Review

Management of Workplace Risks and Hazards using a Safety Consciousness Framework

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Safety consciousness provides the approach required in making all stakeholders realize and appreciate the need to undertake work operations in such a way that hazards and risk of accidents are reduced as far as reasonably practicable in the workplace. While most safety studies have focused on safety climate and safety culture with reasonable commensurate improvements, much still needs to be done considering that safety anomalies are still very much relevant in organizations operating in high risk sectors. Reviewed literature shows that consciousness is very subjective in meaning. It has several dimensions and a number of 20th century perspectives. Safety management provides the platform to identify relevant hazards and determine the level of risk involved through systems integration. The study proposes a framework of safety consciousness which integrates the relevant facets of safety management with the aspects of consciousness.

Key Words: Framework, Hazard, Management, Safety Consciousness, Risk, Workplace.

INTRODUCTION

The significance of safety in organizations operating in high risk sectors makes it necessary to understand how consciousness explicates safety management. This is because safety can only be managed effectively if all stakeholders are aware of its relevance in ensuring the wellbeing of humans and the environment in the face of risks. According to Alison and Vredenburgh (2002), safety management is a product of the practical methods that are used in maintaining the wellbeing and sanctity of people, equipment and resources in any given environment. Safety management systems

and policies are therefore usually put in place to ensure that the least possible harm, injury and destruction are experienced in any organization undertaking high risk operations. These safety management systems and policies increase consciousness as stakeholders become aware of the consequences of things going wrong in the workplace.

Many framework studies have been carried out on safety over the past 3 decades but most have centered on safety climate and culture with hardly significant reference to safety consciousness. Studies on safety emerged in the 1980s with primary emphasis on safety climate (Zohar, 1980; Brown and Holmes, 1986) which was seen as the

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main perception on safety concerns among organizations. Similarly, Milijic et al., (2013), Filho et al., (2010), Griffin et al., (2000) understood safety climate as the portrait defining the nature and extent of safety anomalies in a given organization. The 1984 disaster in a chemical factory in Bhopal, India as well as the 1986 Chernobyl nuclear disaster in the Ukraine were precursors to the need to develop safety culture perceptions that will help in reducing accidents and fatalities particularly in organizations that operate in high risk industries. These accidents resulted in many studies on safety culture as it was seen as a panacea to effectively managing safety anomalies in the workplace (Cox and Cox, 1991; Cooper, 2000; Finlinson and Huang, 2008; Hoivik et al., 2009; Kalejaiye, 2013; Zamanabadi et al., 2015; Emetumah, 2016a). On that note, a positive safety culture is defined by Fernandez-Muniz et al., (2007) as a reflection of employees' and management's commitment towards ensuring that all the directives and procedures that will mitigate accidents and infrastructural destruction, are fervently adhered to. Similarly, Guldenmund (2000) asserted that safety culture is a critical part of organizational culture which is used to evaluate how organizations deal with safety issues. Therefore, poor recourse to consciousness despite its relevance to safety management provides the motivation for developing a framework of safety consciousness in the workplace.

Significance of the problem

Despite numerous studies on safety management, safety anomalies are still of utmost concern to all stakeholders particularly those operating in high risk sectors. Organizations pursue a positive safety climate and culture and expect safety consciousness to be instilled in individual workers; this approach seems ineffective. This is because accidents that result in loss of lives, destruction of infrastructure and environmental degradation are still taking place in many parts of the world (Oti and Nwabue, 2013; Agwu and Olele, 2014; Onyeobi and Imeokparia, 2014; Umeokafor et al., 2014; Ogbonna and Nwaogazie, 2015; Grenfell, 2017). Literature on safety focused primarily on safety climate and culture with less emphasis on safety consciousness which is also important in explicating measures for controlling safety anomalies. The pertinence of safety consciousness is centered on the fact that being aware and adequatetly informed on safety

management techniques does not necessarily imply compliance and conformity with these techniques.The issue of consciousness therefore becomes imperative since it goes a bit further in entrenching safety practices beyond the capabilities of safety climate and culture. It is the contention of this paper that a virile safety climate or culture has to evolve from safety consciousness.

