

Leadership – Overlooked Piece of the Process Safety Management “Puzzle”?

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Leadership influence on process safety has been recognized as the important phenomenon. Various leadership approaches are studied to gain better insight into how leadership can enhance or hinders safety in industrial organizations. However, understanding is still in his early stages, therefore on the elementary level. Various types of leadership and their influence on safety are considered in this paper. Special attention is given to the authentic leadership, newly emerging leadership approach that is perhaps the most prominent among them. To better understand how authentic leadership could influence safety in process industry, a matrix was constructed that illustrates a relationship with a process safety management system. The example that shows how each of the authentic leadership factors can positively contribute to better process safety management system is presented.

1. Introduction

The notion of leadership importance for safety management is supported by both theoretical and practical works that have highlighted its significance as it affects individual interpretations of safety policies, practices, and procedures (Yorio et al., 2014). A number of major accident investigations also highlight leadership as an important factor that has played an important role in the development of events (Chrysanthi & Nicola, 2012). There are different leadership styles that can be associated with both positive and negative effects on safety management performance (Flin & Yule, 2004). It has been showed that leadership can have an impact on different elements. Namely, a connection has been established between leadership, safety performance, and safety culture (Wu et al., 2011). According to van Steen et al. (2016) experience from different industrial sectors has shown that leadership and management commitment are, along site with employees' involvement and empowerment, organizations ability to learn, and communication, one of the most essential dimensions of safety culture. It was also pointed out that if an organization wants to learn from the accidents and prevent their (re)occurrence in the future, leadership and governance are crucial (Hailwood, 2016). Even more, it has been proposed that process safety management is not really so much of a technical issue but one of management and leadership (King, 2013). However, studies on leadership in relation to safety management, especially when it comes to hazardous process industry are still scarce. This paper will try to shed some new light (from technical and managerial view) on the relationship between leadership and process safety management. Based on the literature will be first examined which leadership approach most significantly contribute to successful process safety management. In addition, the paper will try to complement these findings with those from general management, where leadership phenomena are, although in another context, addressed considerably better. In the next step, one of the currently most prominent leadership approaches – authentic leadership – will be further elaborated. To gain a better understanding of its importance for process safety and process safety management system, in particular, their interconnection will be considered in more detail.

2. The role of leadership in process safety

There is a body of research that is focused on understanding how leadership can influence safety performance and outcomes in a different industry. Generally, they consider mainly injuries and other occupational accident within the construction and manufacturing sector or in health care. Studies that would address the role of leadership when it comes to prevention of major accident in the hazardous process industry are therefore scarce. In this relation, research has usually been focused on different leadership styles and the influence that they can have on a safety performance and safety outcomes (Donovan et al., 2016).

2.1 Different types of leadership and their influence on safety

Out of the different leadership styles that have been recognized as positive reinforcement for safety management, three most often addressed leadership styles will be described and their contribution to the safety process and safety outcomes will be highlighted. Since research on leadership and its implications for major hazard prevention in process safety industry is scarce; the scope had to be broadened to include different safety challenges (not limited to process safety) across other industry settings (findings from studies conducted in safety critical/high risk organizations were included).

Transformational leadership

A transformational leader is capable of inspiring his followers to pursue goals that are beyond their own goals. Followers are capable to recognize the value of goals that exceed their self-interest. Transformational leadership consists out of four components namely; idealized influence, intellectual stimulation, individualized consideration an inspirational motivation (Chrysanthi & Nicola, 2012). Each of the above-mentioned components has implications for safety management (Pilbeam et al., 2016). Transformational leadership creates respect, admiration, and trust from followers. Because of those, followers are motivated to exceed expectations. Transformational leaders can have a positive influence on safety and can be viewed as safety role models as they demonstrate that safety received priority over other goals in the organization. This can be attributed to idealized influence. According to inspirational motivation, transformational leaders motivate and encourage employees to strive towards higher safety standards. Leaders will, because of the individual consideration, show genuine concern for the safety of each of their followers. Due to intellectual stimulation, they will be also inclined to adopt new and safer working procedures. Transformational leaders will also intensify perceived fairness, organizational commitment, and safety climate (Chrysanthi & Nicola, 2012).

