An analysis of safety culture across international societies, and the implications for corporate management systems – a Bulgaria Plant Case Study

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Abstract: Organisations working across multiple geographies develop mechanisms for ensuring governance, oversight, and control in the form of guidelines, systems, and processes. Often, there is a concentration on a 'one size fits all' approach because of the ease with which it supports corporate benchmarking processes.

Organisational systems are often forged as a consequence of the experiences of those professionals employed in key roles within that organisation and the societal culture to which they have been exposed. In doing so, there can be a failure to effectively consider the extent to which the organisational systems will interact with the other societal cultures in which the organisation operates. It is in this interaction that the effectiveness of an organisation and its safety culture is established.

Societal factors such as attitudes to authority, communities, personal achievement and uncertainty can have a fundamental impact on the way in which workers adopt and work with systems that have been introduced to maximise their performance as measured through a variety of metrics including safety.

The effectiveness of the interaction can be determined through an assessment of employee perceptions of organisational controls and an analysis of local culture. When these two dimensions are interpreted and understood, there is a substantial opportunity for actions to be taken that create a higher level of alignment which then contribute to better organisational performance.

Key Words: Safety Culture, Organisational Culture, Societal Culture, Organisation Structure, Corporate Systems, Work Management, Values, Beliefs, Bulgaria

Introduction

In 2011, an American investment business acquired a Bulgarian plant from an Italian organisation as part of a stated strategy of growth through acquisition of plants in developing countries. Within the same industrial park, there were a small number of similar plants competing for the most competitive contracts. All were subject to agreements with the state relating to output and price. In order for the plant to achieve the expected return, it had to operate efficiently and consistently within the constraints placed on it by the state and parent company.

The previous owners had appointed a new Plant Manager from Southern Europe with substantial experience at a senior level within the industry and made a substantial investment to improve plant performance and reduce downtime through early fault detection.

A large proportion of the total investment was spent on equipment upgrades comprising new Electronic Control & Instrumentation (EC&I) including video equipment and a new organisational structure was introduced which replaced 'plant wide' production and maintenance functions with five departments reflecting production processes and incorporating their own maintenance sections. This change was introduced to increase accountability and reflected the need for depth of knowledge arising from the scale of the change and introduction of new technology.

The new plant was based on an employment model where only one third of existing employees were required as full time permanent workers on site. All employees were subjected to psychometric tests which had been specifically selected to identify those people that were most likely to work well in the new environment. 80% of the existing employees were not seen as able to make the transition and subsequently left the business. In fact, so many employees failed that it was deemed necessary to recruit additional personnel to achieve required manning levels, all of whom went through the same tests as a part of the selection process.

The new equipment was introduced successfully and had started to produce the performance expected. Output and reliability had increased broadly in line with expectations, and because volume and consistency were regarded as key to achieving the best agreement from the state, the project was regarded as a success.

Despite these improvements, the goal of an accident free site was not realised. This was all the more surprising because of two factors:

1 The Plant Manager had implemented corporate Health & Safety (EHS) Policies precisely and ensured they were embedded across the business. The policies were wide, far reaching, and explicit in terms of both what needed to be done and how. Group IT based reporting systems ensured procedure compliance. Safety data, in the form of both

leading and lagging indicators recorded on IT systems had the potential to significantly increase, reduce or nullify individual employee bonuses.

2 The event, which was captured on one of the newly installed video cameras showed an employee suffering an amputation to the tip of his finger when he had leaned out from the cab of his fork lift truck to close a pedestrian door. As he leaned out, the truck had started to move causing his finger to become trapped between the fork lift truck and the door frame. This action was taken to enable an interlocked electric gate to be opened. An investigation found that the pedestrian door had not worked properly for some time and as a consequence this activity had become a common occurrence.

The report indicated that the incident was 'symptomatic of relatively sporadic unsafe behaviour'. After substantial investments, including significant technological, organisational, managerial, operational, and personnel changes, there was a realisation that the safety culture had not changed in line with expectations.

The Plant developed an assumption for the behaviour on the site. They identified that a good incident record combined with what amounted to a relatively high number of personnel with long service had led workers to under-estimate hazards and de-value risk. They tried a number of initiatives aimed at the 'hearts and minds' of the Technicians and Operators when they were not under supervision. This included a behavioural safety training programme based on an American video with Bulgarian Subtitles[i], and planned behavioural safety tours which took place at particular times during the day.

After several weeks and multiple sessions, participants reported workers not wearing the correct PPE, smoking in non-smoking areas, unapproved scaffolding and a contractor working on a planned activity whose name was not on the work permit. Perhaps unsurprisingly and despite several weeks of behavioural safety tours, the plant management agreed that there remained a level of relatively sporadic unsafe behaviour.

Drawing on the work of Hofstede, the Globe Project in collaboration with ARMSA Consulting, an approach was adopted which sought to produce a greater understanding of the way in which societal and organisational culture (corporate and plant) had influenced behaviour on site. Understanding behaviours from a cultural perspective enabled the identification of specific, targeted recommendations that replaced initiatives to improve safety performance.