LITERATURE REVIEW

Elucidating Consciousness

Arriving at a definitive opinion on consciousness is an arduous task indeed. The issues bordering on consciousness have existed since the dawn of mankind's intellectual curiosity (Levine, 1983). According to Tononi (2012), theoretical methodology to consciousness can supplement basic empirical studies which elucidate many anthropocentric problems and anomalies. On that note, Tononi's Integrated Information Theory of consciousness clearly explicated by the principles of 3 thought experiments (the photodiode, the camera and the internet), show how consciousness maybe derived in the human brain (Balduzzi and Tononi, 2009; Tononi, 2012).

According to Velmans (2009), divergent views on consciousness have made it quite a challenge to provide a holistic and comprehensive definition of consciousness. However, consciousness can be defined according to one's line of thought. Therefore, adequate elucidation can be undertaken on consciousness as long as one is able to specify the boundaries as well as aspects relevant to the issue in question. Nonetheless, a certainty is that consciousness is an experience based phenomenon significantly affected by what is observed (Skinner, 2014). Consciousness can therefore be stated to cover all phenomena that we are aware of through physical or mental experience which include feelings, dreams (or nightmares), sensations, images as well as metaphysical thoughts. In the context of safety, consciousness provides a very useful tool that can serve as knowledge or information affirmation.

Aspects of Consciousness

The aspect of categorization implies that we group or arrange our thoughts even though we cannot
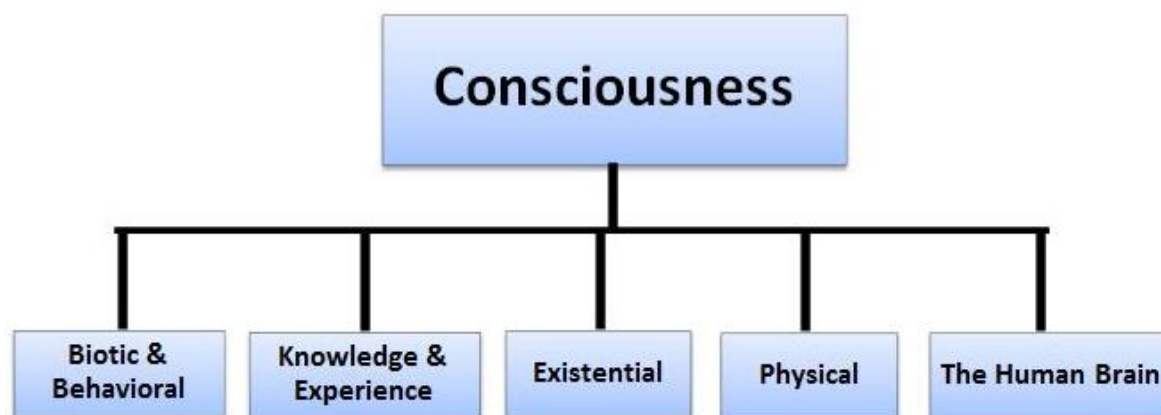
Figure1. 20th Century Perspectives on Consciousness.

realistically do that (Jaynes, 2000). Nonetheless, we still do that because of our anthropogenic qualities makes us naturally aligned towards orderliness and finesse. Fragmentation infers that consciousness of events and conditions are usually fragmented (Block et al., 2014). Individualist opinion simply tries to project the fact that consciousness is quite individualistic and can only be perceived if only the individual in question shares what he/she possesses (Gorodnichenko and Roland, 2012). Descriptive mechanics looks at how the mind's exploits are explicated to a third party in form of narratives (Hunt, 1995). Cognitive mechanism looks at how we are always trying to recognize the things we are conscious about and also how we reconcile them with our physical and experiential realities (Paller and Suzuki, 2014).

20th Century Perspectives on Consciousness

Many studies on consciousness have a number of vital perspectives as illustrated in Figure 1.

Consciousness is synonymous to physical matter (Place, 1956; Nagel, 1974). The way things work in the real world is analogous to the workings of the conscious mind. Consciousness is also a critical part of all biotic elements and is always a product of human behavior (Koubeissi et al., 2014). This assertion is based primarily on the evolution of human behavior and its impact on the development of science in the 20th century (Rutherford, 2003; Peterson, 2004; Skinner, 2014; Emetumah, 2017). Consciousness is also knowledge and experience based (Oizumi et al., 2014). Furthermore, consciousness is affected by the nature of existence

and being (Edelman and Tononi, 2013).

