Taylor & Francis
Taylor & Francis Group

Policy and Practice in Health and Safety

ISSN: 1477-3996 (Print) 1477-4003 (Online) Journal homepage: http://www.tandfonline.com/loi/tphs20

Vision zero: from accident prevention to the promotion of health, safety and well-being at work

Gerard Zwetsloot, Stavroula Leka & Pete Kines

To cite this article: Gerard Zwetsloot, Stavroula Leka & Pete Kines (2017) Vision zero: from accident prevention to the promotion of health, safety and well-being at work, Policy and Practice in Health and Safety, 15:2, 88-100, DOI: 10.1080/14773996.2017.1308701

To link to this article: http://dx.doi.org/10.1080/14773996.2017.1308701

Published online: 07 Apr 2017.

Submit your article to this journal

Article views: 361

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
http://www.tandfonline.com/action/journalInformation?journalCode=tphs20

Download by: [Professor Gerard Zwetsloot] **Date:** 07 October 2017, At: 06:45

POLICY AND PRACTICE IN HEALTH AND SAFETY, 2017
VOL. 15, NO. 2, 88–100
http://dx.doi.org/10.1080/14773996.2017.1308701

CURRENT DEBATE AND PRACTICE CENTRED ON 'VISION ZERO'

Vision zero: from accident prevention to the promotion of health, safety and well-being at work

Gerard Zwetsloot[a], Stavroula Leka[a] and Pete Kines[b]

[a]Centre for Organisational Health and Development, University of Nottingham, University Park, Nottingham, UK;
[b]National Research Centre for the working Environment, Division of Safety Research, Copenhagen, Denmark

ABSTRACT

There is growing attention in industry for the Vision Zero strategy, which in terms of work-related health and safety is often labelled as Zero Accident Vision or Zero Harm. The consequences of a genuine commitment to Vision Zero for addressing health, safety and well-being and their synergies are discussed. The Vision Zero for work-related health, safety and well-being is based on the assumption that all accidents, harm and work-related diseases are preventable. Vision Zero for health, safety and well-being is then the ambition and commitment to create and ensure safe and healthy work and to prevent all accidents, harm and work-related diseases in order to achieve excellence in health, safety and well-being. Implementation of Vision Zero is a process – rather than a target, and healthy organizations make use of a wide range of options to facilitate this process. There is sufficient evidence that fatigue, stress and work organization factors are important determinants of safety behaviour and safety performance. Even with a focus on preventing accidents these additional factors should also be addressed. A relevant challenge is the integration of the Vision Zero into broader business policy and practice. There is a continued need for more empirical research in this area.

ARTICLE HISTORY
Received 30 January 2017
Accepted 16 March 2017

KEYWORDS
Zero accidents; zero harm; psychosocial factors; safety culture; prevention culture

CONTACT Gerard Zwetsloot gz@gerardzwetsloot.nl Centre for Organisational Health and Development, University of Nottingham, University Park, Nottingham, UK

© 2017 Institution of Occupational Safety and Health

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Introduction

The Zero Accident Vision (ZAV) is based on the assumption that all accidents are preventable. ZAV is then the ambition and commitment to create and ensure safe work and prevent all accidents in order to achieve safety excellence (Zwetsloot et al., 2017a,b). This is a high ambition and it sometimes gives rise to the misunderstanding that ZAV focuses on the 'goal' of zero accidents, rather than on a 'journey' and a 'process' of creating safe work (safety excellence). Zwetsloot et al. (2013a) called for more (empirical) research into the practices and perspectives of such commitments for improving safety. They stated that ZAV was developed in industry and needed more attention from safety researchers. In this paper, we want to focus on the broader Vision Zero (VZ), which addresses not only safety but also (occupational) health and well-being, which is often associated with the Zero Harm (ZH) concept. We also focus on the challenges companies may face to keep ZAV or VZ 'alive' in the long run, also when the need to improve health, safety and well-being (HSW) seems less urgent. The latter is closely related to the question of how to sustain VZ as part of the business strategy, in order to prevent it from becoming a new, broader occupational safety and health silo.

The expression 'health and safety', or Occupational Safety and Health (OSH) is often used by people and organizations to mainly address (occupational) safety concerns (Leka, Jain, Zwetsloot, Andreou, & Hollis, 2016); their attention to work-related health and well-being is often limited to hazards and associated risks that stem, like safety risks, predominantly from technology related aspects of production processes, such as the design of technical installations and workplaces. Often there is less organizational and systematic attention paid to health compared to safety, while psychosocial risks and well-being at work often remain out of scope (Bergh, Hinna & Leka, 2014a; Leka, Van Wassenhove & Jain, 2015). It is not known to what degree this bias towards safety is also found in companies that have committed themselves to ZH, which in principle seems to include health. The impression, however, is that many ZH companies that already have developed a high degree of risk control in the area of safety, still have much to gain in the areas of health and well-being.

In this paper, the Vision Zero for health, safety and well-being is based on the assumption that all accidents, harm and work-related diseases are preventable. VZ for HSW is then the ambition and commitment to create and ensure safe and healthy work and to prevent all accidents, harm and work-related diseases in order to achieve excellence in HSW. VZ should be understood as a journey, a process towards the ideal, which is usually expressed in the terms 'zero accidents' (for safety only) or ZH (ideally for safety, health and well-being). VZ is also a value-based vision implying that work should not negatively affect workers' HSW, and if possible, should help them maintain or improve their HSW and develop their self-confidence, competences and employability.

The call for more research into ZAV (Zwetsloot et al., 2013a) generated enthusiasm and was followed up by the publication of some empirical research but also raised criticism. As there are many similarities between ZAV and VZ, part of the criticism explicitly refers to the broader concept of ZH. We will therefore first provide a concise overview and evaluation of raised criticism.

Criticism of the zero accident vision and zero harm

Several critical papers on ZAV or ZH have been published since 2013. The main criticisms are as follows: (1) that ZAV is unrealistic and naïve and denies the realities of risk (implying uncertainties, human limitation and learning by mistake, Long, 2012; Sharman, 2014); (2) ZAV leads to more bureaucratic safety systems and bureaucratic accountability (Dekker, 2014a,b,d); and (3) ZAV leads to a focus on very minor risks (Sharman, 2014), associated with overspending of investigation resources (Dekker, 2014b). The critics also state that ZAV leads to a safety culture of scepticism, cynicism, underreporting, lack of debate, fear of openness, a non-learning climate (Long, 2012), intolerance (Sharman, 2014), stigmatization of workers involved in incidents (Dekker, 2014b) and a punitive mindset (Long, 2012). According to the critics, the focus in ZAV is on attaining zero injury rates, which may lead to underreporting (Sharman, 2014) and

trickery and fraud with numbers (Dekker, 2015; Dekker & Pitzer, 2016; Dekker, 2014b). For a more in-depth overview, see Zwetsloot et al. (2017a).

