CASE STUDIES

EMBEDDING SAFETY IN THE COMPANY´S CORE BUSINESS: THE "STUCK PIPELINE" CASE

1. Organisations involved

This case started as one of five case studies in the context of the research project 'Safety as core business' by TNO for the Dutch Ministry of Social Affairs and Employment (see Section 2.1). This research project is aimed at mapping the critical factors that companies face when considering safety as a part of their core business, which means that safety issues are seen as a critical element of all relevant processes and activities in the organisation, e.g. daily decisions, investments, purchasing, management of employees and work practices. After a list of positive and negative factors had been drawn up through a literature review and interviews with OSH and non-OSH (e.g. management) experts and company visits, a theoretical framework was developed: the Safety@corebusinessc model. The model was tested for practical use in case studies. One of the most interesting cases was case A, also called 'the stuck pipeline'.

2. Description of the case

2.1. Introduction

The underlying assumption of the research project was that safety issues should be closely linked to the business processes of an organisation in order to be effective. The challenge of the project was to find out how this could be done. The Safety@corebusiness philosophy was shared by the company's safety executive. It was one of her challenges to establish greater synergy between the 'business' and 'safety' frameworks. She was dealing with a company that is outstanding in its quality programmes: a lot of attention had been paid to the potential risks in the production process of the end product. However, too many accidents still occurred. Occupational safety sometimes benefits from the high attention given to the quality programme, but this is not always the case. In critical situations, environmental issues and production errors have priority over safety issues. Time pressure of line management appears to be the major reason why safety efforts are hampered. Another conventional safety programme would not have been a solution for the long term. Therefore, an assessment based on the Safety@corebusiness concept had to identify ways of embedding safety in the core business and raise safety performance to a higher level.[1]

2.2. Aims

The company found that too many accidents were occurring, despite existing safety and quality programmes. In some parts of the organisation, there was a target for 50% reduction of accidents. The safety performance and safety culture needed special attention, e.g. the use of personal protective equipment, more safety knowledge, less risk taking, more commitment of management in safety and better communication on safety issues. Reporting of accidents and dangerous situations also had to be improved. In other words, the focus was on safe behaviour by the employees. Measures to improve safety behaviour require the involvement of everyone from management to the shop floor and need to be connected to the actual work processes in order to last. The Safety@corebusinessc model gives an assessment of the organisational processes that are crucial to connect safety to the core business.


2.3. What was done, and how?

The company is a world-class manufacturing company that produces high-quality products in metals and synthetics. It is part of a Canadian group and has about 4,600 employees. In 2003 the number of accidents with leave was 99 and without leave 503. This is about 0.02 accident per employee. The main risks are noise, physical load and machine safety risks.

First the company was assessed using the Safety@corebusiness model (1). Based on the results of the assessment an improvement plan was made to narrow the link between safety and core business (2). Then the intervention was executed (3). Finally, the first step was taken to evaluate the outcome of the intervention (4).

(1) The assessment tool

The Model Safety@core businessc consists of structural, cultural, learning and external factors that are potential links between safety and the core business process (see Figure 1). The result is an overview of the gaps between safety and core business – these are the potentials for improvement.