Safety Management

Safety can be defined as the degree or extent to which an individual, group of individuals, infrastructure, equipment and the environment (physical and biological components) is (are) free from harm (RMS, 2013). This implies that safety is not a complete elimination of harm, rather it is subjective and depends on measures instituted to control identified hazards and minimize inherent risks. Safety issues always have cause – effect parameters: while the *hazards* are usually regarded as the cause of the safety issue under consideration, the *risk* is the likelihood of the hazards in question to cause harm (Okolie and Okoye, 2012; Abubukar, 2015). According to Olutuase (2014), safety is considered optimally effective when it takes a proactive stance by preventing accidents before they occur. This is only possible if all stakeholders are consciously aware of the consequences of accidents during work operations in high risk industries.

A hazard is any tangible situation or physical element that has potential to result in injury/ill-health/fatality for workers/visitors /neighbors, destruction of equipment or infrastructure and degradation in environmental quality (Alison and Vredenburgh, 2002). The tangibility of hazards is very important in understanding how they can pose a danger. It is only what can be perceived that can have any significant effect (RMS, 2013). The physical nature of hazards does not prevent them from causing psychological harm. A steady low

buzzing sound coming from workplace equipment may not cause significant damage to the ear drums but may adversely affect concentration (Özlem, 2014). Furthermore, not being conscious of appropriate safety procedures and techniques can be hazardous, because accidents or incidents may result due to employees not being aware or willing to conduct themselves in the correct way during work operations (Ogbo and Ukpere, 2013).

Risk as a concept of safety management merges the likelihood that an event will take place with the magnitude of its impact if it eventually happens. Therefore, the higher the likelihood that an event will take place, the higher the consequential impacts it will have on employees, neighbors, equipment, infrastructure and the environment (Özlem, 2014). According to Labodová, (2004), risk is always better handled when a multi-faceted approach is taken while being conscious of the consequences of the hazards in question. What may appear as normal from a given perspective could turn out to be completely unsafe from another angle. Therefore, risk is usually a subjective issue whose consequences can only be predicted with a probabilistic value. On that note, the likelihood that an event will occur is only a speculative matter and being conscious of the probabilistic values can significantly affect choice making (Iannacchione et al., 2008).

Management Systems

An effective management system should make provisions for planning, organizing, arranging and controlling the entire organizational management system among others. These provisions are usually benchmarked as industry standard practices (Cunningham, 1979; Akpan, 2011). Globally, many standard documents come from the International Organization for Standardization (ISO) which coordinates the activities of affiliate national standard organizations who are its members or affiliates (ISO Website). The principle behind ISO is to provide a holistic approach for dealing with standardization in a highly globalized world where many corporations operate at the multinational level. Standardization in safety helps organizations in similar areas of operations to have a specific criterion for dealing with the design of their safety management systems (Khawaji, 2012).

Most Management Systems in use today follow the systematic procedure in the Plan–Do–Check–Act (PDCA) sequence which is very similar to the so-called 'Deming Wheel' outlined by W. Edwards Deming to Japanese engineers and manufacturers in the 1950s (Tsutsui, 1996). PDCA is very easy to apply because it lacks complexities usually experienced with other management systems. The steps are: identify the aim, specific objectives as well as resources required by the system in question (PLAN), carry out the plan as effectively as possible (DO), determine if the plan carried out is as effective as desired so that fundamental errors can be recognized (CHECK) and implement corrections in line with the fundamental errors identified so as to make the system optimal (Bulsuk, 2009). The PDCA cycle though initially based on the principle of quality control and improvement, can also be applied in other areas related to overall organizational efficiency (Moen and Norman, 2010). ISO has a number of Management System Standards that are relevant to Safety. Quality Management Systems (ISO 9000 series) is the most popular and deals with improving quality and efficacy of products/production process (ISO, 2015). Environmental Management Systems (ISO 14001) deals with all environment risk management and appropriate measures to eliminate and protect all environmental parameters from pollution and degradation (ISO, 2015a). Occupation Health and Safety Management Systems (ISO 45001) (expected in 2018) concerns making adequate arrangement to protect employees from workplace hazards and risks thereby making the workplace safer and more user friendly (ISO, 2015b). The Occupational Health and Safety Management Systems (OHSAS 18001: 2007) designed by the British Standards Institute (BSI) is the mostly widely applicable standard currently available for managing workplace hazards and risks in the workplace It helps in reducing accidents and mishaps particularly when it is integrated with other Management Systems like those on environment management and quality control (OHSAS 18001, 2007; Emetumah, 2016b).

