School of Sustainability
Arizona State University

In partial fulfillment of the requirements for the degree of

Master of Science

Andrew John De Los Santos

Will defend his thesis

Addressing the Limitations of Life Cycle Assessments for Circular Economy Packaging Innovations with the Kaiteki Innovation Framework

Friday, July 10, 2020
10:00AM
Zoom Meeting ID: 986 0860 9613

Faculty, students, and the general public are invited.

Supervisory Committee:
Dr. Thomas Seager, Chair
Dr. Rajesh Buch, Member
Dr. Kevin Dooley, Member

Abstract

Historically, Life Cycle Assessments (LCA) guided companies to make better decisions to improve the environmental impacts of their products. However, LCA's are only one part of the Circular Economy (CE) to transform goods at the end of their useful life into a resource for other material streams. Research Question: **How do LCA-based tools account for reuse/multiple life cycles of products verses CE-based tools?**

The Kaiteki Innovation Framework (KIF) was used to address the question of circularity of two packaging materials using an Environmental LCA to populate its 12 CE dimensions. Any gaps were evaluated with 2 LCA- based and 2 CE-based tools to see which could address the leftover CE dimensions. Results showed that to

complete the KIF template, LCA data required one of the LCA-based tools: Social Life Cycle Assessment (SLCA) and both CE-based tools: Circular Transition Indicators (CTI) and Material Circularity Indicator (MCI) to supplement gaps in the KIF. The LCA proved useful for providing information on environmental impacts but require LCA-based and CE-based tools to cover social and socio-economic impacts from a cradle-to-cradle perspective with multiple circular loops in mind. These results can help in the research and development of innovative, circular products that can lead to a more environmentally preferred future.