

Bachelor-Thesis B.Sc Business Engineering | Innovation

Assessing Circular Economy Potential in Regulated Diagnostic Products

Purpose

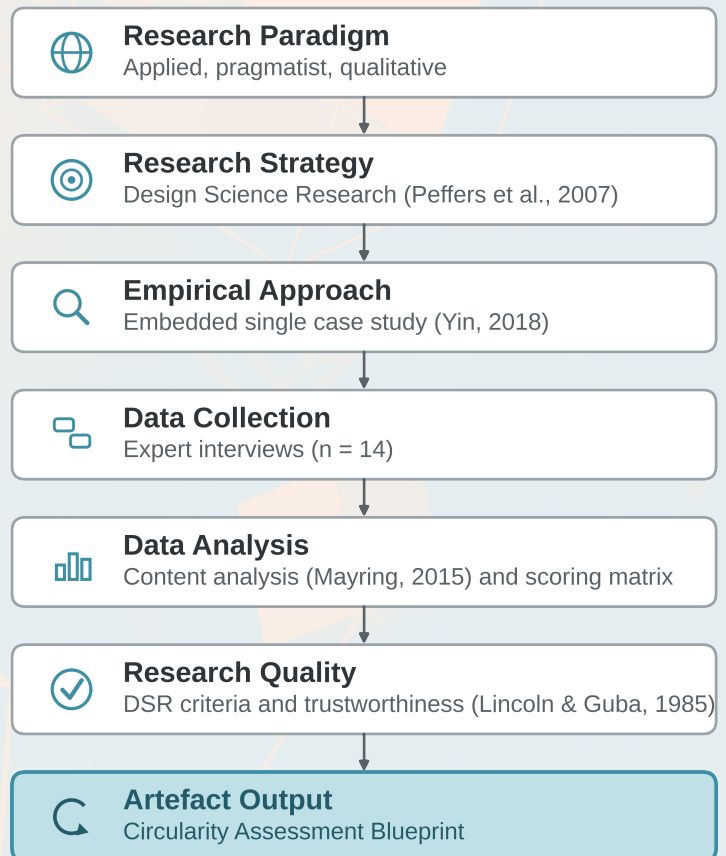
The circular economy retains the value of products, components, and materials through reuse, repair, refurbishment, and recycling, but applying it in in vitro diagnostics is constrained by Regulation (EU) 2017/746 (IVDR), which demands validated stability, traceability, and controlled change. The industry partner, a global diagnostics manufacturer, holds a large and heterogeneous portfolio yet lacks a systematic way to identify and prioritise circular economy potential across it. This thesis develops and applies a standardised circularity assessment blueprint, a multi criteria scoring framework, to prioritise products, select one for in depth analysis, and derive scalable recommendations. The guiding question is how circular economy potential can be systematically identified, assessed, and scaled across regulated diagnostic products.

Method Overview and Materials

The study is designed as Design Science Research: the blueprint is built as an artefact and evaluated in the setting it serves, with an embedded single case study at the industry partner as the empirical basis.

The material comprises fourteen semi structured expert interviews across six functional groups, thirteen analytically productive, plus internal documents such as bills of materials and lifecycle assessments.

The interviews were analysed through qualitative content analysis following Mayring, from which the five assessment dimensions were derived inductively and operationalised in an Excel based scoring matrix, then evaluated naturalistically on real products.



Results

The blueprint was applied to four products spanning the portfolio, each scored on a 1 to 5 scale across five weighted dimensions covering circular strategy potential, data availability, environmental impact significance, supply chain dependency and regulatory pressure, and circular economy market precedent. The weighted composite produced the following ranking: Product 1 (3.96), Product 2 (3.54), Product 3 (3.26), and Product 4 (2.60). A three step selection logic identified Product 1 for in depth analysis, on the basis of the highest composite, the most balanced dimensional profile, and consistency across independent assessors. The result turns a fragmented case by case activity into a repeatable and auditable screening process, with the recommendation to embed the blueprint as a recurring screening step, close the data gaps, and establish cross functional governance.