

Developing a Measure of Safety Data Culture

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Abstract

Safety is a critical concern for many organizations, especially those in construction and manufacturing. A newer approach to improving an organization's decision making involves the use of data analytics. In regard to safety, the use of data analytics would allow for detecting and tracking risk factors such as behaviors, environmental contingencies, production, procedures, and hazards that are associated with workplace injuries. However, many organizations do not have a culture involving the use and measurement of relevant variables on an ongoing basis.

Accordingly, the purpose of the study is to develop a measure of safety culture with a specific emphasis on the extent to which data is being utilized for management of safety in an organization. This measure of safety culture and analytics will assist in determining the extent to which an organization is ready to utilize data analytics into their safety program.

Keywords: safety, culture, data analytics, safety culture, decision making

In 2016 alone, there were approximately 2.9 million nonfatal injuries and illnesses and 5,190 workplace fatalities in the private sector in the United States (BLS, 2017). This was a seven percent increase from 2015 and the first time since 2008 that workplace fatalities were over 5,000 (BLS, 2017). Given that a lack of occupational safety adversely affects so many workers in America, understanding organizational efforts to improve safety is extremely important today. The Occupation Safety Act and Health Act of 1970 and the subsequent creation of the Occupational Safety and Health Administration (OSHA) introduced regulations regarding safety in areas such as fall protection, hazard communication standards, respiratory protection, control of hazardous energy, and machinery and machine guarding. Adherence to these strict guidelines is one way organizations combat workplace injury (OSHA, 2017).

In addition to following OSHA regulations, one technique being used to improve safety in organizations is Behavior Based Safety (BBS), which examines the behavioral and environmental contingencies that impact whether an individual engages in a safe or unsafe behavior(s) (Grindle, Dickinson, & Boettcher, 2000). The data obtained through BBS relies heavily on observations, which are prone to measurement error and subject to other contingencies in the work environment, such as production schedules, management decisions, employee experience, and fatigue. Given the magnitude of variables that influence behavioral outcomes, a relatively recent approach to improving organizational safety involves expanding upon those variables through the use of data analytics. However, very few organizations utilize big data and analytics to manage safety outcomes.

Beyond regulations and BBS practices, an organization's culture, specifically safety culture, can influence the rate of injuries in an organization. In fact, given the emphasis on BBS and the benefits of utilizing data in decision-making (Barends, Rousseau, & Briner, 2014),

understanding and measuring an organization's safety culture and its acceptability of analytics is an area that could greatly improve the safety of an organization. Safety culture can be defined as, "the interaction between environmental variables, organizational practices, and the consequences of those practices" (Bumstead & Boyce, 2005, p. 45). While safety culture measures in the extant literature have examined specific safety attitudes (Pronovost et al., 2003), there is a gap in the literature as to safety culture measures that examine whether organizations utilize data to inform their safety practices. Accordingly, the purpose of this study is to develop a measure of safety culture that examines the extent to which data is utilized in making safety-related decisions.

Much research has examined the development of predictive safety analytics that would prevent accidents (Ancel et al., 2015), model risk (Wang & Abdel-Aty, 2017), and even examine safety climate (Pronovost et al., 2003). Accordingly, in developing the measure, this literature will be consulted through a systematic review of safety culture research in academic journals and trade publications. Information will be obtained about metrics that are available for the utilization of data in safety management decisions. Based upon these findings, a model will be developed to depict the dimensions of an organization's safety culture and items will be created to measure those dimensions. Utilizing the developed measure, we will test the construct and criterion-related validity of the items created for predicting safety outcomes using data from an American Fortune 500 chemical manufacturing firm with world-wide plant sites and 15,000 employees.

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