

# The Role of Leadership in Process Safety Management System “No Process Safety Management System is an Island”

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The role of process safety management system in accident prevention and safety, in general, is well established. However, the same cannot be said when it comes to the influence that different factors can have on the safety management system. Especially, the role of leadership is much less understood. The main purpose of the safety management system is to control risks in the organisation and consequently to prevent accidents. However, such a system is not isolated. Politics, procedures, and practices that are in place to ensure safety in hazardous process industry can be influenced by several factors, in both positive and negative ways. Studies showed that leadership style can have a critical role in the implementation of an effective safety management system, as the importance of senior managers and leaders cannot be overemphasized. This paper tries to shed some light on the relationship between process safety management systems, factors that can influence safety performance, and various types of leadership. Based on the literature, factors that can have the most influence on successful implementation and performance of the safety management system are determined. Several most common leadership types that can contribute to the successful process safety management are also presented. To obtain a better understanding, leadership types were studied in relation to one of the previously identified factors that can support or hinders the process safety management system – managers’ commitment to safety. Findings present different ways in which various leadership types can support managers’ commitment to safety.

## 1. Introduction

In the field of process safety research, safety management systems are still a prevalent topic. However, nowadays, the focus has shifted from the identification of a basic safety system elements into the holistic consideration of safety challenges within general management. The organisations have recognised that well-established process safety management system can help to prevent industrial accidents, and at the same time, have several other positive effects on quality, productivity, and sustainability (Álvarez-Santos et al., 2018). In general, managing safety is an extensive task that takes from the organisation to determine its own specific safety requirements, design appropriate safety management structure, safety process, and decide what kind of activity will be implemented in order to achieve desired safety results. In order to do this, organisations tend to incorporate the management process and activities into one system. This is achieved by means of specific techniques, approaches, and models (Halim & Mannan, 2018). Li and Guldenmund (2018) point out that the safety management system should be seen as the intersection of three perspectives: safety, management, and system. Safety focuses on the accident and loss prevention; management involves planning, organising, leading and controlling functions; and system introduces “input - process – output” view. Through the time safety management systems were gradually developed. They evolve from basic prescriptive safety management system to more advanced forms like Risk Based Process Safety System, that is based on risk and acknowledge that all hazards are not equal (Broadribb, 2018); or Integrated Safety Management System that is more advanced, as it is not set up solely for compliance or certification (Li & Guldenmund,

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2018). In the last couple of decades, safety management systems have been established in numerous organisations throughout different industries. However, as highlighted by Broadribb (2018), many organisations are, despite all efforts, still facing inadequate process safety performance (major industrial accidents are still occurring more or less at the same rate). Since a major accident trend appears to be stagnant, it has become clear that safety management systems don't deliver expected results (at least not in such an extent as they should). In order to address this challenge, we need to take a step back and take into account that process safety management system is not isolated. There are several external and internal factors that can influence implementation and performance.

## **2. Factors that can influence the safety management system**

To better understand why safety management systems are unable to generate the anticipated results, it is necessary to look into the factors that can contribute to their implementation and performance. There are several both internal and external factors that can have an important influence on process safety management system in the organisation. The literature on important contributing factors that could influence implementation and performance of safety management systems in process industry is scarce, therefore the scope will be broadened to include the wider topic of the safety management system (not limited to process safety) in different safety critical/high-risk organisations.

Factors that can have an important influence on safety management system can be seen as enablers of an efficient system that will facilitate better safety performance. Ghahramani (2016) identified eleven categories of different influencing factors that have the potential to promote or hinder the effectiveness of the safety management system in the organisation. Those categories can be divided into two groups; the inside and outside categories. Factors that can influence safety management system from inside the organisation are management commitment (senior management commitment to safety, not just in the implementation phase but through the operation phase); communication (organisation must establish safety communication with employees); involvement of employees (employees must be engaged in safety practices); integration (integration of safety management tasks in other management activities in organisation); safety training (employees safety training should be a continuous process); internal safety incentives (incentive programs should be used to motivate employees to conduct activities in a safe manner); and safety culture (system shouldn't exist only on paper, actual attitudes are important). The category of outside factors consists out of enforcement of safety legislation by the authorities (legislation and specialized program for inspections); authorities support (guidance and consultation on the safety issues); auditing (need for qualified industry-specific third-party audits); and external incentives (external programs that can motivate better safety performance - good practice programs). A similar study was done by Rajaprasad and Chalapathi (2015). They identified several success factors needed for the implementation of the safety management system. Factors include safety culture; safety performance; sustainability; management commitment; continual improvement; morale of employees; supportive work environment; safety policy; and training. Authors also identified which factor has a greater impact on the implementation of the safety management system and what are the relationships between them. Management commitment was identified as the factor with the highest driving power. It was recognised as the most important factor that has also an important influence on several other factors. Safety policy was the second influential factor, and should clearly state the senior managers' commitment to safety. Based on the presented literature, it becomes evident that several factors exist that can have an important influence on the safety management system in the organisation. The question that consequently arises is how the organisation can address these factors?

