Universiteit
Leiden
The Netherlands

The influence of leadership on the prevention of safety incidents: on risk reduction, leadership, safety principles and practices

Roggeveen, V.

Citation
Roggeveen, V. (2022, June 28). *The influence of leadership on the prevention of safety incidents: on risk reduction, leadership, safety principles and practices*. Retrieved from https://hdl.handle.net/1887/3420665

Version:	Publisher's Version
License:	Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden
Downloaded from:	https://hdl.handle.net/1887/3420665

Note: To cite this publication please use the final published version (if applicable).

Leadership is a bit like 'good art' – we may have difficulty in defining it, but we know it when we see it (or experience it).

DAVID PARDEY

4 Safety Leadership Model

In this chapter we will place the three core notions of this research into a three-nodes Safety Leadership Model. We also will specify the characteristics of each notion and utilise these to upgrade the model.

4.1 Safety Leadership Model Version 1

We developed a 'Safety Leadership Model' to discover the actual influence of leaders in the reduction of safety risks, as well as in increasing safety. This model represents the hypothesised ways in which leadership, mediated by risk management as well as directly, affects the safety of the primary process of organisations. We elaborate on this Safety Leadership Model, showing the mutual relationship between the behaviours of leaders, risk management and safety. Figure 21 below shows the *Safety Leadership Model Version I*.

FIGURE 21 Safety Leadership Model Version I

This model, containing the Leaders' Behaviours, Risk Management and Safety nodes, forms the basic structure of the online prospective survey, employed to acquire proactive data about the way leaders influence safety in their organisations.

This Version I of the Safety Leadership Model includes two arrows; one arrow representing the hypothetical influence of leaders' behaviours on risk management, and another arrow representing the hypothetical effect of risk management on safety. These arrows depict the processes behind the central query of this research: "Can the leaders of organisations help to prevent safety incidents?" (ref.3.3)

Following the development of the Safety Leadership Model, we developed a set of questionnaire indicators. We first identified a framework, the characteristics, with which to specify the meaning of the three nodes of the model. These characteristics are presented in the following sections.

4.2 Characteristics

We operationalised the theories and concepts discussed in Chapter 2 (Theory, Concepts and Context) to identify safety characteristics, risk management characteristics and leadership characteristics. In the following sections we present the outcomes of this operationalisation process.

4.2.1 *Safety characteristics*

In this study, *Safety* serves, alongside risk management and leadership, as one of the three core nodes of the Safety Leadership Model.

An important element of our research is exploring the effects of leaders' behaviours where it concerns the prevention of safety incidents. This implies the need to define a set of relevant indicators which determine the level of control over the primary process, and implicitly indicate the plausibility of the occurrence of safety incidents. Generally, this is called the 'safety state', which is often established by measuring/counting the number/severity of (near) incidents. But defining the safety state implies a wider view than a singular focus on incidents. We argue that establishing the safety state of an organisation requires understanding safety-related indicators from a historical, a present, and a future perspective.

Safety incidents are considered unexpected operational disturbances (unplanned deviations from planned activities), which mean that the actual occurrence of safety incidents is not something the people involved (including leaders) are able to plan or control in terms of time, place or consequences; safety incidents happen unannounced, seldom give a pre-warning, appear in a haphazard manner and lead to unpredictable effects, from near-miss incidents to disastrous effects on the fundamental values of organisations. In addition to these uncertain and uncontrollable factors, the observable consequences of materialised events are only informative about the past historical state of the

primary process concerned. Regarding this restriction in awareness, Ale[1] notes:

> We cannot really assemble data on the effects before they take place and we cannot assemble data on the probability either. … When and if certain effects take place, there will be absolute certainty: the effects will have taken place. And before that there is only probability in the true Bayesian sense: a degree of belief that certain negative – or positive – effects will result from our activities. The degree of results may be increased by factual information, but it remains a belief …

Safety incident information in isolation is thus considered inadequate as a representative indicator for addressing a leader's influence on the prevention of safety incidents. In general, as the opposite of risk, there is no such thing as an objective indicator of the safety state of (the primary process of) an organisation.[2] As Slovic[3] phrased it:

> … danger is real, but risk is socially constructed. Risk assessment is inherently subjective and represents a blending of science and judgment with important psychological, social, cultural and political factors.

Within the context of this research, we therefore take the judgment (or belief) of professional, skilled and experienced people, who know their primary processes by heart and who are facing the risks of these processes on a daily basis, as the most reliable (or least unreliable) indicator of the state of an organisation's safety. For convenience, we will further refer to the state of safety simply as *safety*.

