, extensive training was provided to prompt workers to behave safely, and maintain safe working conditions. At both mines, work-related injuries and days lost from work declined dramatically in the first few years, and remained significantly lower than the national mining average thereafter. Programme financial benefits outweighed costs by a minimum of 3:1. The possibility that the reduction in injuries was due to under-reporting was examined and rejected. The severity of injuries meant such concealment was unlikely to account for the dramatic decline in injury rates.
9 Criticisms of behaviour modification

Despite the positive gains in safety performance which have been achieved via behaviour modification, the technique is not without its critics\(^2\)\(^2\)\(^5\). The main criticisms are described below, with alternative viewpoints.

<table>
<thead>
<tr>
<th>Criticism</th>
<th>Alternative Viewpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour modification is no substitute for a rigorously applied conventional safety system, encompassing engineered and system design approaches to ensuring safe operations</td>
<td>True. However, behaviour modification can complement conventional safety systems, but should never replace them.</td>
</tr>
<tr>
<td>Planned modification of employee behaviour is manipulative</td>
<td>Whether a behaviour modification programme is perceived as manipulative is likely to depend on how it is implemented, the perceived motivation for its implementation, and the degree to which the programme is truly owned by employees</td>
</tr>
<tr>
<td>By focusing purely on behaviour, the need to modify unsafe conditions of work, make system improvements, change management behaviour or address root causes is obscured.</td>
<td>Behaviour modification does not replace the need to modify unsafe conditions of work, make system improvements, change management behaviour or address root causes. Depending on how the behaviour modification is designed and implemented, it can support these other important aspects of safety management</td>
</tr>
<tr>
<td>Behaviour modification is often limited to those accidents with clearly identifiable behavioural precursors. It is less able to deal with accidents with multiple causes, which are difficult to anticipate.</td>
<td>True, but this is not an argument for not addressing accidents with clearly identifiable behavioural precursors</td>
</tr>
<tr>
<td>Some behaviour modification applications focus solely on behaviours identified via analyses of past accidents, and do not include other critical behaviours for safe operations identified via risk assessments</td>
<td>True – but other critical behaviours identified via risk assessment can also be included if you wish.</td>
</tr>
</tbody>
</table>

10 Considerations to make prior to selecting a behaviour modification programme

There are a number of issues that must be considered before deciding to implement a behaviour modification programme. The following series of questions may assist in establishing how appropriate this technique is for an organisation.

- Are a significant proportion of accidents primarily caused by the behaviour of front-line employees?

A behaviour modification programme is unlikely to be appropriate if technical failures or a poor Safety Management System are causing the majority of accidents. It is important to recognise that behavioural approaches to safety improvement are likely to be most effective when technical and systems improvements are failing to produce a corresponding reduction in accident rates.
• Do the majority of managers and employees have a desire to reduce the current accident rate?

It is important that managers and front-line employees are convinced of the need to reduce the current accident rate, as the success of the programme is dependent on their continued involvement and commitment. If employees do not perceive a need to reduce the current accident rate then effort will initially have to be made to convince them that all accidents can and should be prevented.

• Are managers going to be comfortable with empowering employees and delegating some authority for safety to employees?

In order for employees to be involved in safety, their managers will need to be willing and able to empower them to make safety observations and recommend ways of improving safety. If managers are likely to respond negatively to workforce empowerment then they are likely to cause the programme to fail. It is important that managers are aware of and agree to the changes in the relationship between managers and employees that are required. Managers must be willing to release some control, within defined boundaries.

• Are managers likely to be willing to trust results produced by the workforce?

If managers are cynical about the motives behind safety improvement suggestions made by their employees then they are unlikely to take them on board, and therefore the programme will fall into disuse. In addition, managers are likely to be hostile to the programme if they feel that employees are manipulating the results to produce a negative picture.

• Are the workforce willing to trust management?

If there are significant levels of cynicism amongst the workforce about the management's true motivation for implementing the programme, this may undermine its success.

• Is there a high level of management involvement in safety, which is incorporated into management structure?

Management support for the programme is likely to be inadequate if managers do not see safety as a line management responsibility. While behaviour modification programmes are designed to involve employees in safety, line managers play a critical role in supporting the programme by showing their commitment and providing resources.

• Does the organisation have the resources available to enable workers to take time to undertake the required training, carry out frequent observations and to make any improvements identified?

The majority of both in-house and proprietary systems require a significant amount of resources to set-up and maintain. The initial costs will include designing the programme, setting up a steering committee and training observers. Once the programme is running the observers will require time to make observations, analyse data, produce charts and time to feedback the results to other employees. In addition, many programmes also involve identifying the conditions that cause employees to choose unsafe behaviours, so that these conditions can be removed. Employees are likely to interpret management reluctance to make the suggested alterations as a lack of commitment and therefore lose confidence in the programme.
• Who is going to be the champion of the programme for the organisation as a whole and at each site?