This approach is now helping the corporate team to optimise operational and EHS performance across their many and varied locations including Eastern and Southern Europe, Africa, and Latin America using a corporate guideline based model which capitalises on local culture to improve performance across a variety of metrics.

Materials and Methods

At the heart of this project was a belief that 'plant safety culture' is not something that operates in isolation, or one that can be dictated or defined at a parent level. Rather, culture is pre-determined at a local level, and plant safety culture is a function of the interaction of local culture and organisational systems and controls. The extent to which these two fundamentally different dimensions align determines the existence of a positive safety culture, either in the form of a progressive development, or as a sustainable model.

Using the work of IAEA (1986) and INSAG (1991), Uttal (1983), and the UK Health & Safety Commission (1993), a definition was developed which supported the subsequent work of the project. This project was based largely on the work of Hofstede (1980[ii] and 2001[iii]), and through subsequent academic work by Greenberg and Erdinc (2002), Davidkov (2002) which evaluated the work of Hofstede specifically in Bulgaria. Work from the Globe Project[iv] was also used to provide the basis on which to base the research. Collectively, this provided the basis upon which to determine and establish an understanding of local culture.

Interviews were held with key members of the organisation with the potential to influence organisational culture including the plant manager and his management team, the EHS manager and senior trade union representative. During these interviews, participants were asked to describe the nature of work at the site. Information was also received on corporate plant performance expectations and EHS Policies and Plans for the current year.

A questionnaire was developed and used to capture employee perceptions of the impact of management instructions, environmental factors, management and supervision, employee attitude, and work planning and organisation. Information was captured across management, supervisory, and operational/technical levels. The questionnaire consisted of 39 statements, against which a Seven-point Likert scale was used to test both positive/negative opinion and strength of feeling. An additional category (Don't Know) was added to reduce centrist responses. Theme related questions were located randomly throughout the survey and the final questionnaire design was tested through both a formal multi-stage review process.

The survey took place over 18 days, and provided the opportunity for all employees in work, across all shifts to participate in the process. Survey responses were classified into broad groups for function, age and service to maximise confidentiality. Other factors including whether previous work experience had been limited to the plant, whether the employee worked mostly alone or with others, and whether the respondent had been subject to a previous accident at the site were also captured.

Classifications and questions were supplied in English and translated into the local language by interpreters that were employed at the plant. Two interpreters were used to produce a three way validation of the questionnaire in the local dialect. Clarification was sought where necessary and several questions were re-worded.

Once the questionnaire responses had been collated and analysed, a detailed interview process comprising 27 interviews lasting approximately 45 minutes each was held over two days to validate the survey findings. These interviews tested both the standard and outlying responses to the survey questions. During the interviews, interpreters were used to translate questions from English to Bulgarian and responses from Bulgarian to English to ensure that the information was relayed with a full and proper understanding. These interpreters were the same interpreters that had been involved in the determination of the questions at the beginning of the survey to ensure a high level of consistency across the process.

The data collated from questionnaire and interview responses were analysed to ascertain the extent to which that had aligned with the traits associated with societal culture, and where such an alignment existed, to make recommendations for improving organisational structures, systems and controls that were sympathetic to societal culture and so more likely to contribute towards the existence of a positive safety culture in the form of a progressive development.

Findings

Defining Safety Culture

Much of the early work on safety culture arose from work based in the nuclear sector. This is not surprising as the term is believed to have been first used by the International Nuclear Safety Advisory Group (INSAG) following the Post Accident Review of the Chernobyl Accident, published by the IAEA in 1986.

Since then, it has featured in the official reports into a number of high profile accidents including the Piper Alpha oil platform disaster, the Kings Cross Underground Station fire, the sinking of the Herald of Free Enterprise, and the passenger train crash at Clapham Junction reflecting a wider and more general application across high risk, high consequence industries.

In 1991, INSAG[v] published a definition of safety culture as an 'assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.' In their paper, they indicate processes at different levels that evidence policy level, management, and individual commitment to safety culture. These include (at a management level) definition of responsibilities, definition and control of safety practices, qualifications and training, rewards and sanctions, audit, review and comparison. At an individual level, they include a questioning attitude, a rigorous and prudent approach, and communication.

In a Health & Safety Commission (HSC) Research Report (RR)[vi] the authors highlight the importance of positive reinforcement, coaching, training, disciplinary policies and proactive intervention as organisational systems and controls to develop a positive safety culture.

The Health & Safety Commission[vii] describe safety culture as 'the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures'.

In general, these statements suggest that a positive safety culture is a function of the extent to which an organisation puts into place systems which achieve safety performance to ensure safety issues receive attention and foster mutual trust and shared perceptions of the importance of safety. Uttal (1983)[viii] proposed a definition of organisational culture (of which safety is a part) which comprises 'shared values (what is important) and beliefs (how things work) that interact with an organisation's structures and control systems to produce behavioural norms (the way we do things around here).

Whilst the INSAG Report and the HSC Research Report identify the type of control systems contribute to achieving a positive safety culture (reinforcement, coaching, training, disciplinary policies and proactive intervention), it is the Uttal definition that identifies the importance of the interaction between the values and beliefs held by individuals in the organisation and organisational systems that establish the culture.