In order to obtain a comprehensive indicator of the actual safety of an organisation, we employ three different characteristics to address the leaders' effectiveness in the prevention of safety incidents. These entities are: 1) Event History, 2) Sense of Safety and 3) safety Risk Potential. We argue that the amalgamated data offers a representative picture of in historical, current and future perspectives.

Next, we will elucidate these three characteristics of the safety of an organisation.

4.2.1.1 Event History

As mentioned above, materialised events are indicators of the past. Incident reports show how an organisation has performed historically, and suggest the safety of the primary process concerned at the time the events occurred. As such this might not be indicative of its present safety, but when historical data is compared to expectations and benchmarked with organisations in relevant business sectors operating comparable primary processes, there may be an indication of whether the leaders in the organisation in

1 Ale (2009), p. 8.
2 Van Asselt (2000), p. 433.
3 Slovic (2001), p. 23.

question are more or less effective in their attempts to prevent operational disturbances than their peers in other organisations.

An inherent problem related to using incident statistics as performance indicators is that improved performance implies a reduction of information. This especially applies to major safety incidents, which, if compared with minor incidents, occur less frequently, but incident statistics are factual and hard, and therefore considered reliable indicators by many organisations and institutes.

4.2.1.2 Sense of Safety

The Sense of Safety characterises the effectiveness of a leader's influence in terms of the present safety of the primary process concerned, as envisaged by all members of the organisation. This characteristic is included in the safety construct as it relates to the conviction that people who are part of the operational aspects of a process know what to be aware of. Sometimes people in operations are accused of not being safety conscious or risk aware, but this is not always the case. People may take risks in their daily operations, but this should not be interpreted too easily as a lack of awareness.

Depending on the shared values and beliefs maintained by the members of an organisation, people are more or less enabled to cope with these trade-off challenges in a safe way. In certain organisations all identified safety risks have been eliminated or are sufficiently controlled. There is then no need to work around agreed procedures and instructions, and interrupting production to take care of suspected safety issues is seen as good practice. In other organisational cultures it is an operational reality that people feel obliged to take shortcuts and perform other substandard acts in order to achieve what they believe is expected from them. In some organisations these practices are entirely accepted and leaders (supervisory/managerial staff) even may turn a blind eye, but after an event has taken place, the same people classify these practices as unsafe acts or even violations. In addition, albeit probably with more caution, these acts continue to be practised as long as people are obliged to operate in the same environmental and organisational context, which encourages risk taking behaviour in order to achieve operational targets. It is also understood that personal factors, such as peer pressure, also may play an important role in this.

The operational realities sketched above might indicate ignorance or fatalistic orientations among people in operations, but although regularly suggested, these practices are not necessarily an indication that people are not aware of the safety risks to which they are exposed. They often know the risks better than anyone else but people in operations may have their own valid personal reasons for using different priorities than those expected by people who do not understand what it means to work in an environment in which the challenges of a primary process determine the flavour of the day. Detailed knowledge of the behavioural particularities of the primary processes and intuition developed by a sufficient dose of operational experience ensure the continuity of many risky primary processes but sometimes people in operations and their leaders misjudge the outcome of their decisions.

It is precisely this operationally-liaised population who knows which particular risks are, often latently, present. When approached in a just, non-threatening manner, their sense of operational safety is a reliable resource when assessing it.

4.2.1.3 Safety Risk Potential

The safety Risk Potential characterises the safety of operational processes with reference to the future. Different primary processes, conducted in different business sectors, imply different types of safety risks. Competent people experienced in the conduct of a particular primary process have personal as well as collective impressions of the plausibility of operational disturbances. They execute their tasks with these impressions in their minds. They are convinced about the correctness of their expectations with respect to the safety Risk Potential of the primary process, and make behavioural decisions based on these expectations. People's behaviours (leaders and followers) are thus closely related to their expected exposure to potential safety risks. This expectation is an indicator of (un-)safe behaviour by the people involved in the conduct of primary processes.

4.2.2 *Risk Management characteristics*

Risk Management is one of the three core nodes of the Safety Leadership Model in this study, alongside Safety and Leader's behaviours.

4.2.2.1 Risk Reduction Cycle

An increase in safety is operationalised in this study by reduced risks. We argue that the ultimate objective of risk management is *reducing* risks, and that risk assessment is the master key to risk reduction. The structure of the risk reduction process can be visualised as a five-phase model, the so-called *'Risk Reduction Cycle'*, which encompasses the following phases: Recognition of risks (recognition and sensemaking), Ability to intervene (opportunity, knowledge and skills), Motivation to intervene (the desire to stabilise the situation), Courage to intervene (daring to put safety first) and remedial Action (removing instability).