DISCUSSION

The relationship between safety and consciousness is very complex. Its facets are not very clear and require a framework that can explicate the pertinent issues by integrating them appropriately as shown in Figure 2.
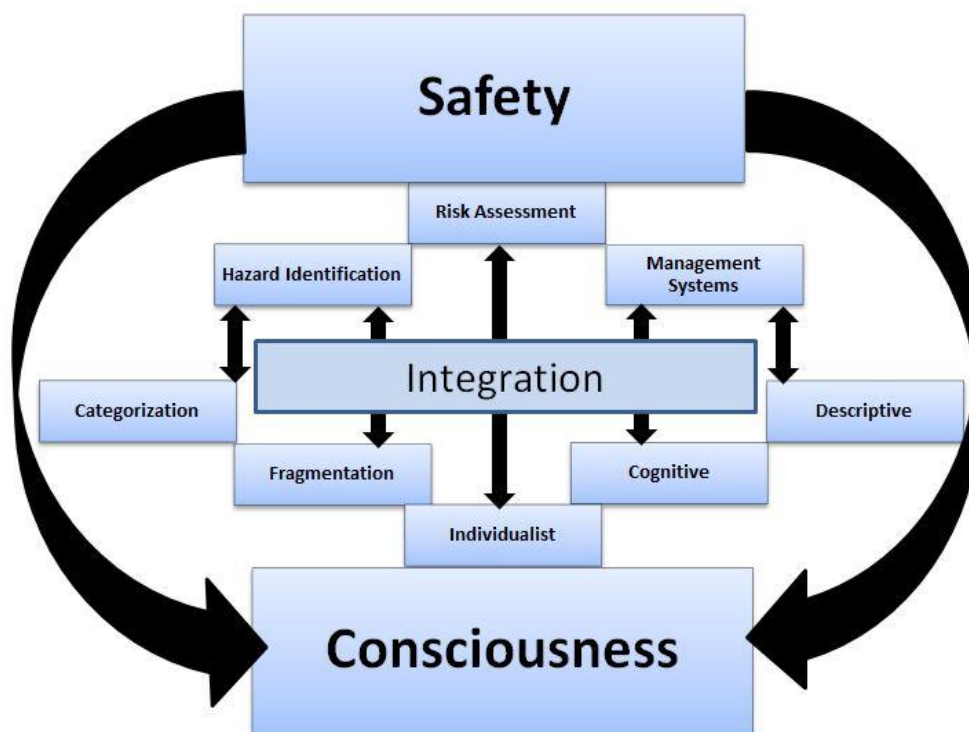
Figure 2. Proposed Framework of Safety Consciousness.

Safety consciousness can be described as physical or mental experiences of various phases which help us to deal with hazards and risks associated with a particular type of activity or endeavor, by integrating the relevant components. The ability of all stakeholders in organizations operating in high risk industries to understand and appreciate the need to be safety conscious is vital in militating against relevant hazards and risks. The proposed framework of safety consciousness in Figure 2 therefore provides a platform for understanding how physical and mental experiences can facilitate the amelioration of hazards and risks in the workplace through integration of relevant facets.

The categorization aspect of consciousness based on orderliness and finesse as described by Jaynes (2000) is very vital in safety management. This is because effectively handling safety issues that are commonplace in high risk operations require sufficient spatial arrangement and deployment of appropriate management techniques. Consequently, safety management systems are realizable when its components are adequately organized so that roles and responsibilities are clearly outlined and standard operating procedures

are complied with. This assertion agrees with Akpan (2011) and Khawaji (2012) on the important role of well designed management systems in ameliorating hazards and risks in the workplace.