The challenge therefore is to develop an organisational structure and a set of systems which align with the values and beliefs held by the individuals employed across the business. Values and beliefs do not necessarily exist across a group business operating in multiple geographies. According to Hofstede (2001), these are developed at a national or sub-national level as a consequence of the symbols, heroes, rituals, and values that they are exposed to from birth. These elements are reinforced through language, religion and law, and are normalised through education, television, politics and family life. Greenberg and Erdinc (2002) proposed these do not only affect individuals, but through their impact on socio-political factors and economic variables, they define how organisations behave and shape productivity, performance, employee motivations and attitudes to change within organisations.

Understanding the Societal Culture

Hofstede and others have developed scoring models that provide data that describes cultures in a way that supports definition, analysis and comparison. The Bulgaria figures used are by Hofstede (2001) in his 6D Model are described below:

Power Distance is the extent to which the less powerful members of society accept that power is distributed unequally. Bulgaria scores 70 – a high score which indicates a culture where - 'people accept a hierarchical order in which everybody has a place and which needs no further justification.' Key features of this culture are the importance of obedience (taught from a young age). There is much less reliance on education to determine standing or position within the hierarchical

structure. This score is derived from a set of questions reflecting a non-participative management style, that is to say, a paternalistic or autocratic management.

Individualism versus Collectivism indicates the degree of interdependence amongst members of the society. Bulgaria scores 30 points which indicates collectivist culture in which the society fosters strong relationships where everyone takes responsibility for fellow members of their group. Workers in these cultures are very conscious of how they fit in with the groups to which they belong.

Masculinity versus Femininity is the extent to which society values competition, achievement, and success as opposed to solidarity, where caring for others and quality of life are seen as important. Bulgaria, with a score of 40, is a predominantly low masculinity in this value. In largely feminist cultures, standing out from the crowd is not an admirable quality. Where problems occur, the root cause (system, process) is likely to be more important than blame.

Uncertainty Avoidance measures the extent to which members feel threatened by ambiguity or unknown situations. Bulgaria, with a score of 85 points reflects a high degree of Uncertainty Avoidance. Workers are likely to respond well to written and unwritten rules.

Pragmatism reflects the extent to which the complexity of life can be easily explained. In Bulgaria, with a high score of 69 points reflects a culture in which Truth is likely to be seen as a function of situation, context and time. Within this culture, change is something that is accepted relatively easily.

Indulgence indicates the extent to which a culture controls its desires and impulses. With a score of 16 points, Bulgaria is indicative of a culture that strongly believes in restraint, reflecting a low emphasis on leisure time, a perception of restraint derived from social norms, and a feeling that indulgence is wrong.

Understanding Plant Culture – a three stage process

The question for this paper is whether the traits established as a feature of societal culture can influence the effectiveness of organisational systems and processes in such a way as to influence the safety culture of the plant. The nature of the incident that had occurred and the conclusion that the event was 'indicative of relative sporadic unsafe behaviour' in itself indicated that the safety culture was not at the anticipated 'positive' level.

The fact that an accident had arisen from a common unsafe practice despite major changes to technology, organisation, and personnel, including the use of psychometric testing targeted specifically to select workers who were most likely to adopt and engage with the new working practices, combined with the implementation of wide, far reaching and explicit health and safety policies, and the removal and replacement of personnel who could not operate under the new regime was hard to explain.

In the mind of the Plant Manager, the plant had done all they could to establish a positive safety culture on site and, perhaps because of his own international differences, was open to the possibility that societal culture could defeat the envisaged improvements arising from the application of a Western European approach to organisational control systems, particularly relating to work management. This view was not necessarily shared at higher levels of the organisation.

The Plant Manager was looking for a new initiative to address the failing and adopted for an American model of behavioural safety coaching which appeared to be having a very limited, if any, effect on the relatively sporadic unsafe behaviour that was reported daily by the end of day review meetings.

Stage 1: Site Visit

A site visit was undertaken during which a number of interviews took place. On the day of the visit, the plant was engaged in a start-up following a national public holiday and the site was expecting a visit from a newly appointed government regulator. The plant had suffered a leak at high level during the restart and employees were busy cleaning up the waste material. The Plant Manager and his team were clear in the way that they saw cleanliness as a determinant of quality and safety and this was repeated at all levels of the plant.

The interviewees were selected on the basis that they were likely to have both a good understanding of the systems and processes adopted across the site and have the potential to influence culture as a consequence of their position either within the senior management team or as a senior union representative on site.

Interviewees were asked to describe the nature of work from the perspective of determination, planning, organisation, execution and close down of work. Descriptions were broadly consistent and although there were variances between the way that routine activity was managed (through work instructions) rather than non-routine activity (through method statements) both consisted of a broadly similar approach that included the formalisation of a way of doing things arising from a consideration of the environmental and task related hazards and risks associated with the activity.

Supervision was limited as is often the case on large sites operating with lean structures, particularly outside of normal day shifts. Despite this, there was a commitment to safety and recognition that a good safety record within what was a high risk environment contributed to production volumes and consistency of supply which were both key to maintaining good government contracts.