According to Zwetsloot et al. (2017a), part of the criticism seems to be based on the assumption that ZAV committed companies are trying harder to do the same old safety things, that is, to make more safety procedures (systems associated with greater bureaucracy) and to be stricter and more punitive towards unsafe behaviour. If that assumption is right, the critics are right. But this is not what the empirical studies of VZ committed companies published so far confirm (Twaalfhoven & Kortleven, 2016; Young, 2012; Zwetsloot et al., 2017b).

The critics assume that ZAV (or ZH) companies have only three options to realize their ambition: stricter control through (bureaucratic) procedures, stricter behavioural control (or error prevention), and fraud with numbers (Dekker, 2014a, c; Long, 2012; Sharman, 2014). In reality, the limited empirical research into ZAV/VZ companies clarified that these companies realize that ZAV is based on a different mindset, requiring a long-term process, and that healthy organizations make use of a wide range of traditional and innovative options to facilitate the ZAV process (Zwetsloot et al., 2017a,b). For instance, developing a 'commitment strategy' for safety, integrating it into business development, using technological and social innovations, developing a learning safety culture.

ZAV committed companies explored innovative ways to improve safety (Young, 2014) and endeavoured to develop a learning-driven safety culture. Instead of stricter control and more sanctions towards unsafe behaviour, there was more empowerment than in other safety frontrunner firms. Managers asked questions in order to trigger reflection and dialogue, instead of giving orders and referring to existing procedures (Zwetsloot et al., 2017a,b).

The empirical results so far show that ZAV implementation often leads to significant safety improvements (Young, 2014; Zwetsloot et al., 2017a), thereby being keen to make use of technical and social innovations (Young, 2014). Companies and their personnel see ZAV as a journey driven by genuine long-term commitment (Koivupalo, Sulasalmi, Rodrigo, & Väyrinen, 2015; Twaalfhoven & Kortleven, 2016; Young, 2014; Zwetsloot et al., 2017a) that does not lead to more bureaucracy. Instead, it leads to higher worker commitment and more empowerment (Zwetsloot et al., 2017b), to managers giving safety very high priority in daily practice, to the encouragement of participation and learning, and a culture that has more characteristics of a 'just culture' than is found in non-ZAV frontrunner firms (Zwetsloot et al., 2017b).

In any case, criticism should not overshadow the many good practices found in the empirical studies so far. All in all, an evaluation of the criticism published so far underlines the earlier Zwetsloot et al. (2013a) call for more research into the industrial practice of ZAV (or ZH) implementation.

It is to be noted that the critics of ZAV and ZH seem to have a very strong bias towards safety. In fact, in their publications, ZH is almost equal to zero accidents (e.g. Dekker, 2014a,b,c; Long, 2012). They assume that the only reason for adopting zero accidents or harm is to reduce loss time incidents (LTI's) to zero (they see it as a goal, not as a process), which is a very limited interpretation of ZH. In addition, they have not seriously addressed the ambitions in the areas of health and well-being.

The critics might be particularly negative about VZ, as they focus only on the unproductive impacts of approaches that are based on a misunderstanding of VZ. However, the criticisms they offer are helpful for understanding the pitfalls of VZ when applied incorrectly. Table 1 provides an overview of some potential pitfalls for companies that strive to achieve zero accidents.

We consider ZAV and ZH companies as companies that are 'innovating' their approaches with the intention to achieve excellence in safety or in HSW. This paper will therefore discuss the consequences of a genuine commitment to ZH for developing an integrated, balanced approach to HSW at work, realizing synergies in HSW.

Vision zero for health, safety and well-being at work

HSW at work are often parallel silos both in organizational practice, and in research communities. There are different foci that have emerged in the various silos, as well as several frequently found

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Table 1. Pitfalls when considering Vision Zero.

Vision Zero used inappropriately	Vision Zero used appropriately
Applying Vision Zero as a **target** and making people accountable for realizing it (perhaps even strengthened by economic incentives)	It is a **process** that requires commitment from all leaders and workers in an organization
Focusing strongly on incident rates (and other **lagging** indicators)	Using **leading** indicators
Assuming that more safety rules, **management** systems and behavioural control will help to go from good to excellent safety performance	Focus on **leadership**, being innovative and promoting (collective and individual) learning
Assuming that **one** approach is able to improve different types of safety (e.g. process and personal safety)	Using a **variety** of approaches and adapting them where appropriate

misunderstandings, which hinder mutual understanding and cooperation in these key areas. Safety experts tend to regard psychosocial risks (let alone positive psychology) as not very relevant for safety and as a 'very soft' area with a lack of hard evidence. A topic like 'personal resources' (an important area in the Job Demands and Resources model referring to self-efficacy, self-esteem and optimism) is likely to be associated by safety experts with the 'accident prone' theory (referring to personal characteristics in general) (Dahlbäck, 1991), which goes back to 1926, but which still remains controversial (Burnham, 2009). See also Christian, Bradley, Wallace, & Burke (2009) for a good meta-analysis of the role of personal factors in workplace safety.

Experts in well-being at work tend to think that safety is a 'hard', technology dominated area, where simple 'mono-causal' factors lead to incidents (well-being being multicausal). However, many safety experts nowadays focus strongly on safety culture and/or safety climate (Griffin & Curcuruto, 2016; Leitão et al., 2016; Petitta, Probst, Barbaranelli, & Ghezzi, 2017; Zohar, 2014), and on interventions to improve safety awareness and organizational and behavioural change, subjects that are certainly not 'hard' nor 'mono-causal'.

It is important to note that ZH implies the control (or reduction) of occupational risks stemming from different types of hazards. Safety hazards stem mainly from energy-intensive processes or products that imply the potential of acute liberation of energy injuring people and damaging the work environment, or they stem from the potential of loss of containment of (acute) toxic materials. Traditional occupational health hazards stem from various (chronic) exposures to physical, chemical and biological agents, as well to physical strain and the burden of unfavourable postures, movements. Psychosocial hazards stem from work organization or negative interpersonal interactions. Although there are many interrelationships between these various types of hazards, the different types of hazards require also different methods for risk assessment and different types of control measures. This is also true within the safety domain, as we now know that a focus on prevention of personal risks does not help to reduce process safety risks (Baker, 2007) and a focus on minor personal safety risks does not automatically help reduce severe personal risks (Mendeloff & Burns, 2013).

While the focus in the area of psychosocial risks, or positively formulated well-being at work, is strongly on work organization and interpersonal interactions, in the area of safety there is little empirical evidence regarding work organization (some exceptions are Laschinger, Heather, Leiter, & Michael, 2006; Parker, Axtell, & Turner, 2001). The psychological perspective on safety seems to be dominated by (safe and unsafe) behaviour and safety culture/climate. While in the area of well-being, growing attention has been placed on the importance of organizational culture (Dollard & Bakker, 2010; Dollard, 2007; Zwetsloot & Leka, 2010).