The rationale underpinning the cycle is that risk reduction is optimal when all phases are fully respected and accomplished. When that is the case, all controls and defences are in shape, and an organisation has achieved the highest feasible level of risk reduction.

In order to ensure the operational applicability (fit-for-purpose) of this Risk Reduction Cycle, the initial draft of the cycle was developed through an iterative, or user-centred design process. The initial design has thus been exposed to critical evaluations by various groups of safety experts in different settings (training course participants, symposium delegates, attendees of presentations, etc.) The cycle was fine-tuned on the basis of the results of these evaluations. This final Risk Reduction Cycle was considered comprehensive with respect to all aspects of the risk reduction process. The final version of the Risk Reduction Cycle is explained below.

4.2.2.1.1 *Recognition of risks*

In this first phase of the Risk Reduction Cycle the focus is on the quality and completeness of risk information. Does that information represent reality and are people aware of the threats they are exposed to? Where risk information is lacking, risk control cannot be sufficient. The result of adequate risk information is optimal awareness of risk. This risk reduction phase serves as the foundation under all initiatives to reduce risks and secure the primary process.

Analysis of this condition could have answered the question whether the potential for these safety incidents was widely known as well as the question whether the people involved were aware of the risks they were running.

4.2.2.1.2 *Ability to intervene*

Being aware of the existing risks, people must understand what to do and have the knowledge to do so.[4] Once people are aware of the risks that threaten the organisation's safety stability, they should know what to do in order to prevent a risk from escalating to an irreversible event. Depending on the organisational possibilities and individual knowledge and skills people may select one of three risk mitigating options: limiting the *severity* of identified hazards, reducing the *likelihood* of triggering an adverse event, or reducing the *exposure* of people, assets, the environment and the continuity of the organisation's primary process. By this understanding they know what action should be taken in order to reduce the identified risks to an acceptable level. Also, this includes a requirement for the presence of knowledge on site; people with the appropriate ability to intervene (conducting the required risk-reducing actions) must be available at the right time on the right place. Analysis of this condition could have answered the question whether the people involved were really sufficiently qualified and experienced.

4.2.2.1.3 *Motivation to intervene*

Once people are aware of the existence of safety risks and they know what to do to reduce these risks and have the abilities to do so, they have to be motivated to realise the required risk-reducing activities. In order to transform knowledge and understanding into action people have to be willing to do so. Legislation, Governmental Rules and Regulations as well as requirements by insurance companies or commercially important clients are strong motivators; there are no excuses for non-compliance with obligations being monitored by the parties mentioned here. The incredible decrease in fatal accidents (70% in 3 years) after the introduction of Life Saving Rules in the chemical industry and a similar effect (50% in 5 years) in hospital after increased attention by the international community, show that intrinsic motivation together with threatening reputational damage works. The key question people ask themselves here is: "What is in it for me?" Based

4 Van Kampen, Van der Beek, Steijn, Groeneweg and Guldenmund (2017).

on the answer to this question the questioner will be motivated to act or not to act.

4.2.2.1.4 *Courage to intervene*

After someone has decided that intervening is the right thing to do, he will select what action to take. In this crucial phase he also decides whether he is the right person to take the trouble to mitigate the identified risk, or deny that the risk is a threat to the safe conduct of the organisation's primary process and leave the mitigating action to others. Here the concept of moral courage (ref. 2.2.7.4) is an essential behavioural property.

In cases where people have the courage to intervene, safety is the most important thing for them, and other priorities are possibly compromised. In that case, there is an opportunity to mitigate the identified risk, however, the actual effect of this 'courageous' decision still depends on how this intervention is followed-up.

4.2.2.1.5 *Remedial Action*

The output of the 'Courage to Intervene' phase results in either *intervention* (potentially leading to mitigation of the identified risk), represented in Figure 22 by the lower return line (leading to the 'Action' phase) or *no intervention*, represented by the upper dotted return line (leading to 'persisting instability' and leaving the risk as is). As long as nobody has decided that safety is most important, the risk remains and the potential of a safety incident also remains.

The Risk Reduction Cycle as described above can be graphically visualised, as shown below.