Employee attitudes were discussed and there was genuine surprise that the accident had occurred but wide acceptance that this was caused by a combination of long serving employees and a good recent safety record which had served to diminish the perception of risk across the site. Much was made of the number of unsafe acts that had been reported at the end of each day and this was seen as positively evidencing the impact that the programme was having across the site.

Accidents were infrequent and the plant had stopped recording near-miss or near-hit incidents 9 months earlier as a consequence to changes to reporting and bonus structures which had been replaced with behavioural safety tour recording. Unfortunately, although 3,995 behavioural safety tours had been recorded, their findings were not always (or normally) recorded. That made the process of establishing recurring themes, in the form of hazards, risks, or even locations to be difficult.

Interviewees were asked where they believed most accidents took place, what the main causes of accidents were, and who was most likely to be injured. Answers varied significantly. There was a strong opinion that employees worked more safely than contractors and that contractors were often engaged in more dangerous work. This was particularly significant given the situation that managers who were perceived to be incapable of change to the new ways of working now owned and ran contract businesses that employed many of the previous employees similarly deemed incapable of change in those contract roles back on the site.

During the interviews, there was a strong focus on determining whether culture or work management was the dominant force. At the end of the interviews, there was no clear answer to this question, although there was a strong perception that both were being squeezed together like two ill-fitting parts in the hope that they would create a whole. At times, work determination followed structured stages whilst at other times it did not. Work planning and organisation was subject to a formalised process but this was not followed precisely, culminating in work that was not always executed in line with corporate policies and standards.

Stage 2: On-line Questionnaire

In order to provide a better understanding of how work management and societal culture combined to create an environment of relatively sporadic unsafe behaviours despite the investments made, an on-line questionnaire was used to collect employee perceptions at management, supervisory and operational/technical levels in relation to work instructions, environmental factors, management and supervision, employee attitudes, work planning and other factors at the plant.

The survey was available on site for 18 days, during which time there were 389 responses from a total survey population of 450. This represented a response rate of 86% (a high level of response for this type of survey). There were responses from 21 managers, 78 supervisors, 250 operational and technical personnel and 40 administrative personnel. These responses were received from Operational (259), Maintenance (91), and back office (40) staff. Responses were received from 171 day workers and between 50 and 60 workers from each of the four shifts in operation at the plant. These statistics were indicative of the plant organisation.

216 respondents indicated that they had only worked at the plant, whilst 173 had worked at other organisations before joining the plant. 21 of 171 day workers indicated that they had sustained an accident at work, compared to 20 of 218 shift workers. Whist this of itself, does not represent a statistically significant variance, the fact that 40 day workers are back office personnel and are less likely to sustain/record an accident suggests that there should be some closer examination of accident statistics, particularly because there is a higher incidence of work equipment interventions, more simultaneous activities, greater access to work planners and more supervision.

A seven point scale Likert Scale was used to capture the survey participants' attitude to a series of statements. Responses were defined as Totally Agree, Largely Agree, Agree, Neutral, Disagree, Largely Disagree, and Totally Disagree. An additional category, Do Not Know was also added to reduce the likelihood of an erroneous centrist response.

Stage 3: Secondary Interview Process

The on-line questionnaire was followed by a series of 27 interviews with employees representing the broad structure of the plant including 4 managers, 11 operators, 2 planners, 9 maintenance personnel and a health and safety inspector. During the interviews, questionnaire results and out-lying responses were tested. This provided valuable qualitative data to provide better perspective on survey findings.

During the interviews, there was a high level of openness and honesty. Opinions and events were discussed and relayed through interpreters to improve understanding particularly of technical concepts, but a basic level of English across the plant ensured a high degree of mutual understanding and questioning in simple terms supported the validation of comments relayed through interpreters.

Results

For analysis purposes, scores were allocated to each of the categories ranging from 3 (Totally Agree) to -3 (Totally Disagree), through Neutral (0). Don't know responses were excluded from the scoring process. The results in summary form, are presented below:

Measure	**Average Value**
The Impact of Management Instructions on Behaviour	
There is a Method Statement for everything I am required to do	**+1.83**
Method Statements always consider the risks	**+1.39**
I have a high degree of control in the way that I go about my work	**+2.42**
Sometimes it is more important to do things quickly than to follow the rules	-1.78
Individuals rather than the organisation generally know the best way to work	**+0.10**
Circumstances mean we sometimes have to change the way we do things	+**0.68**
Sometimes you have to do things that are not in the rules	**-0.85**
Following the rules is not always the most efficient way to get the job done	**-0.54**

During the interview process, comments like '*under pressure, people forget the rules…rules are not so detailed…instructions cannot include every eventuality…in the absence of rules dealing with a situation, there is some improvisation*' were common. Other comments included '*method statements should be updated but it is not usual to do this… employees are not so confident that they can say something*'.

Employees at all levels expressed the view that if anyone was caught doing something that was not in line with expectations, they were sent on re-instruction and assessment. This appears to be the extent of sanctions applied on the site and there was no evidence of disciplinary activity short of the ejection of contractors for being under the influence.

