Developing a Business Intelligence Tool to Quantify and Communicate Circular Economy Impacts

Degree programme : BSc in Industrial Engineering and Management Science
Thesis advisor : Dr. Maria Franco Mosquera
Expert : Adrian Stettler
Industrial partner : Syphon AG, Brügg bei Biel

This project describes the development of a comprehensive Business Intelligence (BI) tool for Syphon AG to measure and communicate the environmental and social impacts of their circular economy practices. By identifying and deploying key indicators like CO2-Equivalence emissions and social metrics such as employee diversity and integration, the tool enhances stakeholder engagement and improves decision-making.

Introduction and Objectives

Syphon AG, a Swiss non-profit, advances circular economy practices in construction. By repurposing components and employing individuals from supported sectors, it cuts waste and CO2 emissions from new material production. This project developed a BI tool to measure and showcase Syphon's environmental and social impacts. The tool calculates the cradle-to-gate CO2 equivalence of reused items and their transport and features a dynamic dashboard highlighting the company's contributions.

Research Design

By firstly engaging in a comprehensive literature review, a basic understanding is developed of what circularity and its aspects entail as well as what options of tools and assessments exist and are currently being used. The development of means to calculate the metric of choice, CO2 equivalence, follows and is being employed by taking a sample of the 50 highest revenue items and compare them with existing databases (Ecoinvent) and/or Environmental Product Declarations (EPD's). Lastly, by interviews with Syphon AG, KPI's and visualizations are determined. Social metrics in Syphon AG's context are measured by evaluating data on workforce demographics, employment of marginalized groups, community engagement, and the social benefits provided through their circular economy practices. This involves quantifying aspects like job creation, integration of social welfare recipients, and contributions to community well-being.

Results

The resulting tool addresses the three core pillars of circularity: environmental (1), social (2), and economic (3) impacts. The environmental section calculates total CO2-Equivalent emissions, including transport, with Power BI visualizations (Figure 1) highlighting savings from reused products. The social dashboard (Figure 2) displays metrics on social integration and circularity. The economic dashboard links cross-valued KPIs to these pillars, generating new metrics and insights. This approach simplifies the assessment and communication of Syphon AG's performance, providing dynamic visualizations tailored to internal needs and external stakeholder interests.

Implications and Recommendations

This tool significantly enhances Syphon AG's ability to communicate their environmental and social circular benefits to stakeholders. The environmental dashboard provides clear visualization of CO2-Equivalence emissions, reinforcing Syphon AG's commitment to sustainability and environmental circularity. Future enhancements should integrate expand lifecycle analysis capabilities as well as further automation via Artificial Intelligence. By continuously refining these features, Syphon AG can maintain its leadership in sustainable construction practices.

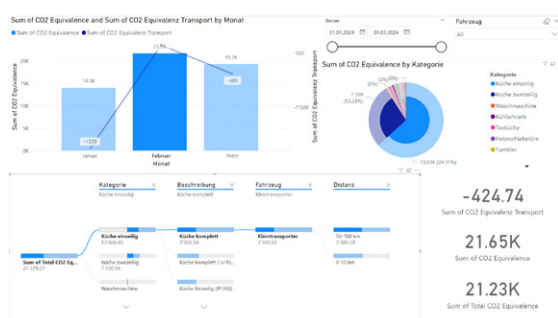Andrej Briggeler
Business Engineering

Figure 1: Environmental Assessment Dashboard

Figure 2: Social Assessment Dashboard