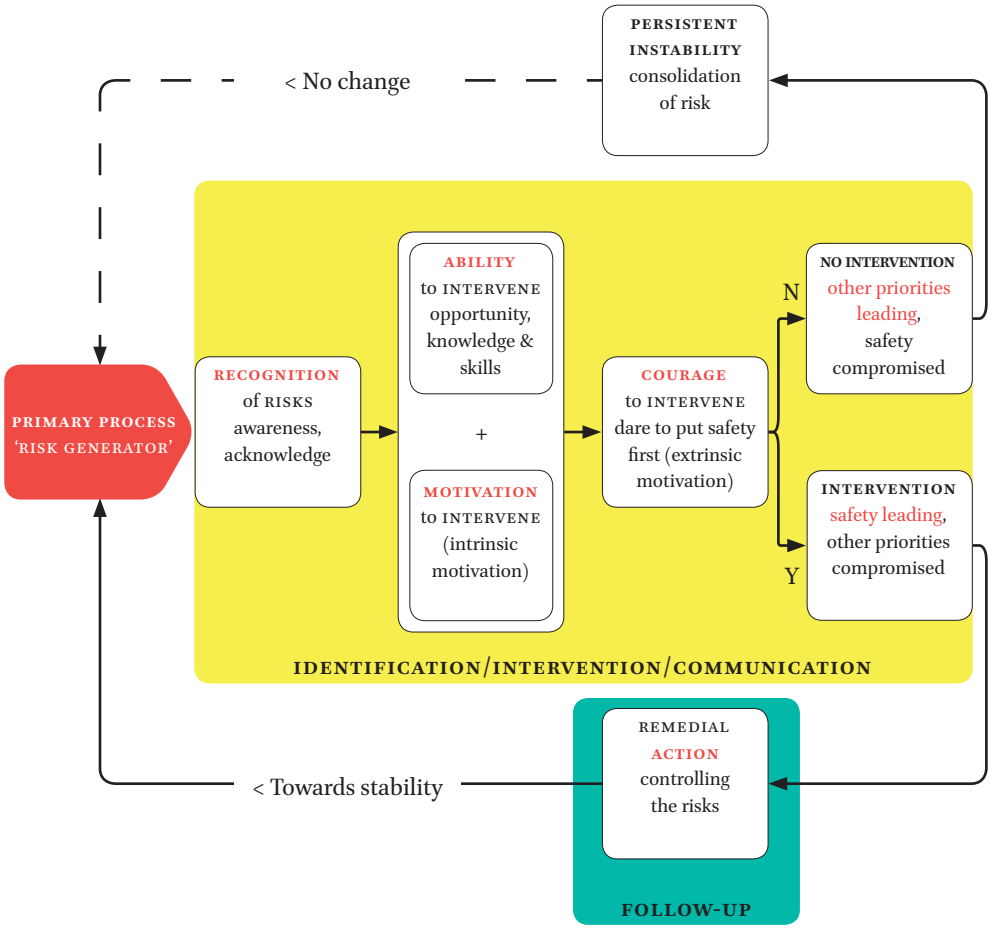

FIGURE 22 Risk Reduction Cycle

In Figure 22 the five phases of the Risk Reduction Cycle are embedded in a circular model.

4.2.3 *Leadership characteristics*

In this study, Leadership serves, in addition to Safety and Risk Management, as one of the three core nodes of the Safety Leadership Model.

The way leadership is practised, is often explained by mentioning a leadership *style*. Leadership styles describe the conceptual principles of leadership according to certain leadership theories. On a more fundamental level, three underlying behavioural dimensions of leadership, so-called 'human motives' are identified; achievement, affiliation and power. These dimensions refer to different motivational strategies by leaders in relation to their subordinates. In this research, these strategies are referred to as three 'leadership orientations'; Task, Relation and Self orientation. These orientations contain elements of

different leadership styles, but overlap these styles and transcend their boundaries.

4.2.3.1 Task-oriented leaders

The main aim of Task-oriented leaders is to achieve production targets. Task-oriented leaders set challenging goals and expect to reach the highest performance. They monitor their team members closely to ensure the continuation of the primary production process. They are optimistic, and trust their intuition when questioning which decision to make. Task-oriented leaders believe that focus on procedures leads to better results, but at the same time they "have guts"; they do not consult with others, but do what they deem right, even if procedures prescribe otherwise.

4.2.3.2 Relation-oriented leaders

Relation-oriented leaders are friendly people. They show compassion and are attentive vis-à-vis their team members. The display social and enthusiastic behaviour. Relation-oriented leaders are good listeners and take the time to communicate. They are honest, sincere and incorruptible. Team members who work for Relation-oriented leaders are rewarded for their efforts.

