Developing an Analytics Strategy to Describe, Diagnose, and Predict Workplace Safety Outcomes

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Abstract

Evidence-based management practices that include big-data mining strategies have become commonplace in many areas of organizational management and have been shown to be effective. However, organizations have yet to fully take advantage of these analytic methods to improve their occupational safety. The proposed study aims to address this gap by developing a strategy to utilize data that organizations are already collecting to describe, diagnose, and predict workplace safety outcomes. The five proposed predictor variable categories are production, procedures, hazards, behaviors, and participation. Data will be collected from a large American Fortune 500 company that specializes in the production of advanced materials, chemicals, and fibers for everyday purposes.

Evidence-based management (EBM) is the process of systematically applying the best available evidence in order to improve decision making quality and solve practical management problems in organizations (Barends, Rouseau & Briner, 2014). Decision makers utilizing EBM use a blend of evidence from a variety of the most trustworthy and relevant sources for any given situation. This strategy helps to combat biases and prevent systematic errors in decision making (Barends et al., 2014). In today's highly competitive global market, organizations use Evidence-based practices (EBP) and data analytics to inform their decisions and increase their odds of success. Competitive organizations also use "Big Data," the ad hoc collection of very large datasets, to identify trends in order to forecast and predict future occurrences or behavior. Organizations in various industries that identify themselves as data-driven are more profitable than their competition (McAfee & Brynjolfsson, 2012). For example, *Match.com*, an online dating site, uses Big Data to note preferences and compatibility profiles (Gelles, 2011). Google's Human Resources department, known as People Analytics, uses EBP and Big Data to create a hiring algorithm with a documented miniscule 1.5% miss rate for hires (Sullivan, 2013).

Despite this widespread utilization of data in the workplace, organizations have not fully applied these analytic strategies to occupational safety, due in part to a lack of research incorporating Big Data and EBP in safety management. Accordingly, the proposed study aims to address this gap by developing a strategy to utilize data that is already being collected by organizations to describe, diagnose, and predict workplace safety outcomes. The proposed predictors are split into five variable groups: production, procedures, hazards, behaviors, and participation. Production variables will capture the variation in an organization's scheduling and workload. Procedure variables will describe the way an organization runs and adapts to change. Hazard variables will include factors that capture how an organization mitigates and reacts to

workplace hazards. Behavior variables will describe employee safety behaviors and characteristics. Lastly, participation variables will examine the extent to which employees participate in safety processes, as well as the overall safety culture of an organization. These variables will be used to predict leading indicators of safety outcomes, such as near misses, as well as specific safety outcomes, such as serious injuries or fatalities.

Data for the proposed study will be collected from a large American Fortune 500 company that specializes in the production of a broad range of advanced materials, chemicals, and fibers for everyday purposes. Data concerning the aforementioned outcome and predictor variables will be gathered from four divisions at one of the company's manufacturing sites. Each division is assigned a project lead who will work with a company liaison to investigate what data has been collected in the past, is currently being collected, or is planned to be collected. This process includes defining each category's metrics, determining if raw data is available, judging the quality of the data, and knowing where the data is being stored. Once these steps are completed, each project lead will work with the organization's information technology liaison to either set up automatic or manual data pulls from multiple data sources to one SharePoint site. From here, SAS will be used to further prepare, clean, and analyze the data. The proposed study will help foster a better understanding of the relationships between the proposed predictors and safety outcomes, which will help better inform organizations of which safety risk factors to focus the most resources on and how to best implement programs to mitigate workplace injuries and accidents.

References

Barends, E., Rousseau, D. M., & Briner, R. B. (2014). Evidence-Based Management: The Basic

    Principles. *Center for Evidence-Based Management.*

Gelles, D. (2011). Inside Match.com. *Financial Times*. Retrieved from

    http://www.slate.com/articles/life/ft/2011/07/inside_matchcom.html

McAfee, A., & Brynjolfsson, E. (2012). Big Data: The Management Revolution. *Harvard*

    Business Review. Retrieved from https://hbr.org/2012/10/big-data-the-management-

    revolution

Sullivan, J. (2013). How Google is Using People Data Analytics to Completely Reinvent HR.

    Talent Management and HR. Retrieved from https://www.tlnt.com/how-google-is-using-

    people-analytics-to-completely-reinvent-hr/