Commonalities of safety and well-being

Safety and well-being likely have more in common than many would expect. In both areas, design and management challenges are important. The control of deviations in work processes is a shared interest. There are many similarities between the promotion of health and well-being and safety promotion. Business ethics are relevant for safety and for well-being, with many recent challenges, for example, the

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

impact of globalization on the (changing) workplace, the impacts of continuous cost reductions and the focus on core activities and outsourcing of all non-core activities. Positive psychology is not only relevant for 'work engagement' but is also likely to be relevant for safety promotion (Mathisen & Bergh, 2016; Nahrgang, Morgeson, & Hofmann, 2011). In the safety domain, the increasing attention to the concept of 'resilience' has also led to a positive safety concept 'Safety 2' (Hollnagel, 2014). In the area of resilience engineering, there is now a growing interest in how 'resources' help to master deviations (Grøtan, Waerø, Van der Vorm, Van der Beek, & Zuiderwijk, 2016). Other common bases for safety and well-being are as follows: (1) control of (work) processes and dealing with deviations, (2) improving accuracy, avoiding human error, and (3) proactive approaches to new developments, including reorganizations and outsourcing, increasing flexibility, job insecurity, etc.

Fitness for the job is a concept that also bridges the two areas. The IAEA (2016) mentions 'fitness for duty' as one of the areas relevant for safety culture. The physical and mental fitness of the workforce is key to alertness and risk awareness. Traditional aspects thereof concern the (non) use of alcohol and drugs and fatigue, but increasingly this is seen in a broader perspective, paying also attention to the prevention of stress and burnout, and the promotion of healthy lifestyles.

Interfaces between steps in the production process are often problematic in safety (potentially causing communication problems and control challenges); in sociotechnical theories, these are known to be a source of production problems (quality), and to be a source of stress. The sociotechnical approach is therefore to reduce the division of labour as much as possible, preferring simple organizations with complex jobs, over complex organizations with simple jobs. See Grote and Kunzler (1996, 2000) for sociotechnical approaches to safety.

From the perspective of credibility for the employees, the two areas (safety and well-being) are also closely associated. Credibility, taking care of the safety of people also implies, often implicitly, taking care of their health and vice versa. The different traditions and foci imply complementarities and opportunities for synergies. Several concepts and models that have been developed and are based on considerable evidence in one area, also seem relevant for the other area, for example, on job design and work organization (well-being) (Leka, Cox, & Zwetsloot, 2008) versus management systems, increasing risk awareness and safety culture (Clarke, 2006; Edwards, Davey, & Armstrong, 2013). This is also evident in the content of developed standards like OHSAS (BSI, 2007) that focuses on OSH management systems, and PAS1010 (BSI, 2011) that focuses on the management of psychosocial risks in the workplace.

While safety experts focus on the organizational level for psychosocial aspects of safety (safety culture and climate), psychosocial experts in the areas of health and wellbeing at work focus on work organization, job content, demands and resources. These different traditions seem highly complementary and suggest a potential for important synergies.

Fatigue and safety

Irregular working hours and overtime work may result in chronic fatigue, which can lead to decreased concentration and cognitive failure during work (Akerstedt, Fredlund, & Jansson, 2002; Williamson et al., 2011). Dembe, Erickson, Delbos, and Banks (2005) report an increase in occurrence of occupational accidents by 23% among employees working at least 60 hours per week. Lamond and Dawson (1999) showed that that moderate levels of fatigue may produce performance impairment equivalent to or greater than those observed at levels of alcohol intoxication deemed unacceptable when driving, working and/or operating dangerous equipment. According to Chan (2011) fatigue is the most critical accident risk factor in oil and gas construction.

Stress and safety

Flin et al. (2008) described how stress can impact workers' performance negatively in terms of efficiency and accuracy, and it has also been associated with lower levels of work situation awareness for drilling

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

personnel on oil and gas installations (Sneddon, Mearns, & Flin, 2013). Mathisen and Bergh (2016) found a positive association between emotional exhaustion and action errors/violations and a negative relationship between engagement and action errors/violations.

Stress has been linked with poor sleep quality, excessive drinking, feeling depressed, feeling anxious, jittery, inattentive behaviour, which may result in momentarily distraction, human error and/or failure in normal activities (Leka & Jain, 2010; Mearns, Flin, Gordon, & Fleming, 2001). Larsson (2003) saw another synergy: according to him, prevention of accidents and injuries is also an important strategy to prevent post-traumatic stress.

Mearns et al. (2001) showed that the variable most likely to predict accidents and near misses on an oil installation is 'unsafe work practices'. The number one predictor of 'unsafe work practices' was employees having a perception of 'high production pressure'. It was the feeling of stress that contributed to performance issues in safety critical operations. Stress as a result of high production pressure was directly related to work practices. It is therefore easy to see a correlation between being stressed as a result of perceived production pressures and making critical errors at work.

Goldenhar, Williams, & Swanson (2003) showed a correlation between several stressors (e.g. job demands, job control, job uncertainty, training, exposure hours and job tenure) and safe work practices in construction, and Glasscock, Rasmussen, Carstensen, & Hansen (2006) found similar results in farming. Bergh, Ringstad, Leka, & Zwetsloot (2014b) found a correlation between psychosocial risk factors and hydrocarbon leaks on offshore platforms, whereas Ramvi (2003) showed a correlation between the quality of the psychosocial work environment and commitment to safety at work at two different oil installations in the North Sea.

Work organization and safety

Given the relevance of stress (prevention) for safety, it is not surprising that there is also considerable evidence that work organization factors are important for safety. Deviations in production process are known to be a potential trigger for the causation of accidents. In psychosocial research, deviations are regarded as 'demands' on the worker to deal with (requiring sufficient autonomy/decision latitude) (Bergh, Hinna, Leka, & Zwetsloot, 2016; Karasek, 1979). Actions to prevent accidents go hand in hand with making operations more reliable, which also have an impact on workers' health and well-being.

The relevance of work organization factors for safety are also addressed in several accident investigation models and methods. For example, the TRIPOD methodology of incident investigation (Groeneweg, 1994) comprises 'error enforcing conditions' as one of the eleven basic risk factors that can underlie many accidents. The great body of knowledge on the importance of decision latitude (autonomy), social support, etc., that is available in the area of psychosocial risk management, has now also been proven to be relevant for safety (e.g. to reduce human error, etc.). A meta-analysis by Nahrgang et al. (2011) showed that job demands and resources relate to safety outcomes.

Broadening the six innovative perspectives

The application of presently available (evidence based) methods and tools can help most companies to realize important steps towards genuine Zero. However, VZ is also paradoxical, and it will also require organizations to explore and identify new paths. In the second ZAV discussion paper (Zwetsloot et al., 2017a), an important discussion is centred on a table that clarifies six innovative perspectives for ZAV. This Table can be adapted to VZ perspectives promoting ZH broadly, encompassing HSW. Table 2 is a first attempt towards this perspective.

