Title: Water-waste measurement experiential exercise to reinforce dual CSR and operations management learning outcomes

**Abstract**

In an operations management course, faculty implemented a water-waste experiential exercise to reinforce learning outcomes associated with managing both traditional business wastes and those associated with environmental and social responsibility. For students, discussions surrounding traditional business waste-reduction methods provide an approachable opportunity to discuss social and environmental waste challenges, and to discuss the synergy between multiple measures in the triple-bottom-line, balanced scorecard, CSR, ESG, or other similar business metrics and drivers. In the experiential exercise, students collected and measured water waste in their residences, learned about regional and global water challenges, the UN Sustainable Development Goals (e.g. Goal #6: Clean Water and Sanitation), and reflected on their own experiences. Session participants will explore applicable modifications to the exercise to create regional relevance for their own classes.

Keywords: lean & green synergy, operations management, corporate and social responsibility

**Introduction**

Increased societal emphasis on business’ role in global sustainable development reinforces the need for business students both to learn about and reflect on the importance of key global challenges in business sustainability. The UN 17 Sustainable Development Goals (SDGs) increasingly have been discussed and adopted by a wide variety of organizations, accrediting bodies, and businesses as a framework for corporate and social responsibility. Within business curricula, operations management courses often address key solutions to sustainability challenges through the lenses of lean systems (cost and waste reduction), and continuous improvement. By applying lean systems business philosophy and tools to a personal daily behavior (water waste), we encourage students to appreciate the importance of improving responsible corporate behaviors that impact regional and global water challenges.

**Theoretical Foundation / Teaching Implications**

Within operations management, lean systems tools provide a robust approach for students to consider and reflect on reducing organizational cost and organizational waste, with an objective to increase organizational competitiveness. In parallel, as organizations place more emphasis on sustainable development as part of corporate and social responsibility, lean systems philosophies help bridge the gap between practical economic bottom-line cost reduction (improvement), and sustainability-centric social and environmental improvement.

Learning Objectives

* Students discover and recognize regional and global water waste challenges, and the impact that corporate decisions have on those regional and global challenges
* Students apply basic data collection and process measurement, learn about and apply basic lean systems and continuous improvement tools, and summarize results in a multi-student experiential project
* Students analyze and reflect on their own daily personal water waste challenges
* Students extrapolate from their own personal water waste experiences to the corporate behaviors that impact regional and global water waste challenges

**Exercise Overview**

We provided a “pre-test” survey to each student before informational materials were presented for the exercise. Students were asked about: a) their individual opinions and previous exposure to experiential learning exercises, b) their general knowledge and familiarity with regional and global water waste challenges, and c) general demographic information.

Throughout the period of the exercise (about four to five weeks total) several sources of information were interspersed judiciously during weekly class activities. Students were presented with brief videos, summarized research materials, and other similar materials. Students learn about regional and global water waste challenges in the context of a business operations management course. Ideally, these short informational interludes could be included as supporting or supplemental materials within course content associated with any of the following primary course topics: lean systems philosophy and tools, continuous improvement, dimensions of competitive advantage (or strategy) in operations management, etc. Similarly, this exercise could be included in a business capstone course, business policy & strategy course, or a business ethics course that has a strong corporate and social responsibility emphasis.

This exercise assumes that students live or work in a location where water waste collection and measurement is feasible. Each student collected their water waste multiple in a limited fashion, from two or more locations in each living location, using the following procedure:

* At each water use location or source within each living environment, students collect water as they wait for cold tap water to reach a usable temperature:
	+ Shower or bathing scenario
	+ Washing hands in a bathroom sink scenario
	+ Washing dishes in a kitchen sink scenario
* Each student collects data from at least two locations within each living environment, with suggestions shown above. At each location or water source, two data collection trials showed occur (n=2) per water source.
* For each data point, students allow water to run and collect the “wasted water” until they judge that the temperature of the water has reached an appropriate usable level. “Wasted water” is the water that normally would simply run down the drain, unused, as students wait for the temperature of the water to reach a usable level.
* Students estimate the number of annual events of each type (e.g. taking a bath or shower) and calculate the estimated wasted water per year per water source. This is summed together for each student and all applicable measured scenarios (e.g. bathing, washing dishes, etc.).
* Based on local water costs, students calculate the wasted budget dollars associated with the wasted water.
* Students reflect on the budget dollars and water wasted per student, and compare individual scenarios to local and regional businesses.

At the end of the exercise, we facilitated a wrap-up discussion, students completed a “post-test” survey, and students performed a reflection exercise. When other classes participate in the exercise during the same semester, students were given the opportunity to compare their class results to other class’ results, as part of the reflection process.

**Session Description**

During the session, we will walk through the exercise, review samples of materials provided to students, and reinforce how it fits with the operations management curriculum and CSR (and similar business ethics curriculum approaches). In addition to the summary of the exercise described above, we will share additional details about the exercise, educational materials utilized, successes and failures in the exercise and the process, and some of the results from the Fall 2022 and Spring 2023 semester’s data collection. Throughout the session, we will seek feedback for modifying and improving the exercise, and increasing its applicability for various regions and locations where water access and scarcity differ.