Fragmentation of consciousness makes it easier to deal with issues we need to be aware and thoughtful about (Block et al., 2014); it is very relevant in understanding safety management. This is because instead of following a single system, the multiplicity of issues involved in maintaining a safe work environment requires solutions from a wide range of areas. This position agrees with Emetumah (2016b) on the need to integrate a number of ISO management systems in order to effectively deal with risks associated with working in high risk operations. Similarly, safety consciousness does not take a singular perspective but combines a number of facets as posited in Tononi's theory of consciousness (Tononi, 2004; Tononi, 2008; Balduzzi and Tononi, 2009; Tononi, 2012).

Consciousness is always individualistic in the sense that we percieve everything in our own unique way. This is in line with Gorodnichenko and Roland's (2012) position that humans are genetically designed to have a desire for freedom

and singularity in perceiving things; safety management is not left out in this human characteristic. Despite the assertion that integration is necessary for effective safety management as posited by Labodová (2004) and Emetumah (2016b), it takes a combined effort of each individual employee to make the system work. This assertion suggests that despite significant studies on safety climate and culture which take organizational standpoints (Cox and Cox, 1991; Cooper, 2000; Finlinson and Huang, 2008; Hoivik et al., 2009; Kalejaiye, 2013) rather than individual loci, safety anomalies persist in many countries and industrial sectors.

Reviewed literature shows that consciousness is absolutely impractical unless it can be described effectively in form of narratives (Hunt, 1995). No individual can go into the mind of another to decipher what is happening there. This assertion agrees with Bulsuk (2009) and Akpan (2011) on the importance of policy and procedurality in making safety management work. Designers of any safety policy or procedures cannot explicate their intentions appropriately if they did not have the correct medium of doing so.

Cognition provides the avenue for consciousness to recognise the need to do what needs to be done at any given situation. This recognition is as a result of environmental and socio-economic factors that affect how we percieve counsciousness (Paller and Suzuki, 2014).

CONCLUSION

The issue of safety consciousness in the workplace is mainly due to the need to protect the wellbeing of all stakeholders from all perceived hazards and risks that can negatively affect the efficacy of work operations. Despite the relevance of consciousness in understanding human perception of safety management, safety climate and culture are the main drivers of safety management techniques mostly through organizational approach. However, consciousness is very intricate due to its subjective nature as well as multifaceted dimensions. The proposed framework of safety consciousness has the capacity to ameliorate pertinent hazards and risks in the workplace through an integrated approach that infuses all relevant components. Safety consciousness is able to manage workplace risks and hazards because it not only considers the

physical and experiential aspects of consciousness, but also looks at the subjectivity of consciousness which takes the human factor into cognizance.

REFERENCES

Abubukar U (2015). An Overview of the Occupational Safety and Health Systems of Nigeria, UK, USA, Australia and China: Nigeria Being the Reference Case Study. Am. J Edu. Res., 3(11): 1350-1358.

Agwu MO and Olele HE (2014). Fatalities in the Nigerian Construction Industry: A Case of Poor Safety Culture. Br. J Econ. Mgt. Tr., 4(3): 431-452.

Akpan EI (2011). Effective Safety and Health Management Policy for Improved Performance of Organizations in Africa. Int. J Bus. Mgt., 6(3).

Alison G and Vredenburgh AG (2002). Organizational safety: Which management practices are most effective in reducing employee injury rates? J. Safety Res., 33:259– 276.

Balduzzi D and Tononi G (2008). Integrate Information in Discrete Dynamical Systems: Motivation and Theoretical Framework. PLoS Comp. Biol., 4(6).

Balduzzi D and Tononi G (2009). Qualia: the Geometry of Integrated Information. PLoS Comp. Biol., 5(8).

Block N, Carmel D, Fleming SM, Kentridge RW, Koch C, Lamme VA and Rosenthal D (2014). Consciousness Science: Real Progress and Lingering Misconceptions. Tr. Cogn. Sci., 18(11): 556-557.

Brown RL and Holmes H (1986). The use of a factor-analytic procedure for assessing the validity of an employee safety climate model. J. Accid. Anal. Prev., 18: 455-470.

Bulsuk K (2009). Taking the First Step with the PDCA (Plan-Do-Check-Act) Cycle. Available at:http://www.bulsuk.com/2009/02/taking-first-step-with-pdca.html

Cooper MD (2000). Towards a model of safety culture. J. Safety Sci., 36: 111-136.