The six innovative perspectives included in Table 2 can be further explored making use of several relevant concepts and theories. An overview thereof is provided in Table 3.

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Table 2. Zero harm for health, safety and well-being – six innovative perspectives (elaborating on Zwetsloot et al., 2017a).

ZAV theme	Traditional safety approach (accident prevention)	Zero accident vision	Zero harm for health, safety and well-being (HSW)
Commitment strategy	Safety **control** strategy	Safety **commitment** strategy	HSW is a **long-term commitment** strategy
	Safety is a **priority**	Safety is a **value**	HSW is a **value**
	Safety (0 accidents) is an (unrealistic) **goal**	Safety is a **process**, a journey	HSW is a **process**, a journey
	Safety and health are in practice two **distinct** worlds	Safety and health are ethically and practically closely **interconnected**	Safety, health and wellbeing are ethically and practically closely **interconnected**
A way of doing business	Safety improvements stem from **safety** programs	Safety is an integrated part of doing **business**	HSW is an integrated part of doing **business**
	Safety is mainly a **tactical** and operational challenge	Safety is a **strategic** challenge	HSW is a **strategic** challenge
	Risk **management**	Safety **leadership** and business excellence	HSW **leadership** and business excellence
	Safety is perceived as a **cost** factor	Safety is perceived as an **investment**	HSW is perceived as a long-term **investment**
	Safety is only relevant **internally** (and for the authorities)	Safety is also relevant for business partners and **external** stakeholders	HSW is also relevant for business partners and **external** stakeholders
Innovation	The workplace is more or less a **static** environment wherein safety management will lead to continuous improvement	The workplace is a **dynamic** environment wherein technological and social innovations are important for significant improvements in safety	The workplace is a **dynamic** environment wherein technological and social innovations are important for significant improvements in HSW
Prevention culture	**Preventing** accidents	**Creating** safety	**Creating** safety, health and well-being at work
	Compliance – 'We have to' (external motivation)	**Participation** – 'We want to' (intrinsic motivation)	**Participation** – 'We want to' (intrinsic motivation)
	Incidents are **failures**	Incidents are **opportunities** for learning	HSW events (incidents, cases) are **opportunities** for learning
	Safe behaviour is **desirable**	Safe behaviour is the **norm**	HSW promoting behaviour is the **norm**
	Workers' behaviour (human error) are part of the **problem**	Workers are empowered to come up with solutions – they are part of the **solution**	Workers are empowered to come up with solutions – they are part of the **solution**
	Safety is designed or prescribed by **experts**	Safety is cocreated by experts and **all** members of the organization (having a questioning and learning approach)	HSW is co-created by experts and **all** members of the organization (having a questioning and learning approach)
	Focus on management **systems**	Focus on **culture** and learning	Focus on **culture** and learning
	Safety culture is important	Safety culture and '**just**' culture are important	HSW promoting a '**just**' culture are important
	Focus on accident **prevention**	Focus on accident prevention and safety **promotion**	Focus on prevention and the **promotion** of HSW in work and **life**
Ethics and CSR	Safety management is always **rational**	Safety management is rational but also founded on **ethics**	HSW leadership is rational but also founded on **ethics**
	Safety is associated with prescriptions, paper work, and owned only by a few **champions**	Safety is inspiring, 'alive' and 'owned' by **all** members of the organization	HSW is inspiring, 'alive' and 'owned' by **all** members of the organization
	Transactional leadership	**Transformational** leadership	**Transformational** leadership also paying attention to job demands and resources
	Safety policy **implicitly** based on values	Safety policy **explicitly** based on values	HSW policy **explicitly** based on values
Networking and co-creation	Safety improvement is triggered by **internal** processes (Plan, Do, Check, Act)	Safety improvement is triggered also by learning from the experiences of others in and **outside** the organization	HSW improvement is triggered also by learning from the experiences of others in and **outside** the organization
	Benchmarking on **lagging** indicators (like injury rates)	Benchmarking on **leading** indicators and good practices	Benchmarking on **leading** indicators and good practices
	Safety improvement is triggered by **best** practices in the sector	Safety improvement is triggered by adopting and adapting **good** practices from other (ZAV) organizations and sectors	HSW improvement is triggered by adopting or adapting **good** practices from other (VZ) organizations and sectors

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Table 3. Vision Zero for health, safety and well-being – six innovative perspectives and associated concepts and theories.

The innovative perspectives	Relevant concepts and theories	Selection of key References
A commitment strategy	Commitment strategy for high performance	Beer, 2009
	Intrinsic motivation and self-determination theory	Deci & Ryan, 2008; Ryan & Deci, 2000
A way of doing business	Goal-setting theory	Locke & Latham, 2002
	Transformational leadership	Barling, Loughlin, & Kelloway, 2002
	Mainstreaming OSH	EU–OSHA, 2010
Innovation	Workplace innovation	Eeckelaert et al., 2012; Oeij et al., (in press, 2017)
	Resilience engineering	Hollnagel, Woods, & Leveson., 2006
	High reliability organization	Roberts, 1990; Weick & Sutcliffe, 2007
	Inherently safer production	Zwetsloot & Ashford, 2003
	Innovation diffusion theory	Rogers, 1993
Prevention culture	Prevention culture	Eichendorf & Bollmann, 2014; Salminen & Lee, 2015: 2nd Strategy Conference, 2011; WSH, 2012
Ethics and CSR	Institutional theory	Powell & Di Maggio, 1991
	Normative management	Bleicher, 2009
	Non-traditional stakeholders	Jain, Leka, & Zwetsloot, et al., 2011
Networking and co-creation	Network organizations and learning	Knight, 2002
	Organizational learning and system improvement	Senge, 1990
	Soft systems methodology	Checkland & Poulter, 2006
	Co-creation	Payne, Sorbacka, & Frow, 2009; Prahalad & Ramaswamy, 2004

Keeping the vision zero spirit alive

There are several challenges and strategies for keeping the spirit of VZ alive. Here, we will focus on three specific clusters of challenges.

1. The first of these is the impact of globalization and the changing world of work (ILO, 2016; James, 2006). More specifically, the global financial situation stemming from around 2008 implies that cost reduction is a dominant factor, leading to a trend towards higher workloads, smaller HSW margins, growing job insecurity (causing stress but also less ownership and commitment to HSW) and challenges in the production chain (with contractors etc.).

The changing world of work also implies a range of other general challenges to the area of HSW. There is growing diversity with workforce migration, often implying different cultural backgrounds, languages and cultures. In addition, work teams are often changing rapidly due to contingent work. At the same time, there are generational gaps between young and older workers. This diversity can have severe implications for communication, education and training, cooperation, culture, and for dealing with personal vulnerabilities. In addition, it implies new forms of risk to worker HSW that impact on company sustainability (EU-OSHA, 2015). It is therefore important the companies commit to a wider VZ that includes these emerging priorities.