## **3. The role of leadership in the safety management system**

The role of process safety management system in the prevention of major accidents in the process industry is evident (Broadribb, 2018). However, even meticulously designed safety management system is no guarantee by itself. Without the right leadership, the safety management system is in danger to simply "stay on paper"; therefore, with no real value for the organisation. In recent years, there has been a growing body of literature that highlights leadership as a possible answer to the stagnation of process safety results (Gravina, Cummins, & Austin, 2017). Therefore, there is a potential that leadership could also be used to address several of above-mentioned factors that influence the implementation and performance of the safety management system. Champion et al., (2017) believe that good leadership support at all hierarchical levels is the prerequisite if the organisation tends to achieve sustainable and successful process safety performance. They observed (on the sample of chemical companies) that the problem is usually not in the design of the process safety, but rather in the execution of the safety system. There is no doubt that a strong management system is important; however, there is also a need to focus more attention on implementation through leadership.

### 3.1 Different types of leadership that can influence safety

There are several leadership styles that can have a positive influence on safety management. Three of these leadership styles that are most frequently addressed in relation to safety will be described with emphasis on their potential contribution to the process safety management system.

#### **Transformational leadership**

Leaders that are characterized as transformational are able to inspire their employees to pursue that are beyond their own. This type of leadership is based on four components: idealized influence, individualized consideration, intellectual stimulation, and inspirational motivation (Chrysanthi & Nicola, 2012). Each of the components has an important influence on safety management (Pilbeam et al., 2016). Transformational leadership is characterized by admiration, trust, and respect from employees. Such leaders can positively influence safety and are perceived as “safety role models”. They actively demonstrate that safety has a priority over other production objectives. This is an attribute of idealized influence. According to individual consideration, leaders show sincere concern and care for the safety of employees. Because of intellectual stimulation employees will also be more willing to adopt new and safer working procedures. Inspirational motivation is shown when transformational leaders encourage and motivate employees towards high safety standards. Transformational leaders will reinforce perceived fairness, safety climate, and commitment to safety (Chrysanthi & Nicola, 2012). Transformational leadership is also related to higher safety organisational citizenship behaviour (Vignoli, 2018).

#### **Transactional leadership**

Transactional leadership is, unlike transformational, build on the hierarchical, non-individualized relationship with followers. It consists of three dimensions: constructive leadership, corrective leadership, and management by exception. Constructive leadership uses material rewards to achieve required performance (increased wage, employee promotion, etc.). The reward doesn't have to be only material (it can include positive feedback or praise). However, to enable this, comprehension of employees' abilities/needs and clear communication are a prerequisite. In a corrective form of leadership, that is sometimes referred to as active management by exception, leader intervenes at a specific level and takes actions that are based on the behaviour of employees. In order to do this, leaders must assess employees' performance according to the established standards. If deviations are found, they intervene. In the case of passive management by exception, leaders interact with employees only when is really necessary. It represents a reactive leadership. In relation to safety, transactional leaders set specific safety objectives and then monitor employees' safety performance according to them. If their behaviour meets safety objectives or even exceeds them, employees are rewarded (Chrysanthi & Nicola, 2012; Pilbeam et al., 2016).