The Impact of Environmental Factors on Behaviour	
We have the best possible to equipment to do the work	+**1.82**
Accidents happen here because of the work we undertake	**-1.06**
Accidents happen because of the nature of the working conditions	**-1.36**
There are few risks associated with the work that I am required to undertake	**+0.27**

During the interview process, comments like '*people are not always paying attention*' and '*people need to be more vigilant to what is going on around them*' were common and reflected a perception that the site did have the potential to cause harm, but that the risks were increased because some people were not exercising the level of cautiousness and awareness that they should. This cannot be attributed to a business approach because there was a regular comment that '*the focus is always to do things in a quality way*'.

The Impact of Management and Supervision on Behaviour	
My manager takes action when I raise a concern	+**2.10**
Our managers and supervisors are always available to help	+**2.05**
Managers, supervisors and planners respond well to any concerns I raise	+**1.62**
Managers, supervisors and planners would be surprised by what I have to do	**-0.86**

During the interview process, comments like '*Supervisors are varied. Some are better than others… Supervisors have mixed willingness/desires… Supervisors can't always be in the right place at the right time*' indicating an acceptance of a varied quality of supervision. '*The person issuing the permit to work is not always able to make the work/place safe*' reflects a limit to safety as a consequence of these gaps. The two most interesting comments were '*I try to provide an opportunity to hear other people's points of view, that is not normal*' and '*it is better to tell your boss to do things in the right way, carefully*'.

The Impact of Employee Attitudes on Behaviour

The people I work with are sufficiently trained to work safely	+**2.15**
We are all subject to regular monitoring	+**2.07**
People understand the consequences of not following the rules	+**2.05**
All employees ae treated equally irrespective of length of service	+**1.23**
I am regularly retrained on the method statements that apply to me	+**2.23**
I understand what is expected of me	+**2.39**
I have never found myself in doubt about what is expected of me	+**1.68**
People on site have a good understanding of the hazards to which they are exposed	+**1.97**
Not everyone executes their work properly (diligently, thoroughly, and carefully)	+**0.28**

During the interview process, comments like '*not everyone has received any training beyond their initial induction…Safety inspection training is like refreshers… good people working around the site are conscious of what is happening around them but not enough people think like this… some people are more diligent than others… there is a formal performance review process annually which includes a bonus element*'.

The Impact of Work Planning and other factors on Behaviour

Work is adequately resourced with a sufficient number of trained personnel	+**0.81**
My work is well planned and organised	**+2.07**
People always consider my working conditions when planning my work	+**1.50**
Before we start, someone always explains how we should do the work	+**1.70**
I feel safer with contractors than employees	**-1.29**
Other departments always work well with each other to complete tasks	+**1.05**

During the interview process, comments like '*we have regular meetings to plan and co-ordinate activity... there are meetings every day to plan for tomorrow and discuss actions for the day… Me and my colleagues distribute the work as equally as possible… we arrange activities in advance*' were typical. There was a sense that when work goes to plan, it works well. However, other comments such as '*additional things happen at the last minute… work is sometimes pressurised, others feel the same way... if one person is missing, you end up going in all directions*' were indicative of a situation where plans were expected to go well but this was not always the case.

Employees were highly critical of Contractors, making comments such as '*Contractors follow signs… when they are being watched… Contractor's equipment is not as good as ours… When we change contractors, it is always complicated… Contractors are often low qualified, low education, low salaries… When companies change, they always take the best people with them… With the safety behaviours training, we have stressed the contractors, and now they stop when we walk passed so that we can't see anything*'.

Discussion

Method Statements

The INSAG safety report established that the definition of responsibilities and the definition and control of safety practices were significant management steps in the establishment of a safety culture. Across high risk, high consequence industries, safety practices in the form of work management systems encompassing method statements and work instructions are generally acknowledged as critical to effective and safe operations. Through proper consideration of hazards and risks and the development of effective and efficient method statements, activities can be structured to maximise productivity and reduce risk to the business, its employees, and others.

It is common in the societies of Northern Europe for employees and managers to work together in the development of these documents reflecting what in essence is a low Power Distance Culture (UK and Germany: 35 – low Power Distance). In the UK, legislation passed in 1966, 1976, and 1996 has required companies to consult with employees and their representatives on safety, but there is similar legislation across Northern and Western Europe requiring companies to consult with employees.

Within Bulgarian health and safety law there is a requirement for owners and managers to assess risks (Article 16) and to ensure that employees receive the necessary information relating to the control of risks (Article 19). There is also a requirement for employers with more than 50 personnel to establish a working conditions committee to meet at least three

times a year to discuss, amongst other things, the results of occupational risk assessments. Notably, there is no specific legal duty on employers to involve employees in risk assessment processes.

Within the survey, there was a moderately high level of agreement that *method statements existed for every task that employees were required to do*. In fact, less than 10% of the respondents disagreed with this statement. Not unusually, although Operations personnel responded significantly more positively than Maintenance personnel. It is common for operations work, which is generally more routine in nature to be better supported by work instructions and method statements, although non-routine work more common in Maintenance departments often represents the greatest risk.

