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

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Reversibility suggests that ‘leaders’ know who they are through the eyes of ‘followers’ and, likewise, ‘followers’ can only know themselves as ‘followers’ through the eyes of their ‘leaders’.

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### 3 Empirical research

In this chapter we present the scope of the study, our basic assumption, the principal research question and related sub-questions and the design and methodology of this research.

#### 3.1 Scope of the study

This research refers to the primary processes of private as well as public organisations; that is, processes performed to achieve the conversion or transformation of source materials, data or services in order to achieve certain monetary or social objectives. According to the Oxford Dictionary, an organisation is considered ‘*an organised group of people with a particular purpose*’.<sup>1</sup> When we use the term *organisation*, we assume the presence of a certain structure, where leaders steer people conducting operations in order to achieve pre-defined goals.<sup>2</sup> We focus on organisations operating in different business sectors in the Netherlands. These organisations cover the following six specific business sectors: tank storage, hospitals, oil and gas, rail infrastructure, process industry, general infrastructure and one general sector, called ‘other’.<sup>3</sup> These sectors have been selected because their primary processes are ‘safety-critical’ and include relatively high safety hazards and are therefore considered vulnerable to safety incidents leading to major consequences.<sup>4, 5</sup> Also, these sectors are considered as relatively mature where it concerns their policies and practices to prevent operational disturbances. These organisations are operating in different sectors and their specific types of risk are considered to be of different natures as well. This means that their individual risk management practices, which may work well in their own organisation or sector, may not be effective at all in the different setting of another organisation or sector.<sup>6</sup> However, in all sectors concerned, the primary objective of risk management is identical: prevention of safety incidents by managing safety risks.

1 Oxford University Press (1989).

2 Hale and Glendon (1987).

3 The group ‘other’ is a mix of respondents whose sector did not match any of the other six sectors.

4 Onderzoeksraad voor Veiligheid (2013d).

5 Venema, Den Besten, Klauw and Ybema (2013).

6 Guldenmund (2010).

In our research we consider the leader in their position as an individual, responsible for ensuring the sufficient control of processes and prevention of incidents, as a preventer of accidental events. This is about the ways in which leaders lead their people, and the effectiveness of their leadership where the management of safety risks and prevention of safety incidents is concerned. Contingency planning or emergency responses provided after a safety incident has occurred are outside the scope of this study. In order to determine the contribution that leaders make to incident prevention, we will approach their role from a prospective as well as a retrospective point of view.

### 3.2 Basic assumption

Many different safety risks are associated with the various primary processes of different organisations. These risks are inherent to the work of these processes and do not disappear by themselves, but risk can be reduced by taking measures.<sup>7</sup> The process aimed at reducing risks is called risk management. To execute this risk management process in an optimal way, leaders need to create a safe environment in which their team members are prepared to support them in their efforts to prevent operational disturbances.<sup>8</sup> The way in which leaders influence their subordinates determines whether their followers are willing to co-operate or not. This willingness depends a great deal on the people's perceptions of safety. As a basic assumption, however, *we assume that leaders play a key role in preventing safety incidents.*

### 3.3 Research enquiries

As enforced in Dutch legislation (e.g., Arbeidsomstandighedenwet, comparable with the UK Health and Safety at Work Act), the responsibility for accident prevention in organisations lays primarily with the people who are considered to control the organisations' operations, i.e., the individuals occupying the highest hierarchical position in those organisations (CEOs and the like), who may appoint other leaders (managers and supervisors) to assist them in the fulfilment of their obligations.<sup>9</sup> This implies an interesting paradox: on the one hand, we assume that all people involved in organisations are committed to undisturbed operations, working in well-controlled processes resulting in an optimal output. On the other hand, we see that these operations themselves generate safety risks resulting in material damage, personal injury and economical/reputational losses. Here, conflicting demands for leaders seem to appear.<sup>10</sup> Based on these seemingly incompatible goals, we wonder how leaders cope with these dilemmas and what kind of trade-off decisions they will make.

<sup>7</sup> Ale, Baksteen, Bellamy, Bloemhof, Goossens, Hale, Mud, Oh, Papazoglou, Post and Whiston (2008), p. 182.

<sup>8</sup> Edmondson (1999).

<sup>9</sup> Arbeidsomstandighedenwet (2004).

<sup>10</sup> Dekker, Hollnagel, Woods and Cook (2008).

### 3.3.1 *Principal research query*

Our research is about the role of leaders in preventing accidental events in their position as the individual responsible for ensuring the sufficient control of processes and prevention of incidents. This is therefore about the way leaders lead their people and the effectiveness of their leadership where the management of safety risks is concerned. Contingency planning or emergency responses provided after a safety incident are outside the scope of this study. This study's principal research query is thus: *"Can leaders of organisations help to prevent safety incidents?"*

### 3.3.2 *Research questions*

In order to resolve the principal research query stated above, we proposed the following questions regarding the relationships between leaders, safety and risk:

1. Does risk reduction relate to safety in organisations?
2. Do the behavioural orientations of leaders relate to risk reduction?
3. Do the behavioural orientations of leaders therefore relate to safety in organisations?