The success of behaviour modification programmes appears to be dependent on someone to drive the programme forward and keep the momentum going at both the site and corporate level. Programmes often appear to grind to a halt if the champion of the programme leaves. It is therefore a good idea to have some redundancy in the system by having a group of committed individuals to champion the programme.

• Are there adequate systems in place to deal with the amount of communication and feedback between management and workers?

One of the positive outcomes of many behaviour modification programmes is increased communication between managers and workers about safety. This unfortunately can mean the programme becomes a victim of its own success. There is a danger that managers end up with communication overload if there are no systems in place to deal with all the information generated by the system. If the organisational structure requires managers to approve all expenditure then they may become overloaded with the number of suggested improvements that can be made to the plant. It is critical that increased communication is anticipated and systems are put in place to cope.

11 Factors which influence the likelihood of success

11.1 Key success factors

Practitioners and researchers have identified a number of factors that enhance the effectiveness of behaviour modification programmes. These factors can be classified under the following headings, the way the programme is initiated and implemented, programme maintenance and the existing organisational structure.

11.1.1 Programme initiation and implementation

The success of a behaviour modification programme can be influenced from the very beginning. The following factors have been identified as factors that enhance the likely success of the project:
- joint management and workforce involvement in the process from the beginning, including the initial discussions about undertaking a behavioural modification project;
- selection or development of a programme that fits with organisational needs, culture and the existing Safety Management System;
- a sample of the workforce to go and visit other companies that have implemented a similar programme;
- selection of a steering group who will work effectively as a team;
- all levels of organisation being briefed about the aims and objectives of the programme and their role in the programme;
- front-line employees participation in the process of setting programme goals and objectives;
- involvement of first line supervisors and middle managers in the process and getting them to act as role models.
11.1.2 Programme maintenance
- enduring management and expert support to provide assistance with any difficulties encountered
- management commitment to the programme to allow staff time to make observations
- the use of all available means of communication to feedback results to the workforce.

11.1.3 Organisational structure
- observers who are confident and have secure jobs and therefore can stand up to managers who may try to subvert the results
- managers having consistent and high existing safety standards who are not sensitive to bad scores
- the selection of behaviours that also have links to management production goals and ones that most employees would like to improve
- an open learning culture i.e. 'fair and just' - and deciding at the beginning of the programme how to deal with observations where people feel discipline is required.

In addition to the above generic success factors there are a number of enablers that assist in overcoming some specific offshore issues. These include developing efficient lines of communication in the offshore environment by
- holding structured meetings
- using of IT systems to facilitate information transfer, where this is a preferred communication medium
- holding important meetings onshore.

11.2 Barriers and pitfalls
A range of barriers and pitfalls have been experienced when trying to implement behaviour modification programmes. These barriers can be classified under three headings, workforce concerns, management and organisational issues and programme suitability and implementation.

11.2.1 Workforce concerns
All behaviour modification programmes rely to a greater or lesser extent on workforce participation, it is therefore critical that 'buy-in' to the process is obtained. There are a number of barriers which could prevent or limit workforce participation, including:
- concern about spying on their colleagues
- perceiving it as another initiative that will never last
- the programme being seen as method for blaming workers for having accidents.

11.2.2 Management and organisational issues
Behaviour modification programmes are less likely to be successful if the following management and organisational barriers are present. It is important to be aware of the potential impact of these barriers, in order to prevent the programme failing to achieve its potential
- insufficient credible management support for the initiative, including neutral or half-hearted support
- expectation of short term gains that leads to a loss of commitment when improvement is slower than anticipated
- lack of friendly communication between managers and workers prior to and during the programme
- organisational change and downsizing, leading to low workforce morale and the loss of committee members and trained observers
- a directive style of management which prevents the empowerment of staff
- managers being inconsistent in enforcement of safety rules prior to and during the programme.

11.2.3 Programme suitability and implementation

The success of the programme can be limited if the programme selected does not fit with the organisational culture or if it is not implemented correctly. A number of barriers frequently encountered are listed below
- not involving supervisors in the process, leading some to abdicate responsibility for safety
- programme sponsor not being available when required
- the selection of an off the shelf programme or 'canned' approach that does not fit with the organisation's requirements or culture
- inappropriate training material – e.g. using material developed for a US population
- employees spread over a wide area working on their own, making observations difficult
- the programme becoming a mode of communication for non-safety issues

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