Transactional leadership

It encompasses three dimensions. First is constructive leadership that is based on material rewards which depend on achieving the desired performance (promotion, wage increase, etc.). The reward can also be psychological (praise, positive feedback). For this, clear communication and comprehension of follower's abilities/needs is a prerequisite. Corrective leadership, that is also known as active management by exception, involves a level at which leader intervenes and take action based on the behavior of followers. Leaders assess the performance of followers according to standards (ensure compliance). If errors are identified, they intervene. The third one is passive management by exception. Here, the leader only interacts with his followers in a case of emergency. Therefore, it represents a reactive leadership. In the context of safety, transactional leaders generally set relevant safety goals and monitor performance against them. If followers behave accordingly and maintain or even improve safety practices they are rewarded (Chrysanthi & Nicola, 2012; Pilbeam et al., 2016).

Leader-member exchange

Leader-member exchange is based on the social exchange relationship between leader and follower. The leader develops a unique relationship with followers and therefore differentially influencing the important leader-member outcome. It is acknowledged that the leader does not form the same kind of relationship with all of his followers. This type of relationship changes over time. At first social exchanges tend to be more "transactional"; however, in time they can become more "transformational" and real partnership can develop. Leadership relationship occurs between the leader and followers when an effective relationship develops. This relationship is based on respect, mutual obligations, and trust. It should result in reciprocal and incremental influence towards common interests. Among positive organizational and individual outcomes are increased work performance, improved promotion opportunities, and positive attitudes of followers in relation to the organization. In the context of safety is suggested that the quality of the relationship between leader and follower has an impact on the safety related events such as near misses and follower's safety citizenship behavior (Chrysanthi & Nicola, 2012; Pilbeam et al., 2016).

3. Authentic leadership and process safety

As it can be seen, there are several types of leadership that can have positive impacts on safety management. Nevertheless, there is still no consensus on which of them can yield more benefits. Because the majority of research is focused on either leader-member exchange, transactional leadership, or transformational leadership, understanding of other types of leadership that recently emerged is also limited (Donovan et al., 2016). Perhaps the solution lies in a different approach to leadership in general, rather than in yet another leadership style? There has been some debate about a new approach to leadership that could prove promising in the context of safety, namely authentic leadership. Even though the research on the authentic leadership and his contribution to safety management is still in his infancy; some positive implications have already been identified. As Chrysanthi and Nicola (2012) stressed out in their report, authentic leadership is an emerging area, that holds much promise; however, it requires additional research to establish its influence on safety management.

3.1 Authentic leadership

Authentic leadership is the answer to the need for a more genuine way of leadership that would address the needs of employees in modern organizations. This new concept of leadership tries to offer a counterbalance to the misleading, dishonest leadership where lack of ethics and integrity predominates. Authentic leadership differentiates from other concepts; as it does not define the leadership style that leaders should adopt, but rather emphasize the personality of the leader. Only when the actions of leaders are in-line with their values, they can initiate the leader-follower process. Nowadays, organizations are perhaps more than ever in need of leaders that will lead with mission and integrity and will be focused on the well-being of their employees and other stakeholders (Dimovski et al., 2009). Authentic leadership can be set apart from other widely researched leadership theories discussed above as it is more generic – root construct. It forms the basis for other types of leadership. Although authentic leadership can integrate other forms of leadership it is a distinct construct (Avolio & Gardner, 2005). When things go according to plan it is not hard to show integrity. However, the authenticity of a leader is most evident right in the risk situations when the leader reveals himself to followers and shows if he really can “walk the talk” (Dimovski et al., 2009). Time of uncertainty is a challenge for any leader and exactly here is an opportunity for an authentic leader to show his edge. Both safety experts and senior managers call attention to a characteristic of authentic leadership; as they believe that authentic leadership approach can be beneficial for leaders when it comes to safety context. Perhaps authentic leadership can offer that “something extra” that increase leaders’ capability to promote safety in hazardous process industry (Roger et al., 2009).

3.2 Key factors of authentic leadership

Eid et al. (2012) propose that authentic leadership should be seen as a pattern of behaviors that use and promote positive psychological capacities and positive ethical climate. They believe that authentic leaders foster self-awareness, an internalized moral perspective, relational transparency and balanced processing which lead to positive self-development in their followers.