Figure 1. TNO Model Safety@core business©
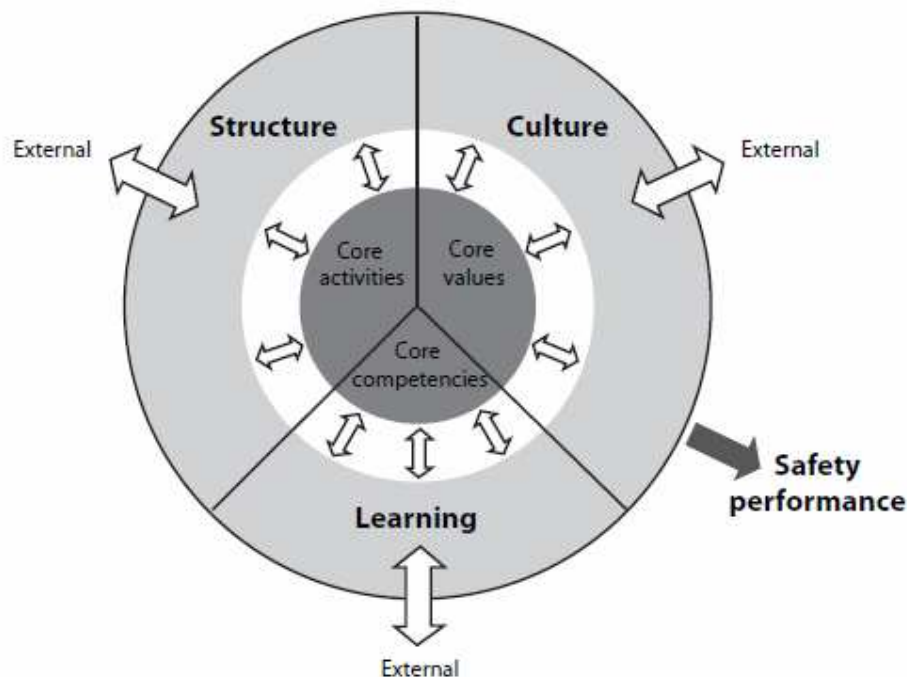
Core business characteristics are described as:

- core activities: the activities which the company defines as core business, i.e. activities that are vital and seen as strategically significant;
- core values: the values shared among management and all employees;
- core competencies: the competencies necessary for the core business activities including individual and collective learning;
- external factors that influence the management of the core business.

Safety characteristics are described in terms of:

- safety structure (all structures, systems and processes, relations between departments and employees and pattern of interactions, installed to ensure production in a safe manner);

- safety culture (all shared values, norms, perceptions and assumptions about safety and risks);

- safety learning (how the organisation and individual employees learn from earlier experiences);

- external factors that influence the management of safety.

TNO has used this model to develop research protocols that enable the characteristics of the core business and the characteristics of the safety activities in an organisation to be defined. This scheme is translated into protocols for interviews and visits, and an audit tool to assess the company. It is used to describe the different ways in which companies describe their own core business and, at the same time, it describes the different approaches they use to deal with safety. The next step was to describe in a qualitative way the similarities and discrepancies between the two.

Besides this company, five other companies were assessed using the Model Safety@core business©. The members of the four-man project team from TNO were divided into various combinations of two, so that each researcher worked on several companies with a different colleague. Each company was visited for full days two or three times, but not on consecutive days. Documents regarding the core business and safety with management, supervisors, employees and employee representatives.

The interview with the general manager focused on aspects of the core business. The main question was: 'what is the company's reason for existing?' Other specific questions related to the cultural, structural, learning and external aspects of the core business model. The other interviews dealt primarily with the structural, cultural and learning aspects of safety in relation to the core business. The results of all 5 cases were discussed in the project team and each company was scored on a 5-point scale (1=not coupled, 2=hardly coupled, 3=sometimes coupled, 4=coupled, 5=completely coupled).

(2) The results of the assessment

Table 1 gives the summarised results of case company A and the four other case companies. The higher the score, the more safety activities are embedded in core activities.

Table 1. Summary of semi-quantified company scores for the level of coupling of safety and core business (five-point scale)

	A	B	C	D	E
Structure	3.7	2.9	4.3	1.7	2.4
Culture	2.7	3.7	4.7	1.7	3.4
Learning	3.5	3.3	4	1.5	2.8
External	2.8	3.5	3	3	2.5

Some examples are:

- a structural connection: in the management meetings quality figures (e.g. regarding supply liability) are dealt with next to occupational safety figures;

- a cultural gap: there is a tension between profitability and abstract values such as safety. Safety investments are not seen as issues that can be related to financial benefits. The negative consequences of safety are also not seen as potential strategic assets;

- a cultural gap: the safety aspects of the end product are more valued than the safety aspects in the production process of the product. In addition, environmental issues get more attention because of their relation to the end product;

- a cultural/structural gap: production targets are evaluated at the end of each day; OSH indicators on the other hand are evaluated once a month and are thus less pressing;

- a connection in the learning mechanisms: safety incidents and accidents are also seen as process failures and thus as a potential for process optimalisation (efficiency);

- a gap in the learning mechanism: the company wants to be 'top of class' from a technological point of view, but this is focused on the production processes and not on safety knowledge;

- an external connection: a 'noise issue' has already shown that occupational issues can be a risk for the image of the company equal to product-related risks.

