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# PAPER BURNING AND ASSOCIATED POLLUTION PROBLEMS IN HIGHER EDUCATIONAL INSTITUTIONS OF ETHIOPIA: THE NEED AND POTENTIAL FOR RECYCLING

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Higher educational institutions (HEIs) use large amount of paper for students' assessment each year. As recycling is one of the best options for efficient material utilization and waste management, the potential in higher education institutions was assessed taking Kotebe Metropolitan University (KMU) and Ethiopian Civil Service University (ECSU) as sampling site. The aim was to evaluate the human health and environmental consequences of storing and burning assessment paper, thereby turning the cause of the damage to sustainable utilization through proposing recycling. Accordingly, the potential criteria air pollutant emissions while burning assessment papers, heavy metal concentrations in the ash of the burned paper and macro-nutrients were determined using Aero-Qual series 300 in open burning at KMU, and Atomic Absorption Spectrophotometer at JIJE Analytical Testing Service Laboratory, respectively. It was found that the average emissions for CO (119.67 ppm), CO<sub>2</sub> (1700 ppm), SO<sub>2</sub> (038 ppm), VOCs (3749 ppm) and NO<sub>x</sub> (0.10 ppm) were recorded. The concentration of CO, SO<sub>2</sub> and NO<sub>x</sub> were significantly higher than the guidelines recommended by WHO and other international organizations. The paired sample t-test between white paper and the printed one showed significant difference ( $p < 0.05$ ) on the parameters CO<sub>2</sub> and NO<sub>x</sub>. Similarly, the heavy metal analysis result indicated that Cd (0.47 mg/kg), and Pb (0.48 mg/L) were detected from the ash of printed paper. Moreover, the average pH and macro-nutrients (NPK values) of the printed paper were 9.07, 0.83%, 40.88 ppm and 83.68 ppm respectively. About 35,000 reams of paper are burned in each of the institutions per year, and 69% of the respondents (instructors) were volunteered and were ready, to provide assessment paper for recycling which shows that there exist considerable potential for paper recycling in HEIs. Therefore, the researchers need to recommend that paper recycling should be taken as an integrated system of the activities in HEIs.

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