Self-awareness

Self-awareness takes place when the leader is aware of her/his own existence and realize his personal strengths and limitations in the context within which he operates. This is an ongoing process, not a destination. In this process, the leader comes to understand his values, purpose, talents, beliefs, and desires (Avolio & Gardner, 2005). In the case of gas and oil offshore installations, for example, leader (at different hierarchical level) have to work with an explicit focus on internal safety procedures, training requirements, emergency exercises, environmental compliance, and at the same time had in mind cost and production requirements. In this type of industry, safety context must be part of the leader’s self-awareness (Eid et al., 2012).

Relational transparency

Second authentic leadership factor is relational transparency which denotes the way in which the leader presents his authentic self to followers. His behavior would promote trust through open sharing of important information and showing true feelings and thoughts, without expressing inappropriate emotions (Neider & Schriesheim, 2011). Leaders in gas and oil installations work under special working conditions. The work environment is often isolated and confined, the shift cycle is 24 h and can last several weeks, privacy opportunity is limited, etc. With that kind of conditions, the leader is always visible to his followers that have multiple opportunities to see if the leader (really can “walk his safety talk”) is living up to his own safety standards (Eid et al., 2012).

Internalized moral perspective

The internalized moral perspective is the third factor and can be viewed as an inherent moral component of the authentic leader (Avolio & Gardner, 2005). It suggests that a leader can develop and use reserves of moral capacity, courage, efficacy, and resiliency when tackling difficult ethical issues and accomplish moral actions. For example, a leader in offshore installation can come across important ethical dilemmas. Decisions can result in unfavorable consequence for his followers or third-party workers. One of the most difficult dilemmas that offshore loaders often face is the conflicting expectations to meet two usually incompatible goals of production and safety. An authentic leader should be seen to abide by his moral principles and values (Eid et al., 2012).

Balanced processing

Balanced (unbiased) processing is the fourth and last factor of authentic leadership. Relevant data should be objectively analyzed in decision making process (Neider & Schriesheim, 2011). It is especially important in environments where a lot can go wrong. A leader that apply balanced processing always tries to gather as much information as possible and consider all alternatives when making a decision. If circumstances would require, he will even go and challenge the established view on the problem. Such a leader would also encourage his followers to share important information and their critical, contrasting opinions (Eid et al., 2012).

3.3 How authentic leadership can influence safety

Although authentic leadership can yield positive organizational outcomes, positive outcomes in a safety context are still not fully researched and understand. Studies that address this subject are rare. However, those that exist highlight several elements that can benefit from authentic leadership. Safety climate is by far the most commonly researched element. Trough safety climate, organization can enhance safety compliance and participation (Donovan et al., 2016). It is argued that leadership has a greater potential to affect safety climate than national values, external regulations and organizational procedures (Borgersen et al., 2014). Positive safety climate can also reduce risk perception amongst workers. This is important, as studies connect high risk perception to a negative outcome like psychological distress and job dissatisfaction (Nielsen et al., 2013). Alongside authentic leadership, the influence of psychological capital on safety climate and outcomes has been researched. It was demonstrated that authentic leadership can have a direct influence on the safety climate as well as an indirect influence through the psychological capital. Psychological capital can influence positive emotional states and attitudes that can result in higher safety compliance and participation of followers in safety related activities (Hystad et al., 2014). In addition to the aforementioned, a positive relation between authentic leadership and safety compliance, safety participation and perception of justice has been established (Donovan et al., 2016). When authentic leadership was examined in comparison with laissez-faire leadership, it was established that can (considering the effects on psychological job demands and situational awareness) have an important influence on willingness to take risks. Authentic leadership positively influenced situational awareness; that was in turn negatively connected with the willingness to take the risk. On the contrary, laissez-faire leadership had a negative influence on situational awareness and was positively related to the willingness to take the risk. Such behavior can manifest in the abandonment of safety procedures and dangerous task performance (Sandhåland et al., 2017).

4. Interconnection between authentic leadership and process safety management system

With the above-mentioned in mind, it becomes evident that authentic leadership can have a significant positive influence on safety process and outcomes. However, when it comes to process safety management system in the hazardous process industry, research is still scarce. To our knowledge, there is no study that would try to address authentic leadership in relation to process safety management systems. In an attempt to broaden understanding of how authentic leadership can positively influence process safety management, four factors of authentic leadership and four pillars (20 elements) of a risk based process safety management system based on CCPS (CCPS, 2007) were cross-examined. The intention here was to establish which factors of authentic leadership could positively influence the safety management system and would be potentially interesting for empirical research. Based on the literature (CCPS, 2007; Neider & Schriesheim, 2011) matrix was formed that combined the aforementioned factors/elements. Definition and context of each element were then studied in relation to all four factors of authentic leadership, to determine if there is an interconnection between factors/elements that could influence the safety management system in practice. Through this process, it has become evident that two categories of elements (two pillars) are especially influenced by authentic leadership factors. Those two were “commitment to process safety” and “learning from experience”. Among the elements that can particularly benefit from all four factors of authentic leadership are process safety culture, process safety competency, stakeholders’ outreach, training and performance, emergency