In a culture of high Power Distance, it is not unusual for Technicians and Operations to expect to be told what to do, and subsequently to perform in that way. An example was given of a cleaner working at the front of the plant who generally swept in a direction which was contrary to the prevailing wind. After being witnessed doing this over a long period, the plant manager approached the operator and asked why he worked in that way. The cleaner responded that he thought it was wrong but that was the way that he had been told to do it. Incomplete or inaccurate method statements can create a far greater risk to the organisation because those undertaking the work are unlikely to challenge or criticise working methods.

With broadly neutral scores for statements relating to the quality of method statements such as *Individuals rather than the organisation generally know the best way to work, Circumstances mean we sometimes have to change the way we do things, Sometimes you have to do things that are not in the rules,* and *Following the rules is not always the best way to do things*, there has to be a heightened concern that method statements and work instructions which have been written by local managers without effective consultation may introduce ways of working which are not practical or possible given the nature of the task, work environment, or people involved.

There was a very high positive response relating to the degree of control in the way that respondents go about their work prompting the use of the word 'improvisation' during one of the interviews. In Bulgaria, there is a preference for clarity, clear rules, and predictability (high Uncertainty Avoidance) and employees are likely to feel uncomfortable in an environment where this level of certainty is reduced through the high degree of personal control in the way that they go about their work. When this was questioned in interview, employees generally indicated that they were more likely to use their discretion than to ask questions of their managers or supervisors.

In the absence of efficient, safe, comprehensive, accurate or up to date method statements, employees are likely to establish and easily justify their own workarounds (high Pragmatism). Although those workarounds are likely to be within known limits and constraints, are unlikely to take risks which could harm others (Low Individual versus Collective), or maximise reward (low Indulgence). This was reflected in a relatively high scoring response to a statement that question whether speed or following the rules was more important.

There are ways in which, even in high Power Distance cultures (particularly those that are also high Collective) method statements and work instructions can become more effective. Although some of these techniques were adopted in pockets around the organisation, this was not common practice across the site.

Environmental Factors

The use of well specified and high quality equipment is an effective way for management to positively reinforce and proactively intervene to promote a visible commitment to safety. A high response to the statement: *We have the best possible equipment to do the work* is to be expected in a culture that shares a combination of high Power Distance (Paternalistic), high Femininity and high Collectivism and this was what the survey found. In these cultures, there is a high level of recognition that employees should be protected and cared for.

Within a Pragmatic culture, where change is accepted easily and truth can become a function of circumstance, it is important that improved ways of working (including those related to safety) are embedded in a sustainable way and are reinforced through a combination of systems and training.

There was moderate disagreement with the statement that accidents happened either because of the nature of work or working conditions. This in part has arisen from a consistent message from management that it is people that cause accidents.

In an environment which could be described as high risk, high consequence, it is important that the hazards and potential for harm arising from tasks and working conditions, and from the combination of people and/or tasks and working conditions are not ignored as a consequence of an overly aggressive focus on people and behaviour related risk. Interestingly, Maintenance personnel under the age of 30 were unique in the way that they scored these factors positively, suggesting a recognition that risks do arise from the working environment and tasks that employees on the site are required to undertake. This is almost certainly as an outcome of training received outside the plant.

Management and Supervision

Organisation structure, in terms of the definition of responsibilities, is identified as one of the ways in which management demonstrate a commitment to safety culture (INSAG, 1991). The way in which its interaction with the shared values and beliefs of the employees influence organisational culture make this element a key element of a successful safety culture.

When the plant structure was changed to increase accountability at a lower (unit) level, not everyone supported that change, and managers within the maintenance function were particularly critical. The fact that there was likely to be a degree of hostility was never in doubt to the plant manager. He strongly felt that the increased accountability, combined with a greater local focus and reduced training time would accelerate the process of embedding the technological, organisational, managerial, operational and personnel, changes with reduced project risk.

The new structure has however created a sense that managers and supervisors are there to help. This was an original concern given the size of the plant and the relatively low numbers of employees operating across it. Furthermore, and as a consequence of the increased accountability, there is a perception across all employees that *managers take action when employees raise a concern*. This scored highly in this survey. This is typical of a high Power Distance (Paternalistic) culture but nonetheless serves to demonstrate the effectiveness of the new structure. There had been a concern expressed in the earlier stages of the project that across such a large site, managers and supervisors could not always be there to oversee their teams. Despite this concern, there was a strong perception on site that managers and supervisors were always available to help.

There was a notably less positive response to the statement that *managers, supervisors and planners always respond well to any concerns raised*, particularly from Operators and Technicians that responded with only a marginally positive score. This reflected the comments in interview that '*hearing other people's point of view is not normal'* and '*it is better to tell your boss to do things in the right way, carefully*'. Across this particular site, these perceptions were much more likely to be as thoughts in the minds of the workforce as they were to be real behaviours exhibited by the management team. In any event, it is likely to impact on the extent to which Technicians and Operators are likely to raise concerns directly with their manager.

Training is an important part of organisational culture generally and safety culture specifically. Whilst operational and technical skills were generally regarded positively, there was question over supervisor skills and capabilities. It had been a long time since training had been provided to supervisors and some of the more recent personnel had not received any training at all. Supervisor training was seen as specific within these circumstances and included a need to understand the plant and its processes; an understanding of the defined work management processes and their application; and the supervision of direct and indirect (contract) labour. This had not happened and created a situation where Supervisors did not know all that was necessary to effectively perform the permit to work activity.