The general results of company A were moderate to good. The weak spot in the safety and core business level was found in the cultural aspects. The company showed more discrepancies between its safety culture and core values than other companies with similar management systems.

Primarily, this seemed attributable to the strong focus on production and product safety, and on a lack of knowledge about the possible consequences of a lack of safety in the work process. The direct supervisors appeared to be the strategic links in the system: all lines for production and other fields come together in their function. Because of this, they suffered from task overload and time pressure.

(3) The intervention

Conclusions and examples of good and poor relationships between safety and core business were presented by TNO to the company's representative, and discussed. This diagnosis showed that there was a discrepancy in the way safety on the one hand and product quality on the other were valued (and prioritised). Although supervisors had the intention of giving safety the same priority as quality issues, time pressure prevented them from taking the necessary safety action. In an attempt to come up with successful improvement measures, the following question was asked: 'what really motivates management and supervisors?' The answer was that company X is famous for its quality programme. Everybody, including top management, was very proud of the company's quality achievements. If a connection between safety and these successful quality programmes could be made, safety could profit from this success.

The intervention plan was drawn up in a meeting with the safety and quality representatives of the company and the TNO representatives. In this meeting the history of the company's quality culture and the possible connections to safety management were discussed.

In this business there is a historical high attention to efficiency. Efficiency programmes such as Lean Manufacturing and World Class Manufacturing (WCM) are a 'must' for companies in this sector to survive. The successful WCM programme in company X was of strategic importance.

(4) Results

The meeting with the safety representative and quality representatives led to the understanding that safety and quality have more in common than was previously thought. Quality losses and safety incidents have the same 'precursors', such as communication failures, suboptimal organisation, problems in man-machine interfaces, etc. It actually appeared to be a simple step to embed safety in the existing quality circles: adding safety standards to quality standards and topics.

Moreover, the insight that safety and quality are connected meant the beginning of a positive development of the safety image. Safety is no longer an issue relating to unsafe working places, but the importance of safe behaviour is now valued. The idea that safety should be a part of the core business has now been absorbed into the general management philosophy of the organisation.

2.4.   What was achieved?

This project has led to a new inspiring cooperation between the safety and quality department, and to more effective and efficient safety activities. The expectation is that this initiative will also relieve the workload of supervisors.

Other results are that:

- managers have a more advisory role and are fully responsible for safety;

- employees now recognise when something has gone wrong and there is a sense that something has to be done. The extent of self-direction has increased;

- culture and behaviour are crucial and evolve along with these developments. Success generates success. Also for safety, there need to be successes that can be celebrated. In the past, companies tended to forget this;

- employees on the shop floor are more involved in safety. It has now become a matter of 'craftsmanship'.

At present the time frame is too short to verify whether the number of accidents within the company has fallen, or whether employees are wearing more personal protective equipment. That is why an impact measurement was performed based on employee behaviour, as the described improvement approach is focused on this behaviour. Behaviour is difficult to measure, however. A questionnaire was developed for this purpose (as a measurement tool) based on the intention to behave safely, combined with the measurement of environmental factors that shed light on the likelihood that this intention will lead to safer action. In social science it is customary to find out people's intentions. This means that people are asked whether they plan to behave in a certain way when a certain situation arises. This intention is a good indicator for the effective behaviour.[2] For example, an employee might have the intention of wearing safety gloves. He will not wear them, however, if they are not available or difficult to obtain. A questionnaire was developed to measure intention, based on social norms, attitude and intention. A checklist based on the Tripod model[3] was used to measure factors concerning the organisational environment

The Tripod model measures the environmental factors that influence safe behaviour. The starting point is that human actions are most effectively improved by improving the quality of the individual's environment. The focus is on organisation factors, also known as latent failures. There are 11 clusters of organisation factors or Basic Risk Factors (BRFs). The 11 BRFs are: Design, Hardware, Maintenance, Housekeeping, Error Enforcing Conditions, Procedures, Training, Communication, Incompatible Goals, Organisation and Defences.

