

Using Topic Modeling to Understand Workplace Health and Safety Ownership

Dion Hoe-Lian Goh, Chei Sian Lee, Yin Leng Theng, Han Zheng, Htet Htet Aung,
Megha Rani Aroor, Edmund Wei Jian Lee, Chen Li

Wee Kim Wee School of Communication and Information
Nanyang Technological University, Singapore
{ashlgoh, leecs, tyltheng, zhenghan, hhaung, mrraroor,
edmundlee, lichen}@ntu.edu.sg

Abstract. This paper is a first step in understanding the concept of workplace health and safety ownership. Using topic modeling, we identified three major themes in the literature, including work related to interventions, issues concerning organizational-level ownership, and issues related to group/personal level ownership.

Keywords: Topic modeling, workplace health and safety, ownership.

1 Introduction

Unsafe workplace conditions affect employees' wellbeing, as well as the reputation and profits of an organization. Consequently, it is crucial that organizations provide effective workplace safety and health (WSH) systems and policies.

Critical to this endeavor is the concept of "ownership", which would lead to commitment and participation [1] in WSH practices. However, being a relatively new concept in WSH research, the disparate body of literature makes it difficult for researchers and practitioners to understand the domain. Hence, the present study is a first step to summarize existing literature on WSH ownership by identifying major topics that have been published in this domain using topic modeling in our analysis.

2 Methodology

The ProQuest database was primarily used to retrieve the peer-reviewed articles relevant to WSH ownership from the years 2006 to 2016. Keywords used in the literature search included terms such as *locus of control*, *job attitudes*, *employee commitment*, *management commitment*, with the combination of *workplace safety* and *workplace health*. Only full text, peer-reviewed and scholarly articles were included, and after removing duplicate articles, 140 articles were selected for analysis.

Next, we employed Latent Dirichlet Allocation (LDA) topic modeling on our corpus. LDA enables "efficient processing of large collections while preserving the

essential statistical relationships that are useful for basic tasks such as classification, novelty detection, summarization, and similarity and relevance judgements” [2]. Two criteria were used to determine the number of topics. First, we assessed the perplexity score, which is an index of goodness-of-fit. The second step was to check the meaning of the topics and their relevance to WSH ownership.

3 Findings and Analysis

Three main topics that emerged from our LDA modeling were: Intervention, Organizational-level ownership, and Group and personal level ownership:

- Topic 1 (Intervention). Publications focused on activities or interventions that promoted WSH ownership. Examples of publications include the use of health circles as an intervention in the workplace, and interventions on supervisor support training to improve employees’ health and safety.
- Topic 2 (Organizational-level ownership). Publications covered broad issues relevant to ownership at the organizational level. These include organizational culture in occupational health, and the impact of organizational practices on productivity and workplace safety.
- Topic 3 (Group and personal level ownership). Publications discussed issues relevant to ownership at the group and personal levels. Examples include the exploration of how group-level factors (e.g., safety climate) and personal-level factors (e.g., motivation, knowledge) relate to various safety outcomes.

An interesting outcome of our study concerns the multi-dimensional conceptualization of WSH ownership at the organizational (Topic 2) level, and the group/personal level (Topic 3). This corroborates with the assertion of [3] that WSH ownership operates throughout an organization’s hierarchy, and no single level can be responsible for it. Our work thus suggests that WSH researchers should attempt to measure ownership as a multi-dimensional construct. It would also be advantageous for practitioners to consider all dimensions (organizational, group and individual levels) when devising WSH policies, campaigns or other interventions.

This study may be limited by the use of particular search terms and databases to obtain relevant publications related to WSH ownership. In future work, it would worthwhile to conduct more extensive bibliometric analysis to uncover patterns such as prominent authors/institutions, co-word/co-citation analyses, evolution of topics.

Acknowledgement. This research project is funded by WSH Institute, Singapore and supported by WSH Council, Singapore.

References

1. Van Dyne, L., Pierce, J.L.: Psychological ownership and feelings of possession: Three field studies predicting employee attitudes and organizational citizenship behavior. *Journal of Organizational Behavior* 25, 439-459 (2004)

2. Blei, D.M., Ng, A.Y., Jordan, M.I.: Latent Dirichlet Allocation. *Journal of Machine Learning Research* 3, 993-1022 (2003).
3. Zohar, D.: Safety climate and beyond: A multi-level multi-climate framework. *Safety Science* 45, 376-387 (2008)