Employee Attitudes

Employees have an important part to play in the creation of a positive safety culture. Based on a North and Western European approach, there is an expectation that employees will have a questioning attitude, a rigorous and prudent approach, and engage in communication. There is a similar expectation that a process of rewards and sanctions will be in place to support the development of an effective safety culture.

Evidence already presented indicates how high Power Distance, Uncertainty Avoidance and Pragmatism are likely to create a culture where there is limited questioning and limited upward communication. Management systems need to be established to compensate for this reality and in this case, employees believed they were subject to regular monitoring. During the interview process, employees were asked why they felt they were closely monitored. The consensus was that this was primarily an outcome of the newly installed EC&I equipment. This view was in line with the survey data which showed a higher score from Operations (where there was greater monitoring) than Maintenance.

All employees are subject to a formal annual review process. This review includes a discussion on safety and links to a bonus, paid annually. Some good changes have been made to the bonus scheme to allow reductions for safety infractions but the bonus is paid annually and the sanction is not always or consistently applied. Furthermore, much of the basis for the bonus is seen as being outside of the control of the employee, and in any event, in a low Indulgence culture, there is little discussion of money so employees do not get to hear of another's loss. Individual reward systems based on an annual payment which may or may not happen is unlikely to be valued in a culture of high uncertainty avoidance and in which indulgence is considered inappropriate.

Using the framework for nuclear chemical facilities, 'disciplinary policies with an agreed distinction between acceptable and unacceptable behaviour' are seen as an intrinsic part of nuclear professionalism. In a societal culture where the focus is collective, individual interventions are less common, and less likely to yield a collective change to behaviour. Furthermore, in a societal culture which is feministic in nature, there is likely to be much more acceptance of systemic or procedural failings, rather than human error attributed to weaker members of the group. If there is a risk of sanctions to one member of the group, there is a risk that the group may hamper efforts to undertake investigations.

Employees indicated on the survey that they *understood the consequences of not following the rules*. In fact, employees in Operations are re-trained and assessed. There was a very high level of *acceptance of employees who did not work as diligently as other*s. This is typical of the low Masculinity and high Collectivism culture. When questioned in interviews there was an almost total acceptance that some are weaker or less diligent than others.

In the main, employees have a *good knowledge and understanding of what is expected of them*. This is a function both of the high Power Distance (accepting rules without question) supported by the existence of work instructions or method statements. It was also a function of the high Pragmatism in which different ways of working had become readily accepted. Maintenance with fewer management instructions and more non-routine work are more likely to find themselves in this position than operations personnel.

Employees said in interviews that there was a good understanding of the hazards whilst undertaking tasks, but that they are sometimes less conscious of what is happening around them and the potential for incidents close by that could affect them.

Employees feel that they are well trained but whilst training is taking place on operational rules, plant and equipment, and behavioural safety, there is a training gap that relates to the safe way to carry out instructions. Even if the training gap was addressed, until the method statements and work instructions are efficient, safe, comprehensive, accurate or up to date, the value is likely to be limited. Safety inspection training is going some way towards filling the gap, but it is not a substitute for retraining and refreshment on the correct way to do the job.

An only moderate positive score for equal treatment suggests an organisation in which justified variances in treatment exist. Whilst a Collectivist culture is likely to promote equal treatment generally, differing circumstances (length of service, age, experience, etc.) are likely to create an environment in which a high Feministic culture seeks to support those in greater need, and high Pragmatism is likely to support the justification of this difference in treatment.

The changes to the structure of the Plant and the increased reliance on contract labour, has put some pressure on resources, particularly in Maintenance. This may be exacerbated by absences due to holidays and sickness. The sometimes unpredictable nature of their work means that they can be stretched at times. One young supervisor described a situation where 'trouble never comes singularly'.

Work planning

The definition and control of safety practices within an organisation are fundamental to the establishment of a positive safety culture. Much time was invested throughout the project in understanding of how work was identified, planned, organised, actioned and closed. Structured meetings amongst site personnel and a multi-stage process of risk assessment/method statement approval were well embedded within the organisation. Work Planning was largely undertaken by a Planning team that was separate from but worked closely with Maintenance. There was a greater sense of disconnection with Operations.

The systems in place are well understood and well structured, incorporating views from Operations and Maintenance to effectively plan activity. The level of permitted activity is not beyond manageable limits, and is within the capabilities of the management and supervisory team, although pressure is sometimes felt when colleague absences, unexpected work, or increases in the distance between supervised tasks increases.

Method Statements supplied by contractors are scrutinised by a number of senior personnel but evidence was presented where these had been reviewed by four people before a glaring error was spotted at the final approval stage. This was a good example of how an organisation had established a system to reduce or avoid uncertainty but which failed through a lack of understanding or communication.

There is an agreement that work is well planned generally but a low score for work planning amongst maintenance technicians, combined with a lower score for the consideration of working conditions, suggests that there is room for improvement in the planning of maintenance activities.