2. An additional ongoing challenge is reaching and engaging the many small- and medium-sized enterprises that often do not have a long-term vision or policy in HSW. Larger VZ-committed companies can play an important role in this respect by increasing the general business attention to HSW, and by motivating and supporting smaller enterprises that are their suppliers, contractors, customers or neighbours to commit to HSW goals. As VZ companies are highly ambitious, they are likely to recognize these generic challenges at an early stage and to deal with them seriously and effectively. This is another reason why research into the practices of VZ companies is interesting and important.

3. Mainstreaming into business management is the third important challenge. The VZ message needs to go beyond individual HSW company departments, from the HSW community (including HSW policy makers) to business leaders. It is important in this respect to keep in mind that ZAV and ZH are usually

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

part of a broader 'family of Vision Zero', for example, zero defects, zero waste and traffic accidents (Zwetsloot et al., 2013,2017a). Seeing ZAV, ZH and VZ in a broader setting was suggested also as an explanation for why ZAV was more easily accepted in industrial practice than in the safety science community (Zwetsloot et al., 2013a). These broader 'zero visions' often go beyond aspects of internal organization and may include the development of new products and services, for example, Volvo and General Motors both claim to work on the development of 'zero crash cars', and they see it as a marketing incentive to work safe and produce safe products (Avila & Hosford, 2012; Volvo, 2017).

Singh (2012), an important business analyst, sees the broader VZ perspective, which he calls 'innovating to zero', as one of the 10 Mega Trends that will impact business and society globally in the coming decade. Singh emphasizes the innovative nature of VZ, its close relationship with running business and describes it as a journey generating many opportunities along the way to creating and ensuring safety.

'The most remarkable feature of this Mega vision is that the ultimate opportunity lies not in attaining the actual goal itself, but in capitalizing on the opportunities that would lead to it … …. It also needs a strong culture from people within that ecosystem' (Singh, 2012, p. 59).

Clearly, this implies several challenges not only for the industry, but also for the HSW community at large.

Developing a full zero harm culture

Genuine commitment to zero accidents or harm is a value-laden commitment that has many implications for organizational culture. In the safety literature, there continues to be a lot of attention to safety culture and climate and safety leadership (Clarke, 2006, 2013; Leitão & Greiner, 2016; Petitta et al., 2017), and there is growing attention to safety as a value (Cooper, 2001; Ratilainen et al., 2016). In the area of health and well-being, there is a growing interest in organizational values, culture and leadership (National Institute for Health and Care Excellence (NICE), 2015).

Organizations increasingly define core values to give meaning to the companies' existence and their value for society. When core values are more than a public relations instrument, they are important for the identity and cohesion of organizations. Core values have the potential to guide the practices and behaviours of managers, supervisors and workers.

From this perspective, it is logical that there is growing attention to values that support safety (Ratilainen et al., 2016) and to the value of HSW. Again there are several values that are supportive of HSW (Zwetsloot, van Scheppingen, Bos, Dijkman, & Starren, 2013b). In their broad literature review, Zwetsloot et al. (2013b) identified seven core values that are supportive to HSW, which could be clustered into three groups: (1) a value cluster characterized by a positive attitude towards people and their 'being' (comprising the core values of interconnectedness, participation and trust); (2) a value cluster relevant for organizational and individual 'doing' (comprising justice and responsibility); and (3) a value cluster relevant for 'becoming' which is characterized by the alignment of personal and organizational development (comprising the values of growth and resilience).

However, values can have a broader meaning related to work as well: values for doing 'meaningful' work (Milliman, Czaplewski, & Ferguson, 2003), and for being inspired, motivated and engaged through alignment of individual and organizational goals (Beer, 2009). These broader values also imply the development of a positive organizational culture, beyond safety culture. Olsen, Naess, & Høyland (2015) showed that a positive organizational climate (broader than safety climate) can also be relevant for safety on oil platforms.

Another challenge is the development and maintenance of a 'learning driven culture' for HSW (IAEA, 2016). This implies a learning attitude of management and workers, as well as a transition from 'We must work safe and healthy' to 'We want to work safe and healthy' (intrinsic motivation; Ryan & Deci, 2000).

One model that moves towards this more holistic HSW understanding is the 'Total Worker Health' approach which focuses on policies, programmes and practices that integrate both 'protection' from OSH

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

hazards and 'promotion' of injury and illness prevention in furthering well-being for a globally competitive workforce (Schill & Chosewood, 2013). A review of Total Worker Health interventions has shown preliminary and promising results of the integration of HSW promotion activities (Anger et al., 2015).

Conclusions

There is a steadily growing attention in industry for VZ in terms of a long-term commitment process to strive for Zero Accidents and/or ZH. In most organizations, the attention for safety is dominant, while health and wellbeing at work still receive much less attention. VZ should be regarded as a holistic vision, wherein health, safety and wellbeing at work are all addressed, and synergies between these areas are recognized and utilized. There is already sufficient evidence to state that fatigue, stress, and work organization factors in general are important determinants of safety behaviour and performance. The broadening of ZAV to a ZH vision wherein wellbeing is addressed seriously is therefore an important challenge for many industries. The integration into business development and the development of a broader ZH culture (or prevention culture) are important challenges for VZ committed companies. There is a clear need for empirical research into this challenging area.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

ORCID

Gerard Zwetsloot http://orcid.org/0000-0002-2160-9427
Stavroula Leka http://orcid.org/0000-0003-3847-6816
Pete Kines http://orcid.org/0000-0002-8660-6366

References

2nd Strategy Conference (2011). Five Pillars for a culture of prevention in business and society. Strategies on Safety and Health at Work, 3-4 February 2011, DGUV Academy Dresden. (23, February 2017). Retrieved from: http://www.dguv.de/iag/veranstaltungen/strategiekonferenz/2011/index-2.jsp.

Akerstedt, T., Fredlund, P., & Jansson, B. (2002). Workload and work hours in relation to disturbed sleep and fatigue in a large, representative sample. *Journal of Psychosomatic Research*, *53*, 585–588. http://dx.doi.org/10.1016/S0022-3999(02)00447-6

Anger, W.K., Elliot, D.L., Bodner, T., Olson, R., Rohlman, D.S., Truxillo, D.M., … Montgomery, D. (2015). Effectiveness of total worker health interventions. *Journal of Occupational Health Psychology*, *20*, 226–247. http://dx.doi.org/10.1037/a0038340

Avila, J., & Hosford, M. (2012). General Motors' super cruise technology aims to bring accident free car, ABC News, 17 September 2012. (20, January 2017). Retrieved from: http://abcnews.go.com/Technology/general-motors-supercruise-technology-aims-bring-accident-free/story?id=17218793.