4.2.3.3 Self-oriented leaders

Self-oriented leaders are dominant people. They behave in an individualistic way and avoid involvement with their team members. Self-oriented leaders have an authoritarian way of communicating, and always have the final word. They claim credit for work done by others, and sometimes behave in a hostile way. Self-oriented leaders need to be monitored regarding taking unacceptable safety risks.

4.3 Safety Leadership Model Version II

We presented Safety Leadership Model Version I in Section 4.1. In the previous sections we added characteristics to the three nodes of this model. In this section we will enhance the Safety Leadership Model Version I to a Version II model by including these characteristics. As a consequence of including the characteristics, we will retitle the nodes: 'Risk Management' to *Risk Reduction Capacity* and 'Leaders' Behaviours' to *Safety Leadership*. We explain these changes below.

4.3.1 *From Risk Management to Risk Reduction Capacity*

In the context of this research, the level of risk reduction is determined by investigating the perceptions of the online proactive survey respondents regarding the five phases of the Risk Reduction Cycle: Recognition, Ability, Motivation, Courage and Action (Figure 22).

In Version II of the Safety Leadership Model, we refer to the aggregated scores of these perceptions as the *Risk Reduction Capacity*. Finally, we propose that the level of Risk Reduction Capacity is an indicator of the opportunity for safety incidents to occur, where a low level of Risk Reduction Capacity relates to a high opportunity of occurrence, and vice versa.

4.3.2 *From Leaders' Behaviours to Safety Leadership*

Where people in the same organisation operate as a group to achieve shared goals, they do not act as independent individuals, but they co-operate in order to complete the tasks which their leaders consider as required to achieve the organisation's goal. Each member of the group possesses individual competences matching the requirements and responsibilities of their specific assigned tasks. In conjunction with the specific circumstances as occurring in their day-to-day work, the different tasks are divided among the members of the group and relate to the specific knowledge, skills and other relevant properties of the individual members.[5] Operational tasks are associated directly with the production of intended added values (i.e., products or services); altogether these tasks represent the primary process (ref. 2.4.1.3).

The Leaders' Behaviours node in the Safety Leadership Model includes the way leaders behave when dealing with the prevention of operational disturbances. We distinguished three characteristics of leaders' behaviours as orientations; Task, Relation and Self orientations (ref. 4.2.3). In Version II of our Safety Leadership Model, we refer to these characteristics as *Safety Leadership*, which we define as *all activities that leaders conduct with the objective of preventing operational disturbances, which may* (*potentially*) *result in a safety incident*.

4.3.3 *Safety Leadership Model Version II*

As explained above, we included the three leadership orientations (Task, Relation- and Self-orientation), as well as the five risk reduction phases (Recognition, Ability, Motivation, Courage and Action) and the three safety characteristics (Event History, Sense of Safety and Risk Potential). We also retitled two of the three nodes. These modifications resulted in Version II of the Safety Leadership Model, which is shown in Figure 23 below.

5 Kotter (1999).

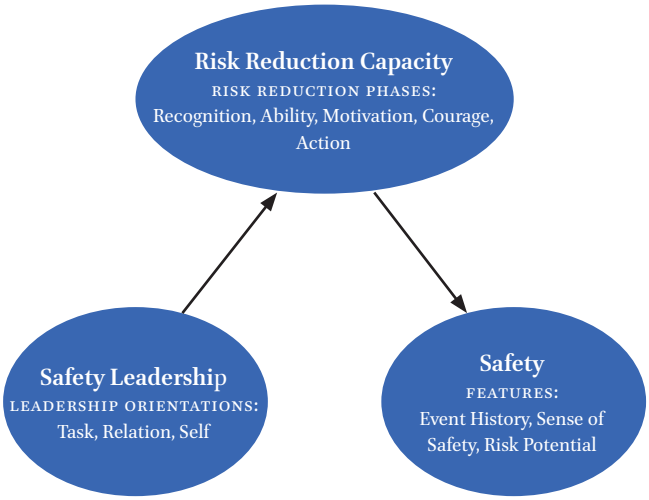

FIGURE 23 Safety Leadership Model Version II

We developed an online prospective survey questionnaire based on the Safety Leadership Model Version II. In order to test this questionnaire in terms of validity and reliability, as well as to obtain an indication of the relevance of the questionnaire indicators and its practical applicability for the target population, we conducted a pilot survey among a limited group of relevant people. The next chapter describes the design, conduct and outcome of this pilot survey.