management, metrics and measurement, auditing, management review, and continuous improvement. However, the safety management system is comprised of both technical and organizational elements; therefore, as expected, a direct connection was not recognized between all cross-examined elements/factors (see Table 1). There could be a potential indirect link between elements/factors in some fields; however, the indirect influence was not in the scope of this comparison.

Table 1: A full map of connections found between elements and factors denoted by X

Process Safety Management System (CCPS, 2007) Element	Contributing Factors of the Authentic Leadership (Neider & Schriesheim, 2011)			
	Self-Awareness	Relational Transparency	Balanced Processing	Moral Perspective
PILLAR: I. COMMIT TO PROCESS SAFETY				
1. Process Safety Culture	X	X	X	X
2. Compliance with standards			X	X
3. Process Safety Competency	X	X	X	X
4. Workforce involvement		X	X	X
5. Stakeholders outreach	X	X	X	X
PILLAR II. UNDERSTAND HAZARDS & RISK				
6. Process knowledge management			X	
7. Hazard Identification & Risk Analysis		X	X	X
PILLAR III. MANAGE RISK				
8. Operating procedures				X
9. Safe Work Practices			X	X
10. Asset integrity and reliability			X	X
11. Contractor Management		X	X	X
12. Training and performance	X	X	X	X
13. Management of Change			X	X
14. Operational readiness			X	X
15. Conduct of Operations		X	X	X
16. Emergency Management	X	X	X	X
PILLAR IV. LEARN FROM EXPERIENCE				
17. Incident Investigation		X	X	X
18. Measurement & Metrics	X	X	X	X
19. Auditing	X	X	X	X
20. Management Review & Cont. Improvement	X	X	X	X

To demonstrate how factors of authentic leadership can contribute to better process safety management system, Table 2 presents an example (from the matrix) based on the element 5. Stakeholder outreach. It can be defined as the identification process that tries to determine which organizations or individuals could be affected by company operations and establish a dialog with them concerning process safety. It is also important that the relationship with local community organizations, professional groups, companies, and local/regional/state authorities is established. The organization should provide accurate and specific information about the plans, products, processes, hazards, and risks of the company and its facilities (CCPS, 2007; p.146).

Table 2: Example of authentic leadership contributing factors in element 5. Stakeholders outreach

Contributing Factors of the Authentic Leadership (Neider & Schriesheim, 2011)			
Self-Awareness	Relational Transparency	Balanced Processing	Moral Perspective
Leaders are cognizant that individuals and organizations can be affected by an organization's operations.	Sharing safety information applies to individuals or organizations that can be affected by an organization's operations.	Decisions consider also on the information and views from the individuals and organizations that can be affected by an organization's operations.	Decision making in the organization is guided by internal moral standards and is not bend by possible non-moral external pressures.

To successfully achieve this requirement, all four factors of authentic leadership play its important part. Through the process of self-awareness, the leader is capable to understand that different risks which arise from company operations are not limited only to the organization. He is aware of all individuals and organizations that can be affected. Relational transparency is most visible when it comes to relations with

individuals and organizations. This is reflected in sharing safety information to different entities that can be affected by companies' operations. When employing balanced processing, the leader will gather and analyze different information and consider conflicting views from relevant individuals and organizations before making a decision. An authentic leader with an internalized moral perspective will base his decisions on moral standards, even in a case of conflicting interest between safety and productivity, that is a common moral dilemma in the process industry.

5. Conclusions

Authentic leadership can, through self-awareness, relational transparency, balanced processing, and internalized moral perspective, uniquely support process safety management system. Based on the presented results and the example, it is evident that each of the authentic leadership factors can contribute its part to the process safety management puzzle. Authentic leaders array characteristic that can give safety management a certainly needed edge in context of safety in the process industry. Based on the proposed matrix, an in-depth analysis of the interconnection between authentic leadership factors and process safety management system is planned to address this relationship in more detail.

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