Baker, J. (2007). The Report of the BP US Refineries Independent Safety Review Panel.

Barling, J., Loughlin, C., & Kelloway, K.E. (2002). Development and test of a model linking safety-specific transformational leadership and occupational safety. *Journal of Applied Psychology*, *87*, 488–496. http://dx.doi.org/10.1037//0021-9010.87.3.488

Beer, M. (2009). *High commitment, high performance – How to build a resilient organization for sustained advantage*. San Francisco: Jossey-Bass.

Bergh, L.I.V., Hinna, S., Leka, S., & Zwetsloot, G.I.J.M. (2016). Developing and testing an internal audit tool of the psychosocial work environment in the oil and gas industry. *Safety Science*, *88*, 232–241. http://dx.doi.org/10.1016/j.ssci.2015.06.003

Bergh L.I.V., Hinna S., Leka S. (2014a). Sustainable business practice in a Norwegian oil and gas company: Integrating psychosocial risk management into the company management system. In: Leka, S., & Sinclair R.R., (Eds), *Contemporary Occupational Health Psychology: Global perspectives on research and practice*, Chichester, UK: Wiley & Sons.

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Bergh, L.I.V., Ringstad, A.J., Leka, S., & Zwetsloot, G.I.J.M. (2014b). Psychosocial risks and hydrocarbon leaks: An exploration of their relationship in the Norwegian oil and gas industry. *Journal of Cleaner Production*, *84*, 824–830. http://dx.doi.org/10.1016/j.jclepro.2013.09.040

Bleicher, K. (2009). *Normatives und strategisches management*. St Gallen Switzerland: Christian Abegglen.

British Standards Institution (BSI), 2011. *Guidance on the management of psychosocial risks in the workplace: PAS1010*. London: British Standards Institution.

British Standards Institution (BSI) (2007). *Occupational health and safety management systems: OHSAS 18001*. London: British Standards Institution.

Burnham, J.C. (2009). *Accident prone – A history of technology, psychology, and misfits of the machine age*. Chicago: University of Chicago Press.

Chan, M. (2011). Fatigue: The most critical accident risk in oil and gas construction. *Construction Management and Economics*, *29*, 341–353. http://dx.doi.org/10.1080/01446193.2010.545993

Checkland, P., & Poulter, J. (2006). *Learning for action: A short definitive account of soft systems methodology and its use, for practitioners, teachers and students*. Chichester: John Wiley and Sons Ltd.

Christian, M.S., Bradley, J.C., Wallace, J.C., & Burke, M.J. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology*, *94*, 1103–1127. http://dx.doi.org/10.1037/a0016172

Clarke, S. (2013). Safety leadership: A meta-analytic review of transformational and transactional leadership styles as antecedents of safety behaviours. *Journal of Occupational and Organizational Psychology*, *86*, 22–49. http://dx.doi.org/10.1111/j.2044-8325.2012.02064.x

Clarke, S. (2006). The relationship between safety climate and safety performance: A meta-analytic review. *Journal of Occupational Health Psychology*, *11*, 315–327. http://dx.doi.org/10.1037/1076-8998.11.4.315

Cooper, D. (2001). Treating safety as a value. Professional Safety, February, 17–21.

Dahlbäck, O. (1991). Accident proneness and risk-taking. *Personality and individual differences*, *12*, 79–85.

Deci, E.L., & Ryan, R.M. (2008). Self-determination theory: A macro theory of human motivation, development and health. *Canadian Psychology*, *49*, 182–185. http://dx.doi.org/10.1037/a0012801

Dekker, S.Z.W. (2015). The psychology of accident investigation: Epistemological, preventive, moral and existential meaning-making. *Theoretical Issues in Ergonomics Science*, *16*, 202–213. http://dx.doi.org/10.1080/1463922X.2014.955554

Dekker, S.Z.W., & Pitzer. (2016). Examining the asymptote in safety progress: A literature review. *International Journal of Occupational Safety and Ergonomics*, *22*(6), 57–65. http://dx.doi.org/10.1080/10803548.2015.1112104

Dekker, S.Z.W. (2014a). The bureaucratization of safety. *Safety Science*, *70*, 348–357. http://dx.doi.org/10.1016/j.ssci.2014.07.015

Dekker, S.Z.W. (2014b). Employees: A problem to control or solution to harness? Retrieved from: Insurance newsnet.com. Newswires, (22, August 2014).

Dekker, S.Z.W. (2014c). The problems of Vision Zero in work safety. *Malaysia Labour Review*, *8*, 25–36.

Dembe, A.E., Erickson, J.B., Delbos, R.G., & Banks, S.M. (2005). The impact of overtime and long working hours on occupational injuries and illnesses: new evidence from the United States. *Occupational and Environmental Medicine*, *62*, 588–597. doi: 10.1136/oem.2004.016667

Dembe, A.E., Erickson, J.B., Delbos, R.G., & Banks, S.M. (2006). Nonstandard shift schedules and the risk of job-related injuries. *Scandinavian Journal of Work, Environment & Health*, *32*, 232–240. http://dx.doi.org/10.5271/sjweh.1004

Dollard, M.F., & Bakker, A.B. (2010). Psychosocial safety climate as a precursor to conducive work environments, psychological health problems, and employee engagement. *Journal of Occupational and Organizational Psychology*, *83*, 579–599. http://dx.doi.org/10.1348/096317909X470690

Dollard, M.F. (2007). *Psychosocial safety culture and climate: definition of a new construct*. Adelaide: Work & Stress Research Group of South Australia.

EC., (2013). European Commission: Directive 2013/30/EU on safety of offshore oil and gas operations.

Edwards, J.R.D., Davey, J., & Armstrong, K. (2013). Returning to the roots of culture: A review and re-conceptualisation of safety culture. *Safety Science*, *55*, 70–80. http://dx.doi.org/10.1016/j.ssci.2013.01.004

Eeckelaert, L., Dhondt, S., Oeij, P., Pot, F.D., Nicolescu, G.I., Webster, J., & Elsler, D. (2012). *Review of workplace innovation and its relation with occupational safety and health*. Bilbao: EU-OSHA.

Eichendorf, W., & Bollmann, U. (2014). Future approaches to a culture of prevention. In: *From Risk to Vision Zero – (Selected) Proceedings of the International Symposium on Culture of Prevention – Future Strategies* (pp. 43–53) Helsinki: FIOH.

EU-OSHA – European Agency for Safety and Health at Work (2015). *Second European survey of enterprises on new and emerging risks (ESENER-2)*. Luxembourg: Publications Office of the European Union.

EU-OSHA. (2010). Pawlowska, Z., & Eeckelaert, L., (Eds.), *Mainstreaming OSH into business management*. Bilbao: European Agency for Safety and Health at Work.

