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An occupational ergonomics in the Indonesian state mandatory sustainable forest management instrument: A review

Efi Yuliati Yovi*, Dodik Ridho Nurrochmat

Department of Forest Management, Faculty of Forestry, Bogor Agricultural University, Campus IPB Dramaga, Bogor, West Java 16680, Indonesia

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ABSTRACT

Designed as a biodiversity-maintenance concept, Sustainable Forest Management (SFM) considers not only forest for its ecological function, but also forestry workers whom play a significant role in executing the SFM program in the implementation stage. By using occupational ergonomics approach, this paper aims to examine how the Indonesian mandatory SFM certification, the so-called *Pengelolaan Hutan Produksi Lestari* (PHPL) positioned forestry workers in its SFM scheme. This issue is important since forestry work is a well-known profession with high occupational safety and health (OSH) risk. Content analysis on occupational ergonomics-related national policies and the mandatory PHPL Criteria and Indicators (C&I), and interviews with forest managers, PHPL auditor, and forestry workers indicate the poor performance of the instrument to assess the occupational-ergonomics-related factors at a practical level. This study reveals that PHPL is more of administrative liability obligation fulfillments rather than performance-based fulfillments (meanwhile, OSH status should be seen as an outcome of a good safety culture rather than an artifact/document). This study verifies content-overlap among the verifiers, content mismatch between the verifiers and the actual characteristic of forest operation, and the absence of distinct assessment standard. This study also discovers the existence of “ergonomics holes” in the PHPL C&I: (1) promoting a safe working environment for forestry workers, (2) distinct organization structural linkage on safety responsibility assignments, (3) emergency procedure, (4) distinct qualification for heavy machine operator and chemical technician, (5) sub-contract workers, and (6) the importance of management commitment and workers' participation. Revision on PHPL should seriously consider integrating OSH and well-being aspect as mentioned in Indonesia's national policies concerning manpower and occupational safety.

1. Introduction

1.1. The concept of sustainable forest management and the occupational risk in forestry work

Sustainable forest management (SFM) is accepted as a concept designed to embrace different forest interests on the value of various stakeholders (Berninger et al., 2008). This complexity is mentioned in the UNCED “Forest Principles,” which explicitly states that SFM should consider the social, economic, ecological, cultural, and spiritual needs of present and future generations (UN, 1992). Principle Numbered 2(d) states that forestry workers should be given an opportunity to actively participate in the development, implementation, and planning of forest policies (UN, 1992). This definition reflects that forest not only provides ecological function but also should consider human and social aspects, including the safety of the workers as they play a significant role in executing SFM program in the implementation stage.

On the other side, studies reveal that forestry workers often suffer

from hazardous working conditions and work environment that threatens their safety and health, and at the same time their well-being (Heinimann, 2000; Brodie and Ibrahim, 2010; Lindroos and Burström, 2010; Tsiaras et al., 2014). The workers have to face both human-made and nature-given sources of hazards, in which forest environment dominates the uncontrollable hazard sources in both physical elements (climate, topography, accessibility, altitude) and biological elements (heavy and large dimension of trees, insects, wild animals, poisonous plants, and microorganisms). Previous researchers have confirmed how these sources of hazards have triggered fatal accidents and occupational health disturbances (Thelin, 2002; Klun and Medved, 2007; Enez et al., 2014; Tsiaras et al., 2014; Yovi and Prajawati, 2015). In terms of physiological burden, Yovi et al. (2005) stated that forest operations (manual clear cutting in Java Island) may consume up to 78% of VdotO₂max of a worker, which was slightly lower than the energy expenditure of a soccer referee during official matches (Weston and Brewer, 2002).

* Corresponding author.

E-mail address: eyyovi@apps.ipb.ac.id (E.Y. Yovi).

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1.2. SFM in Indonesia and its occupational ergonomics issues

Indonesian Government has demonstrated efforts to protect its biodiversity (Law Numbered 5/1990) by implementing a state mandatory forest management certification scheme called *Pengelolaan Hutan Produksi Lestari* (Sustainable Production Forest Management; henceforth referred to as PHPL) to promote SFM. The formulation of the PHPL platform was initiated in 2002 (Government Regulation Numbered 34/2002) and the first instrument was set in 2009 (Regulation on Ministry of Forestry Numbered P.38/Menhut-II/2009) (Ruslandi et al., 2014). The latest PHPL Standard and Guidelines are laid down in Regulation of Directorate General of Sustainable Management of Production Forest Ministry of Environmental and Forestry Numbered P.14/PHPL/SET/4/2016.

This state mandatory PHPL instrument is developed based on ITTO's definition of SFM: “the process of managing a forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and service without undue reduction of its inherent values and future productivity and without undue undesirable effect on the physical and social environment”. Looking at the scope of the criteria and indicators (C&I) developed in PHPL principles i.e.: main precondition, production, ecology, and social aspects (Maryudi et al., 2017), the instrument also covers several issues on occupational safety and health (henceforth referred to as OSH), well-being, and productivity of the workers; in which, these issues are deeply discussed in the field of occupational ergonomics.