In pragmatic cultures, Managers and Supervisors can sit in a comfortable position believing that all is well, whilst Operators/Technicians adopt unapproved pragmatic solutions to 'surprises'.

Contractors

There is a high reliance on contractors to carry out much of the maintenance activity across the site. As such, they play a key role in ensuring asset integrity and play an important part in determining asset life and performance. Given the impact that contractors can have on the overall performance of the plant, the selection and determination of the contractor is a significant determining factor on the overall asset lifecycle.

Interestingly, there was a perception, through the interviews that many of the contractors were now managed by ex-managers of the plant, employing personnel who had similarly been employed by the plant. There is a certain irony that those now undertaking some of the more hazardous activities are those same personnel that were terminated because they were considered less likely to attune to the new working methods, and who through their departure have had the least exposure to the new working methods and the importance of following that approach.

Contractors present through this process as using sub-standard materials and personnel, and regularly fail to work in a safe way. They have been the subject of a number of safety behaviour reports, but are developing coping strategies to avoid criticism. They are not necessarily improving behaviours.

Inter-departmental relationships

It is natural for there to be conflict within a Plant. The extent to which it occurs can be influenced by the extent to which each side understands each other's position. This can be built into functional interactions through process and systems to minimise conflict. Furthermore, structuring each intervention in a more holistic manner helps to increase the sense of belonging to the wider organisation.

There was no evidence that routine tasks, whether undertaken by Operations or Maintenance caused conflict between departments. Operations are most likely to raise concerns or log defects and have the most positive perception of different departments working together.

There was also no specific evidence of problems associated with unplanned events, such as breakdown repairs (those involving the application of temporary fixes to the plant). The area of criticism seemed to come most directly from the planning meetings, decisions, and arising actions, and in particular the relationships between different maintenance functions.

Conclusions

Organisations recognise diversity, either because they see the value that it brings to their decision making processes, or because they have to, but despite this, produce standardised business systems with homogenised measures to assess and compare performance. They can include corporate policies and processes in relation to organisation structures, safety policies, procedures and practices, employee training and development, appraisals, and approaches to rewards and sanctions.

Sometimes, corporate entities implement global IT based systems to monitor the extent and commitment to compliance, often as part of the establishment of their own rigorous and consistent systems to support oversight and benchmarking processes as a part of their own governance and control systems.

Executives in corporate roles are likely to establish these systems based on best practice as it is presented in the culture in which they are operating and they are likely to work well within that sector. Unfortunately, these same approaches do not translate effectively in societies with fundamental variances in cultural dimensions. As such, the organisational structures and control systems that are developed fail to provide the anticipated improvement in performance (safety or otherwise) which is anticipated during their development and introduction. Because culture is so embedded in the individuals responsible for the systems they are operating, they do not always see how or why the disconnection exists.

Hofstede's work on Power Distance, Individualism versus Collectivism, Masculinity versus Femininity, Uncertainty Avoidance, Pragmatism versus Idealism, and Indulgence versus Restraint provides a good basis on which to evaluate existing systems and identify the necessary actions to support the translation of processes in such a way as to maximise return on investment.

Power Distance measures provide a strong indicator of the likely extent to which management style is likely to support consultative approaches (for example in risk assessment), encourage questioning from employees and effectively use two-way communication. Processes that rely on these dimensions are therefore likely to be less effective in cultures that score low values in this dimension.

Individualism versus Collectivism provides a measure of interdependence amongst employees. In individualist societies, a system based on discretion and control in what you do and how you do it, combined with personal targets and challenges are valued highly and work well. Within Collectivist cultures, learning together, working together and shared goals are likely to yield the most effective results. These can have significant impacts on the impact of different reward systems.

Masculinity versus Femininity can have a dramatic influence on appraisal and development systems, particularly those that focus on achievement, progression, personal challenges and reward. In cultures that score highly for femininity, relationships, teamwork, and job security may be much more highly prized outcomes and promotion or progression may be seen as a less favourable reward for good performance.

Uncertainty Avoidance relates to the extent to which people find work stressful, rules are clear and easy to follow, and the extent to which people value their jobs and want to keep them determine these people want to stay are the basis on which this factor is measured. As such, it amounts to a fear of the unknown. Anxiety is best reduced through efficient, safe, comprehensive, accurate or up to date work instructions, method statements, and other rules of work.

Pragmatism relates to the way that lessons of the past are reconciled with challenges of the current and the future. High scores are likely to be reflective of cautious investment, perseverance and saving. It is also likely to be indicative of an ability to accept and adapt to changing circumstances. Low scores are likely to reflect a more short term attitude.

Indulgence is a function of what makes people happy, the extent to which they feel they are in control of their life, and the importance and use of their leisure time and how that is used. A low score in this dimension can also suggest a more pessimistic society. The nature, frequency and scale of any reward can be perceived very differently across these cultures.

The way in which organisations apply systems or try to apply their organisational culture across different geographical areas creates a framework , and what and how an organisation rewards particular behaviours are all part of an organisational framework of systems and controls which will interact with the societal culture to establish the culture of an organisation of which safety is a part. This manifests amongst other ways in stakeholder perceptions of organisational control systems, work environments, management and employee behaviours.

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