Flin, R., O'Connor, P., & Crichton, M. (2008). *Safety at the sharp end – A guide to non-technical skills*.Boca Raton: CRC Press.

Glasscock, D.J., Rasmussen, K., Carstensen, O., & Hansen, O.N. (2006). Psychosocial factors and safety behaviour as predictors of accidental work injuries in farming. *Work and Stress*, *20*, 173–189. http://dx.doi.org/10.1080/02678370600879724

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Goldenhar, L.M., Williams, L.J., & Swanson, N.G. (2003). Modelling relationships between job stressors and injury and near miss outcomes for construction labourers. *Work and Stress*, *17*, 218–240. http://dx.doi.org/10.1080/02678370310001616144

Griffin, M.A., & Curcuruto, M. (2016). Safety climate in organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*, 191–212. http://dx.doi.org/10.1146/annurev-orgpsych-041015-062414

Groeneweg, J. (1994). *Controlling the controllable – The management of safety*. Leiden: DSWO Press, University of Leiden.

Grøtan, T.O., Waerø, I.O., Van der Vorm, J.K.J., Van der Beek, F.A., & Zuiderwijk, D.C. (2016). Using gaming and resilience engineering training of front-end operators and managers. In: Walls, Revie, & Bedford (Eds.), *Risk, reliability and safety: Innovating theory and practice*, pp 2246–2253, London, UK: Taylor & Francis.

Grote, G., & Kunzler, C. (2000). Diagnosis of safety culture by safety management audits. *Safety Science*, *34*, 131–150. http://dx.doi.org/10.1016/S0925-7535(00)00010-2

Grote, G., & Kunzler, C. (1996). Safety culture and its reflections in job and organisational design: Total safety management. *International Journal of Environment and Pollution*, *6*, 4–6.

Hollnagel, E. (2014). *Safety I and safety II, The past and future of safety management*.Boca Raton: CRC Press.

Hollnagel, E., Woods, D.D., & Leveson, N. (2006). *Resilience engineering: Precepts and concepts*. Aldershot: Ashgate.

IAEA., *(*2016). Performing safety culture self-assessments. Safety Reports Series No 83 (annex 1), IAEA, Vienna.

ILO – International Labour Organization (2016). *Workplace stress: A collective challenge*. Geneva: ILO.

Jain, A., Leka, S., & Zwetsloot, G.I.J.M. (2011). Corporate social responsibility and psychosocial risk management in Europe. *Journal of Business Ethics*, *101*, 619–633. http://dx.doi.org/10.1007/s10551-011-0742-z

James, P. (2006). The changing world of work: an exploration of its implications for work-related harm. *Policy and Practice in Health and Safety*, *4*, 3–15. http://dx.doi.org/10.1080/14774003.2006.11667672

Karasek, R.A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*, 285–308. http://dx.doi.org/10.2307/2392498

Knight, L. (2002). Network learning: exploring learning by interorganisational networks. *Human Relations*, *55*, 427–454. http://dx.doi.org/10.1177/0018726702554003

Koivupalo, M., Sulasalmi, S., Rodrigo, P., & Väyrinen, S. (2015). Health and safety management in a changing organisation: Case study global steel company. *Safety Science*, *74*, 128–139. http://dx.doi.org/10.1016/j.ssci.2014.12.009

Lamond, N., & Dawson, D. (1999). Quantifying the performance impairment associated with fatigue. *Journal of Sleep Research*, *8*, 255–262. http://dx.doi.org/10.1046/j.1365-2869.1999.00167.x

Larsson, T.J. (2003). Who will use claims data for the prevention of occupational trauma? *Safety Science Monitor*, *7*, 1–10.

Laschinger, S., Heather, K., Leiter, R.N., & Michael, P. (2006). The Impact of nursing work environments on patient safety outcomes: The mediating role of burnout engagement. *Journal of Nursing Administration*, *36*, 259–267. http://dx.doi.org/10.1097/00005110-200605000-00019

Leitão, S., Greiner, B.A. (2016). Organisational safety climate and occupational accidents and injuries: an epidemiology-based systematic review. *Work and Stress*, *30*, 71–90. http://dx.doi.org/10.1080/02678373.2015.1102176

Leka, S., Jain, A., Zwetsloot, G., Andreou, N., & Hollis, D. (2016). Future challenges of occupational safety and health policy making in the UK. *Policy and Practice in Health and Safety*, *14*, 1–16. http://dx.doi.org/10.1080/14773996.2016.1231871

Leka, S., Van Wassenhove, W., & Jain, A. (2015). Is psychosocial risk prevention possible? Deconstructing common presumptions. *Safety Science*, *71*, 61–67. http://dx.doi.org/10.1016/j.ssci.2014.03.014

Leka, S., & Jain, A. (2010). *Health impact of psychosocial hazards at work: an overview*. Geneva: WHO.

Leka, S., Cox, T., & Zwetsloot, G. (2008). The European framework for psychosocial risk management. In: Leka, S., & Cox, T., (Eds.). *The European framework for psychosocial risk management: PRIMA-EF*. Nottingham: I-WHO Publications.

Locke, E.A., & Latham, G.P. (2002). Building a practically useful theory of goal setting and task motivation. A 35-year odyssey. *American Psychologist*, *57*, 705–717. http://dx.doi.org/10.1037//0003-066X.57.9.705

Long R. (2012). *The zero aspiration – The maintenance of a dangerous idea*. (2016, January 28). Retrieved from: http://www.humandymensions.com/images/images/The%20Zero%20Aspiration%20the%20Maintenance%20of%20a%20Dangerous%20Idea.pdf.

Mathisen, G.E., & Bergh, L.I.V. (2016). Action errors and rule violations at offshore oil rigs: The role of engagement, exhaustion and health complaints. *Safety Science*, *85*, 130–138. http://dx.doi.org/10.1016/j.ssci.2016.01.008

Mearns, K., Flin, R., Gordon, R., & Fleming, M. (2001). Human and organizational factors in offshore safety. *Work and Stress*, *15*, 144–160. http://dx.doi.org/10.1080/02678370110267837011006661 6

Mendeloff, J., & Burns, R. (2013). States with low non-fatal injury rates have high-fatality rates and vice versa. *American Journal of Industrial Medicine*, *56*, 509–519. http://dx.doi.org/10.1002/ajim.22047

Milliman, J., Czaplewski, A.J., & Ferguson, J. (2003). Workplace spirituality and employee work attitudes. *Journal of Organizational Change Management*, *16*, 426–447. http://dx.doi.org/10.1108/09534810310484172

Nahrgang, J.D., Morgeson, F.P., & Hofmann, D.A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement and safety outcomes. *Journal of Applied Psychology*, *96*, 71–94. http://dx.doi.org/10.1037/a0021484

NICE – National Institute for Health and Care Excellence. (2015). *Workplace health: Management practices*. UK: NICE guideline [NG13]. Retrieved from: nice.org.uk/guidance/ng13.