Occupational ergonomics assumed that all related aspects in any activity should support or serve the human operators (in terms of their safety, health, and productivity), and not the other way around (ILO, 1998a). Ergonomics is applied across all aspects of human activity through the application of theoretical principles, data, and methods originating from multi-discipline sciences to optimize labor/human well-being and overall system performance (IEA, 2017). This way, humans will be able to perform their best activity since humans have needs and capabilities, but at the same time also have limitations (ILO, 1998a).

However, a paradox prevails. Mandatory PHPL was intentionally designed in 2002 to promote sustainable forest management. Concerning that the instrument covers several OSH and well-being related aspects, the instrument should also advocate the workers' needs and requirements to execute SFM programs in the implementation stage. In spite of this, the current studies still show clear evidence on the lack of safety standard knowledge among forestry workers particularly at the supervisor and operator levels (Yovi and Yamada, 2015; Yovi et al., 2016). This situation has resulted in unsafe and improper forest operations. On the other side, the existence of poor OSH status which linked to poor working conditions in Indonesia actually has been reported since years back (Gandaseca and Yoshimura, 2001; ILO, 2010). Therefore, there is a visible indication that considerations towards the workers' needs have remained weak and relatively stagnant for decades.

1.3. Objectives

Globally, SFM certification schemes are promising in promoting biodiversity maintenance (Rametsteiner and Simula, 2002). However, the paradox raises questions about how the current mandatory PHPL scheme accommodates the workers' needs. Therefore, this study was conducted to examine the emerging issues below concerning Indonesia's mandatory PHPL instrument from the standpoint of “occupational ergonomics”:

- (1) Identify the foundation and substances of the state's current PHPL mandatory instrument.
- (2) Examine the performance of PHPL on protecting OSH and well-

being of the workers involved.

- (3) Investigate the “ergonomics holes” in the current state's mandatory PHPL instrument.
- (4) Make suggestions that may improve OSH protection and well-being of Indonesian forestry workers.

2. Methods

Many studies in forest policy employ multidisciplinary approaches to evaluating gap implementation and to formulating policy recommendation (Nurrochmat et al., 2016; Sukwika et al., 2016;). Adopting a concept known as bricolage (Denzin and Lincoln, 2000; Kincheloe, 2001), this study is a qualitative research employing a multidisciplinary approach both to data collection and analyses. Following Denzin and Lincoln (2000), Kincheloe (2001) emphasizes that “bricolage recognizes the dialectical nature of the disciplinary and interdisciplinary relationship and promotes a synergistic interaction between the two concepts”. Data used in this analysis were occupational ergonomics-related policy documents, the state's mandatory PHPL documents, PHPL audit reports, operating procedures on forest operations, and the workers' perspective towards risk management. Information related to the PHPL audit process and safety management aspects were also taken from PHPL auditors and the managerial representatives.

Referring to the application of content analysis in forestry field (Ekayani et al., 2016; Nurrochmat et al., 2016), this study also uses content analysis (Hsieh and Shannon, 2005) to evaluate the occupational ergonomics-related policy documents and the PHPL related documents in order to capture how the PHPL translates the term of “OSH and well-being” in its Criteria and Indicators (C&I). The perception of forestry workers pertaining to risk management was collected through focus group discussion (FGD) and individually face-to-face semi-structured interviews depending on the most likely conditions in the field. As many as 110 forestry workers (32 chainsaw operators, 16 field supervisors, 16 heavy machineries operators, 11 office staffs, 8 forest inventory staffs, 8 logging truck drivers, 7 nursery workers, 5 mechanics, and 7 miscellaneous workers) chosen from various forest types, forest operations and management, and work experience were involved in this study. There were four questions applied in both the FGD and interviews: (1) how do you describe the term “hazards”?, (2) list the sources of hazards in your workplace, (3) how do you describe the term “risk”?, and (4) list the losing parties when an accident occurred. The definition of “risk” in this study is based on the analysis of risk assessment using technical approaches (Grammenco, 2004; CCPS, 2008) that define risk as a function of “probability and magnitude” and hazards as “something that (potentially) dangerous and may cause harm”, which is a common definition widely accepted in Indonesia. The answers were categorized as “correct” if it (in the end) had the same meaning with the common definition (we used ILO, 1998b as the standard reference), “incorrect understanding” if it pointed to other topics but still related, and “being ignorant” if there was no answer at all. The answers on the sources of hazards were examined based on the respondent's duties, as a different job is associated with a different workplace and working conditions. In case of losing parties, an occupational incident may cause a direct burden to the victim (worker), the employers (Pérezgonzález and Hrymak, 2007), and their family. In this question, no answer was categorized as “being ignorant”, one correct answer was categorized as “fair”, and at least two correct answers were categorized as “good”.

Interviews were also carried out to top management representatives in five forest management units to obtain information on OSH organization structure and safety commitment. Face-to-face interviews with five independent PHPL auditors and experts were also carried out to capture the PHPL performance from a different perspective.

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