Cox S and Cox T (1991). The structure of employee attitudes to safety - a European example. J. Work Str., (5): 93 - 106.

Cunningham J (1979). The Management System: Its Functions and Processes. Mgt. Sci., 25(7): 657 - 670.

Edelman GM and Tononi G (2013). Consciousness: How Matter becomes Imagination. London:

Penguin.

Emetumah FC (2016a). Appraising Management Perception of Health Safety and Environment Culture in a Nigerian Petroleum Company. Adv. Res., 7(5): 1-15.

Emetumah F (2016b). Integrated Management Systems as a Risk Management Tool: Combining ISO 9001, ISO 14001 & OHSAS 18001 Standards in Process Industries. In L. Walls, M. Revie, & T. Bedford (Ed.), Risk, Reliability and Safety: Innovating Theory and Practice (pp. 1216-1221). Glasgow: CRC Press.

Emetumah FC (2017). Modern Perspectives on Environmentalism: Technocentrism & Ecocentrism in the Nigerian Context. As. Res. J. Arts Soc. Sci., 2(4): 1-9.

Fernandez-Muniz B, Montes-Peon J and Vazquez-Ordas C (2007). Safety culture: Analysis of the causal relationships between its key dimensions. J. Safety Res., (38): 627-641.

Filho AP, Andrade JC and Marinho DO (2010). A safety culture maturity model for petrochemical companies in Brazil. J. Safety Sci., (48): 615-624.

Finlinson S and Huang YH (2008). Occupational safety: Application of the job demand–control–support model. J. Accid. Prev., 40(5): 1713–1723.

Gorodnichenko Y and Roland G (2012). Understanding the Individualism-Collectivism Cleavage and Its Effects: Lessons from Cultural Psychology. In M Aoki, T Kuran, G Roland (Eds.), Institutions and Comparative Economic Development. International Economic Association Series (pp. 213-236). London: Palgrave Macmillan.

Grenfell O (2017). At least 23 dead, dozens trapped in Iranian coal mine disaster. World Socialist Website, May 4. Available at: https://www.wsws.org/en/articles/2017/05/04/iran-m04.html

Griffin MA, Hart PM and Neal A (2000). The impact of organizational climate on safety climate and individual behavior. J. Safety Sci., Pp. 1-30.

Guldenmund FW (2000). The nature of safety culture: a review of theory and research. J. Safety Sci., (34): 215-257.

Hoivik D, Moen B, Mearns K and Haukelid K (2009). An explorative study of health, safety and environment culture in a Norwegian petroleum company. J. Safety Sci., (47): 992-1001.

Hunt HT (1995). On the nature of consciousness: Cognitive, phenomenological, and transpersonal perspectives. New Haven: Yale University Press.

Iannacchione AT, Brady TM and Varley F (2008).The Application of Major Hazard Risk Assessment (MHRA) to Eliminate Multiple Fatality Occurrences in the U.S. Minerals Industry. Washington: U.S. Department of Health and Human Services.

ISO (2015). ISO 9000 Quality management Series.

ISO (2015a). Introduction to ISO 14001:2015 Geneva: International Organization for Standardization.

ISO (2015b). ISO 45001 Briefing notes on Occupational health and safety. Available at: http://www.iso.org/iso/iso_45001_briefing_note.pdf

ISO Website. (n.d.). International Organization for Standardization. Available at: http://www.iso.org/iso/home.html

Jaynes J (2000). The Origin of Consciousness in the Break Down of the Bicameral Mind. Boston: Houghton Mifflin.

Kalejaiye PO (2013). Occupational Health and Safety: Issues, Challenges, and Compensation in Nigeria. Peak J. Pub. Health Mgt., 1(2): 16-23.

Khawaji I (2012). Developing System-Based Leading Indicators for Proactive Risk Management in the Chemical Processing Industry. MSc. Thesis: Massachusetts Institute of Technology.

Koubeissi MZ, Bartolomei F, Beltagy A and Picard F (2014). Electrical Stimulation of a Small Brain area reversibly disrupts Consciousness. Epil. Behav., (37): 32-35.

Labodová A (2004). Implementing Integrated Management Systems using a Risk Analysis Based Approach. J. Cleaner Prod., 12(6): 571–580.