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017

Oeij, P.R.A, Rus, D., Pot, F.D., (Eds.), in print. (2017). *Workplace innovation: Theory, research and practice, 'aligning perspectives on health, safety and well-being' series*. Dordrecht: Springer Publishing Company.

Olsen, E., Naess, S., & Høyland, S. (2015). Exploring relationships between organizational factors and hydrocarbon leaks on offshore platform. *Safety Science*, *80*, 301–309. http://dx.doi.org/10.1016/j.ssci.2015.07.023

Parker, S.K., Axtell, C.M., & Turner, M. (2001). Designing a safer workplace: Importance of Job autonomy, communication quality and supportive supervisors. *Journal of Occupational Health Psychology*, *6*, 211–228. http://dx.doi.org/10.1037//1076-8998.6.3.211

Payne, A.F., Sorbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the Academy of Marketing Science*, *36*, 83–96. http://dx.doi.org/10.1007/s11747-007-0070-0

Petitta, L., Probst, T.M., Barbaranelli, C., & Ghezzi, V. (2017). Disentangling the roles of safety climate and safety culture: Multi-level effects on the relationship between supervisor enforcement and safety compliance. *Accident Analysis and Prevention*, *99*, 77–89. http://dx.doi.org/10.1016/j.aap.2016.11.012

Powell, W.W., & DiMaggio, P.J. (1991). *The new institutionalism in organisational analysis*. Chicago, IL: University of Chicago Press.

Prahalad, C.K., & Ramaswamy, V. (2004). Co-creation experiences: The next practice in value generation. *Journal of Interactive Marketing*, *18*, 1–14. http://dx.doi.org/10.1002/dir.20015

Ramvi, E. (2003). Sikkerhet, følelser og fellesskap (Safety, emotions and community). *Tidsskrift for arbeidsliv*, 5*(2)*, 43–61. http://dx.doi.org/10.1002/dir.20015

Ratilainen, H., (Ed.), Salminen, S., Zwetsloot, G., Perttula, P., Starren, A., Steijn, W., … Kalakoski, V. (2016). The value of safety and safety as a value. Saf€ra Technical Report No 1, SAFERA.

Roberts, K.H. (1990). Some characteristics of high-reliability organizations. *Organization Science*, *1*, 160–177. http://dx.doi.org/10.1287/orsc.1.2.160

Rogers, E.M., (1993). *Diffusion of innovations*. New York: Free Press.

Ryan, R.M., & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78. http://dx.doi.org/10.1037//0003-066X.55.1.68

Salminen, S., & Lee, J. (2015). A concept of a culture of prevention: A review of literature. *Occupational Medicine and Health Affairs*, *2*, 154. http://dx.doi.org/10.4172/2329-6879.1000154

Sharman, A., 2014. *From accidents to zero*. Great Britain: Maverick Eagle Press.

Schill, A.L., & Chosewood, L.C. (2013). The NIOSH total worker health program – an overview. *Journal of Occupational and Environmental Medicine*, *555*(12), 8–11. http://dx.doi.org/10.1097/JOM.0000000000000037

Senge, P. (1990). *The fifth discipline, the art and practice of the learning organisation*.New York: Doubleday.

Singh, S. (2012). *New mega trends – Implications for our future lives*. Hamshire (UK), New York (US): Palgrave Macmillan.

Sneddon, A., Mearns, K., & Flin, R. (2013). Stress, fatigue, situational awareness and safety in offshore drilling crews. *Safety Science*, *56*, 80–88. http://dx.doi.org/10.1016/j.ssci.2012.05.027

Twaalfhoven, S.F.M., & Kortleven, W.J. (2016). The corporate quest for zero accidents: A case study into the response to safety transgressions in the industrial sector. *Safety Science*, *86*, 57–68. http://dx.doi.org/10.1016/j.ssci.2016.02.010

Volvo., (2017, January 20). Volvo sees crash free car by 2020. Retrieved from: https://www.cnet.com/roadshow/news/volvo-sees-crash-free-car-by-2020/.

Weick, K.E., & Sutcliffe, K. (2007). *Managing the unexpected*. San Francisco: Jossey-Bass.

Williamson, A., Lombardi, D.A., Folkard, S., Stutts, J., Courtney, J.K., & Connor, J.L. (2011). The link between fatigue and safety. *Accident Analysis and Prevention*, *43*, 498–515. http://dx.doi.org/10.1016/j.aap.2009.11.011

WSH (2012). *Towards vision zero – A guide for business leaders*. Singapore: WSH Institute.

Young, S. (2014). From zero to hero. A case study of industrial injury reduction: New Zealand Aluminium Smelters Limited. *Safety Science*, *64*, 99–108. http://dx.doi.org/10.1016/j.ssci.2013.11.016

Zohar, D. (2014). Safety climate: Conceptualization, measurement, and improvement. *The Oxford handbook of organizational climate and culture*. pp. 317–334.

Zwetsloot. G.I.J.M., Kines, P., Wybo, J.L., Ruotsala R., Drupsteen, L., & Bezemer, R.A. (2017a). Zero accident vision based strategies in organisations: Innovative perspectives. *Safety Science*, *91*, 260–268. http://dx.doi.org/10.1016/j.ssci.2016.08.016

Zwetsloot, G.I.J.M., Kines, P., Ruotsala, R., Drupsteen, L., Merivirta, M.L., & Bezemer R.A. (2017b). The importance of commitment, communication, culture and learning for the implementation of the zero accident vision in 27 companies in Europe. *Safety Science*, *96*, 22–32. http://dx.doi.org/10.1016/j.ssci.2017.03.001

Zwetsloot, G.I.J.M., Aaltonen, M., Wybo, J.L., Saari, J., Kines, P., & Op De Beeck R. (2013a). The case for research into the zero accident vision. *Safety Science*, *58*, 41–48. http://dx.doi.org/10.1016/j.ssci.2013.01.026

Zwetsloot, G.I.J.M., van Scheppingen, A.R., Bos, E.H., Dijkman, A., & Starren, A. (2013b). The core values that support health, safety, and well-being at work. *Safety and Health at Work*, *4*, 187–196. http://dx.doi.org/10.1016/j.shaw.2013.10.001

Zwetsloot, G.I.J.M., & Leka, S. (2010). Corporate culture, health and well-being. In: Leka, S.& Houdmondt, J., (Eds.), *A text book for occupational health psychology* (pp. 250–268), Chicester (UK): Wiley Blackwell.

Zwetsloot, G.I.J.M., & Ashford N.A. (2003). The feasibility of encouraging inherently safer production in industrial firms. *Safety Science*, *41*, 219–240. http://dx.doi.org/10.1016/S0925-7535(02)00003-6

Downloaded by [Professor Gerard Zwetsloot] at 06:45 07 October 2017