### 3.4 *Research design*

This study was conducted in the following business sectors: tank storage, hospitals, process industry, oil and gas exploration and production, general infra, rail infra and general industries. All participating organisations are based in the Netherlands. Regarding safety incidents, the primary processes in these sectors are considered to carry 'high safety risks', potentially resulting in major incidents threatening people, assets and/or the continuity of primary processes. This consideration was confirmed by 46% of the respondents, who indicated that in their organisation a safety incident leading to multiple fatalities could occur; additionally, 22% of the respondents suggested that a safety incident resulting in a single fatality or major damage to assets, pollution of the environment, or damage to the organisation's reputation could happen in their organisation. In these organisations we acquired data related to safety leadership, risk management and safety characteristics. These data were acquired in five different stages: stage 1. an online prospective survey; stage 2. reflection on the outcomes of these surveys by senior leaders; stage 3. retrospective analyses of case history; stage 4. interviews with risk analysis experts about the quality of risk analyses; and stage 5. a review of incident investigation reports as published by the Dutch Safety Board. The data acquisition period covers the timespan from March 2016 until October 2019.

### 3.5 Methodology

In the next paragraphs an overview of the methods used during the data acquisition process is presented.

#### 3.5.1 *Prospective study*

##### *Stage 1: Online prospective survey*

Prospective data is collected to reveal the role of leaders in conjunction with the general state of safety in organisations. An online prospective survey used questionnaires designed to establish the perception of general employees about the degree of risk reduction, the behavioural orientations of their leaders and the perceived level of safety of the organisations the respondents are working in.

Before conducting this survey, we conducted a pilot survey among a group of 99 professional safety experts. The data generated by these experts served to verify the design of the questionnaire and test the Safety Leadership Model. The initial survey questionnaire, as used in the pilot survey, contained questions to discover the respondents' perceptions of the level of risk reduction, as well as of their leaders' behaviours. After analysing the pilot survey data, the Safety Leadership Model was upgraded and the online questionnaire was extended with questions about safety. The finalised online prospective survey was then conducted among a total of 4561 respondents, working in 33 organisations, active in six specific business sectors.

##### *Stage 2: Reflections by senior leaders*

After analysis of the survey data from the questionnaires, interviews were held with selected leaders, CEOs, operational managers and safety managers, to collect their reflective opinions on the analysis results.

#### 3.5.2 *Retrospective views*

##### *Stage 3: The view of incident investigators*

A case history analysis was performed in order to determine the level to which, and in what way, leaders have influenced the causation and/or escalation of different major incidents ('low frequency/high severity incidents'). This retrospective approach is specifically intended to reveal the contribution of leaders' behaviours and the flaws in risk management in organisations where major incidents have occurred, in comparison with the general safety state as found via online prospective surveys among all the organisations considered.

A group of 18 professional incident investigators individually reviewed existing analysis reports of 19<sup>11</sup> different major incident, with a focus on the specific leadership orientations of the leaders involved, as well as on the risk reduction phases being compromised.

<sup>11</sup> One investigator delivered two reviews.

These incident investigators were selected on basis of their qualifications and experience as safety professionals, as well as their experience in the field of incident investigation. The following selection criteria were applied: experience as a safety professional, experience as an incident investigator, number of incidents investigated, business sectors in which incidents were investigated, and investigation tools applied. An overview of these parameters for each investigator is shown in Appendix 15.1, Qualification Information Incident Investigators. Based on the outcome of these reviews, we related the influence of leaders (expressed in leadership orientations) to the identified compromised risk reduction phases. This resulted in a retrospective view of the role of leaders in safety incidents.

#### *Stage 4: The view of risk analysis experts*

As awareness of risks is the first step in risk reduction, the recognition of risks is considered an important element. This applies especially where there are high risks with the potential for major incidents affecting the fundamental values of an organisation. After analysing the final survey data, we considered it useful to obtain an independent picture from the professionals about the quality of risk assessments in organisations in which high risk primary processes are carried out. We therefore conducted interviews with five professional risk analysis experts and questioned them about the quality of risk-assessment methods as practised in 'major hazard' (BRZO) organisations, in order to verify the risk analysis-related aspects of the data gathered by the online survey. The knowledge and operational experience of these risk analysis experts was utilised to put the data into perspective, and to draw relevant conclusions.

#### *Stage 5: The view of the Dutch Safety Board*

The Dutch Safety Board was established as an independent investigation body, charged by law with investigating and analysing safety incidents in the Kingdom of the Netherlands.<sup>12</sup> It is their mission to contribute to safety improvement in the Netherlands. The role of the board is thus a retrospective one: it investigates major incidents after these have taken place and draws lessons based on their analyses. The board has no responsibility for prospective analyses.<sup>13</sup> The Dutch Safety Board is concerned with the investigation of major incidents in different business sectors in the Netherlands. We reviewed twelve of the board's reports with a special focus on the contribution of risk assessment in the development of major incidents. This review served as the third retrospective approach to analysing the contemporary quality of the understanding of risk in different business sectors.

This chapter described the different elements of the empirical research. The next chapter discusses the development of a Safety Leadership Model and provides each of the core notions (safety, risk management and leadership) with specific characteristics.

<sup>12</sup> Rijkswet Onderzoeksraad voor veiligheid (2004).

<sup>13</sup> Ibid.