Levine J (1983). Materialism and Qualia: The Explanatory Gap. Pac. Phil. Quart., 64(4): 354-361.

Milijic N, Mihajlovic I, Strbac N and Zivkovic Z (2013). Developing a Questionnaire for Measuring Safety Climate in the Workplace in Serbia. Int. J. Occup. Saf. Ergon. 19(4): 631-645.

Moen R and Norman CL (2010). Circling Back: Clearing up Myths about the Deming Cycle and seeing how it keeps evolving. Qual. Prog., 43(11): 22-28.

Nagel T (1974). What is it like to be a bat? The phil. Rev., 435-450.

Ogbo AI and Ukpere WI (2013). Management of Designed Safety Adherence Model for the Nigerian Work Environment. J. Hum. Ecol., 41(3): 183-191.

Ogbonna CI and Nwaogazie IL (2015). Fire safety

preparedness in workplaces in Port Harcourt, Nigeria. Int. Res .J. Pub.Env. Health, 2(8): 12-121.

OHSAS 18001 (2007). Occupational Health and Safety Management Systems. London: BSI.

Oizumi M, Albantakis L and Tononi G (2014). From the Phenomenology to the Mechanisms of Consciousness: Integrated Information Theory 3.0. PLoS Comp. Biol., 10(5).

Okolie KC and Okoye PU (2012). Assessment of National Culture Dimensions and Construction Health and Safety Climate in Nigeria. Sci. J. Env. Eng. Res., 167.

Olutuase SO (2014). A Study of Safety Management in the Nigerian Construction Industry. J. Bus. Mgt., 6(3): 1-10.

Onyeobi T and Imeokparia EG (2014). Heavy Metal Contamination and Distribution in Soils around Pb – Zn Mines of Abakaliki District, South Eastern Nigeria. Front. Geosci., 2(2): 30-40.

Oti W and Nwabue FI (2013). Heavy Metals Effect due to Contamination of Vegetables from Enyigba Lead Mine in Ebonyi State, Nigeria. Environ. Pollut., 2(1): 19-26.

Özlem DE (2014). Analysis and Modelling for Risk Management for Underground Coal Mines' Safety. Doctoral Thesis. Middle East Technical University.

Paller K and Suzuki S (2014). The source of consciousness. Trends Cogn. Sci., 18: 387–389.

Peterson GB (2004). A Day of Great Illumination: B.F. Skinner's Discovery of Shaping. J. Exp. Anal. Behav., 82: 317–328.

Place UT (1956). Is consciousness a brain process? Bri. J.Psychol., 47(1): 44-50.

RMS (2013). A Guide to International Health & Safety at Work (2nd ed.). Stourbridge: RMS Publishing.

Rutherford A (2003). B.F. Skinner's Technology of Behavior in American Life: from Consumer Culture to Counterculture. J. Hist. Behav. Sci., 39(1): 1-23.

Skinner BF (2014). Science and human behavior. Cambridge, MA: The B. F. Skinner Foundation.

Tononi G (2004). An Information Integration Theory of Consciousness. BMC Neuroscience, 5(42).

Tononi G (2008). Consciousness as Integrated Information: a Provisional Manifesto. Biol. Bull., 215(3): 216-242.

Tononi G (2012). Integrated Information Theory of Consciousness: an Updated Account. Arch. Ital. Biol., 150(2-3): 56-90.

Tsutsui W (1996). W. Edwards Deming and the Origins of Quality Control in Japan. J. Jap. Stud., 22(2): 295-325.

Umeokafor N, Evaggelinos K, Lundy S, Isaac D, Allan S, Igwegbe O and Umeadi B (2014). The Pattern of Occupational Accidents, Injuries, Accident Causal Factors and Intervention in Nigerian Factories. Dev. Coun. Stud., 4(15): 119 - 127.

Velmans M (2009). How to Define Consciousness - and how not to Define Consciousness. J. Consc. Stud., 16(5): 139 - 156.

Zamanabadi KI, Kavousy E and Tehrani MM (2015). Hofstede's Cultural Dimensions and HSE Culture Behavior. Ar. J. Bus. Mgt. Rev., (Nigerian Chapter), 45.

Zohar D (1980). Safety climate in industrial organizations: theoretical and applied implications. J. Appl. Psychol., 65(1): 96–102.