#### **Authentic leadership**

This leadership approach contrast with others, because it does not determine the leadership style that should be adopted. Instead of that, it puts emphasis on the leader's personality. In order to establish the leader-follower process, leaders actions must be aligned with their values (Dimovski et al, 2009). Authentic leadership differentiates from other leadership theories as it is more generic. It can be seen as a base for other leadership types. Even though that can integrate other types of leadership, it is a separate construct (Avolio & Gardner, 2005). Authentic leadership is composed of self-awareness, balanced processing, internalized moral perspective, and relational transparency (Eid et al, 2012). When a leader is conscious of her/his own existence, understand personal advantages and limits regarding a specific context, then self-awareness occurs (Avolio & Gardner, 2005). Such leader would focus not only on production requirements and cost, but also on safety procedures, emergency exercises, safety training, and environmental responsibility at the same time (Eid et al., 2012). Relational transparency indicates how the leader demonstrates his authentic self to employees. Through open expressing his thoughts, feelings, and sharing of other information, his behaviour would foster trust (Neider & Schriesheim, 2011). In the case of a high-risk environment that requires close cooperation, leader's behaviour and actions are always visible to his employees. This kind of situations shows if the leader is capable of living up to his own safety expectations (Eid et al., 2012). Internalized moral perspective is a moral component that is inherent to an authentic leader (Avolio & Gardner, 2005). It implies that a leader can use moral capacity, efficacy, courage, and resiliency when addressing ethical issues and so achieve moral actions. In the context of safety, such an ethical dilemma arises when a leader is in a position that has to balance between safety and production objective. The leader should remain true to his principles and values (Eid et al., 2012). Balanced processing implies that all information is objectively evaluated when making a decision (Neider & Schriesheim, 2011). This is even more important when critical safety decision has to be made. An authentic leader would try to acquire all available information and consider different alternatives before making a decision (Eid et al., 2012).

#### 4. Connecting leadership with influential factors

It is important to point out that identified factors, important for implementation and performance of the safety management system can vary depending upon the different industry and specifics of the individual safety management system. Nevertheless, studies (Gerede, 2015; Ghahramani, 2016; Rajaprasad & Chalapathi, 2015; Yiu, Sze, & Chan, 2018) highlight managers' commitment as both most common and important factor that can influence the implementation and performance of the safety management system. Therefore, the determination of the possible influence of leadership will be limited to this specific factor.

As Halim and Mannan (2018) point out, the journey to better process safety starts with both external as well as internal influences. Among the latter, the commitment of the highest leadership in the organisation tends to be the most important. Leaders are in a unique position to ensure (through leadership) better implementation and performance of process safety management.

##### 4.1 Managers commitment to safety

It has been established that safety commitment at all organisational levels can have an important influence on safety (Ghahramani, 2016). However, the role of senior managers and their commitment towards safety is especially important if an organisation tends to improve the performance of the safety management system. They are the ones that are authorized to decide which goals and objectives will be pursued and where organisations' resources will be allocated. Gerede (2015) believe that if senior managers do not understand the importance of safety management system, if they are not acquainted with the system, if don't support a safety culture, and if safety-related commitments remain "on paper", then the prospects for successful implementation and performance of safety management system will be undermined.

Managers' commitment is most visible through managers support, or better lack of it. The pressure of management to finish operation on time, regardless of safety concerns may indicate that operational goals come before safety goals. Such prioritization can have a negative effect on employees' perception of management commitment and also weakens safety culture. Performance of a safety management system will be also affected if managers fail to show readiness to improve safety management system or dedicate sufficient attention towards safety. Managers should (through policies, processes, and practices) encourage all employees to contribute to safety; since the successful performance of safety management system is the result of joint endeavours of entire organisation (Gerede, 2015). Managers should demonstrate their safety commitment in both words and in actions. Senior managers should demonstrate their safety commitment through active participation in internal safety inspections. They should encourage employees to carry out their work safely and support different safety programs in an organisation. Safety commitment can also manifest through training programs, the participation of senior managers in safety committees, and manager reviews. Management should be attentive when it comes to a delegation of authority, support, and feedback to other managers. Commitment to safety is considered a prerequisite for a successful safety management performance. It is evident that management's efforts to improve safety commitment will also have a broader positive impact on other identified factors since there is a relationship between them (Ghahramani, 2016).

Lofquist et al. (2011) highlight that employees' perception of the managers' commitment to safety (not necessarily managers' own safety commitment) could have the biggest influence on safety perception in the organisation. If employees detect that words and actions of managers are inconsistent, this can cause distrust, which can consequently result in a negative effect on perceptions of managers' safety commitment. Employees may perceive that the managers place more emphasis on other issues, therefore a commitment to safety is expressed only on a symbolic level without genuine conviction.