The instrument that was developed to measure the safety effects was applied to the improvement approaches in company A. The questionnaire was submitted to two temporary improvement groups (TIG) in the company. One of the TIGs had focused explicitly on safety, while the other had not. Unfortunately the environmental factors in this company had not been measured using the Tripod model. Results showed that the intention to act safely was higher in the group that focused explicitly on safety, compared with the group that did not. Introducing a safety improvement group thus seems to lead to safe action. The effect on the number of accidents has yet not been felt. This could, however be due to the short time-frame of the measurement. Effects might only become visible after some time.

Problems faced

When responsibility for safety improvement is placed at a low level on the shop floor, there will be questions and requests from that same shop floor which need to be answered or met. It is important that the people on the floor receive sufficient support in order to be able to really change something, while not being hampered by executives. Consequently, an important focus of the new method is the presence of sufficient possibilities for making adjustments. People now learn by themselves to recognise situations that are not safe and that need to be

[2] Fishbein M. & Ajzen I. Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison Wesley, MA, Reading, 1975.
[3] Reason JT, Shotton R, Hudson, PTW, Groeneweg J and Wagenaar WA. Tripod: *A principle approach to Safety Management*. Shell International Petroleum Mij Report EP 89-0310, 1988.

remedied. Employees are given the opportunity to find solutions themselves, in order to implement improvement. But in so doing, they depend on the time and the will of others, i.e. the availability of executive expertise. The example has been mentioned of a 45-year-old man, who worked in a standing position and who had indicated that he wanted to work with a PC mat. The answer from Facilities was: 'If I do this for you, I will shortly be ordering another 100 of these mats.' This type of practice works as an obstacle. Improvements need to be picked up and implemented quickly. The new approach thus requires a different type of (executive) employee, with a higher (internal) customer orientation.

2.5. Success factors

The key to this success lies in the relationship between the world of quality managers and that of the safety manager. It has already been mentioned that the causes of safety and quality problems overlap. It has also been shown that the success factors of improvement approaches are similar. In the field of quality problems as well as in the field of safety, it is necessary that:

1. the situation is made visible, for example with photos that are easily recognised;

2. the issue is brought closer to the people;

3. people can change something themselves (ownership).

This approach, combined with WCM, will increase employee involvement as regards safety and quality. The functional approach of safety is outmoded. Safety also has to be attractive. In this company quality means 'success'. When safety is included in this equation, people are stimulated by safety and enjoy paying attention to safety. It is important to effectively celebrate successes, especially at a low level. In this company Lean & Mean was initially seen as a 'must', but that has now changed into a shared experience. By experiencing/feeling you can include employees in your efforts to improve. Safety now follows this stream. The first ISO initiatives at one time were imposed by the customer. Legislation and potential image problems enforce environmental measures. The necessity to act is less clear for safety. In this company the anchoring of safety in Improvement Teams has led to the realisation that learning from accidents is a value-added activity. When the emphasis is on productivity and the reduction of disruptions in a company, safety becomes part of the company's value stream.

2.6. Further information

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2.7. Transferability

There is a Safety@corebusiness assessment tool that can, in principle, be applied in all branches. The method has been tested in several sectors of the economy, in large companies and in companies with fewer than 100 employees. The diagnosis of the weak embedding of safety in core business does yield different types of improvement approaches, depending on the type of company. At present, this still requires an expert approach. The development of a self-assessment method is currently ongoing. It is currently necessary to enlist the support of safety and health professionals in this approach or vision. It is not currently possible to use this instrument without expert support. The improvement approach, i.e. the embedding of safety in quality programmes, has already been applied in a different manner within this company and another company. The underlying concept is that safety standards are included, next to quality standards, thus realising involvement and self-direction throughout the organisation as far as the shopfloor. Many companies have implemented quality programmes such as WCM or TPM. The exact form depends on the quality system.

3. References, resources:

- http://osha.europa.eu/en/publications/reports/mainstreaming_osh_business

EU-OSHA – European Agency for Safety and Health at Work