##### 4.2 Employees perceptions of managers' commitment to safety

Employees that perceive managers to be committed to safety are more prone to comply with safety rules and participate in other safety activities. This is especially important in different safety critical/high-risk organisations. Employees interpret managers' commitment to safety typically through observations of managers' decisions, their behaviours and other information (stories, discussions, awards). This can be somehow difficult if employees have only a few opportunities to observe the decision making and behaviour of senior managers. Therefore, managers should strategically ensure that their communication of safety commitment is received and recognized by employees. Study (Bowers & Fleming, 2018) point out that employees interpret senior managers' commitment to safety through both direct (personal interaction) and indirect experiences (making a deduction about managers' actions through work). Perception of employees is formed based on senior managers' engagement through leadership; consistency of this leadership; design and implementation of safety policies, process, or procedures; and allocation of attention and resources for safety. However, those managers that focus on safety at individual level tend to be perceived as more authentic in their commitment to safety. Managers with consistent and personal communication of safety

commitment are perceived as more credible. The climate (shared perceptions of managers' safety commitment) that exist in an organisation should also be considered as it can influence their interpretation of managers' commitment.

### 4.3 How leadership can influence safety commitment

In commitment theory, leadership is commonly identified as an important factor that can contribute to the development of commitment; therefore, leadership could also contribute to the specific form of safety commitment (Delegach et al., 2017). To better understand how leadership can contribute to the identified factors that can have an important influence on the implementation and performance of safety management system, possible connections of three leadership styles and specific characteristic of managers' commitment to safety were studied. The intention of this paper was to determine how various leadership styles can affect managers' safety commitment and to determine if this relationship would have the potential for further empirical research. Based on the literature (Eid et al, 2012; Avolio & Gardner, 2005; Neider & Schriesheim, 2011; Delegach et al., 2017; Gerede, 2015; Ghahramani, 2016) characteristic of leadership styles and managers' safety commitment were gathered and cross-examined. Table 1 summarizes the possible influence between three leadership styles and managers' commitment to safety that was recognized through the process of cross-examination.

*Table 1: Possible influence of leadership style on managers' safety commitment (MSC) characteristic*

Characteristic of MSC	Transformational leadership	Transactional leadership	Authentic leadership
Leaders do not exert pressure to achieve production objectives, regardless of safety.	Leaders shape a safe environment, where employees perceive safety as the highest objective.	Leaders set clear objectives. There will be no confusion that safety has the highest priority.	Leaders are aware that all objectives are important, including safety.
Through policies and procedures, leaders encourage all employees to contribute to safety.	They ensure that safety policies and procedures would not stay "just on paper" and will be actively transferred to practice.	They ensure that policies and procedures will be clearly defined and their implementation will be closely monitored.	Through policies and procedures, they ensure that different responsibilities will be equally balanced.
Leaders are acquainted with the system and have required understanding to make safety decisions.	Through personal involvement, they are also able to familiarize with important safety aspects.	In order to set a suitable safety objective, they have to get acquainted with the safety system.	They try to acquire all information and consider different alternatives.
Clearly set safety goals, safety achievements are rewarded.	/	Safety goals will be monitored and acceptable performance rewarded.	Because of the authentic relationship, rewarding is transparent.
Active support to safety and personal involvement in safety programs, committees.	They show concern for the safety of employees and take an active, personal role in promoting safety.	/	They demonstrate authentic self to employees and get personally involved.
Safety commitment is evident in both words and in actions (there are no discrepancies).	/	/	They are true to their words. Employees see their commitment as genuine.

\*Note: Characteristic are based on the literature that addresses the topic of managers' commitment to safety; however, the list is not comprehensive. The / indicates that the possible influence was not found.

It is evident that all leadership styles have the potential to positively influence managers' commitment to safety in one way or the other. Transformational leadership seems to provide better support for managers' commitment to safety when it comes to active and personal involvement in different safety tasks, as they are often perceived as "role models". On the other hand, transactional leadership can be a better choice when it comes to setting clear rules and safety objectives. The best qualities of authentic leadership are shown when leaders demonstrate their commitment to safety in both words and actions. However, different elements of managers' commitment to safety have different significance for safety, depending on the context of the

situation. Nevertheless that understanding the influence of leadership styles on factors that can promote or hinder the safety management system proves to be important, it is very limited. Therefore, more research should be done to gain deeper insight.

## 5. Conclusions

The understanding of factors that can promote or hinder the implementation and performance of the safety management system is still inadequate; therefore, the knowledge of how to influence them is also limited. However, as it seems, the best way to address this challenge is through a better understanding of the leadership role and possible influence on the safety management system. We hope that this paper will encourage debate and increase understanding of leadership which is usually overlooked even though it is crucial if we aim to establish a good process safety management system.

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