Sustainability Assessment of Circular Economy Initiatives

1. Context and motivation

Circular Economy (CE) is rapidly getting its momentum as world's leading advocacy associations and governmental bodies recognize the approach as a way of boosting business and economies without exploiting the resources at the rate that exceeds Earth's capacity. The ultimate goal of promoting CE is the decoupling of environmental pressure from economic growth. When it comes to CE implementation, companies adopt circular strategies that focus on superior design of products, services and business models, eliminating waste by closing the loops and encouraging product reuse, remanufacture or recycling. This shift often comes coupled with jobs creation, economic growth and social equity. However, that not all CE approaches are intrinsically leading to an improved environmental quality or financial benefits. Therefore, there is a need for a tool to help decision makers choose a CE strategy based on the assessment of its environmental performance, social and economic benefits.

The objective of the current PhD project is to conceptualize, develop, validate and implement a framework to assess the potential sustainability contribution of CE implementation on micro-level (i.e. business and companies) across a number of business processes. The sustainability impacts will be measured with the help of leading key performance indicators (KPI's) that are classified according to the three sustainability dimensions, CCE strategies and primary business processes.

Therefore, this research aims to cover the gap by investigating solutions to support the design and implementation of a Sustainability Assessment Framework in the CE context. The purpose of the framework is to support companies in evaluating the potential sustainability impact of different CE approaches/initiatives/solutions to support decision-making.

This PhD project is comprised within the CIRCit project "Circular Economy Integration in the Nordic Industry for enhanced sustainability and competetitiveness". The CIRCit project is funded by NordForsk and will be held in collaboration with the Norwegian University of Science and Technology (NTNU), SWEREA in Sweden, Innovation Centre Iceland and Confederation of Technology Industry in Finland. A strong collaboration with the aforementioned partners of the CIRCit group and Nordic industries will take place for the creation, testing, validation and implementation of the sustainability assessment framework, which will be ultimately rolled out within the Nordic industry.

1.1. Research objective, research questions and hypotheses

The present *research phenomenon* being studied is a development of a framework for assessing potential sustainability impact of CE initiatives by Nordic manufacturing companies to support their decision making, by selecting and employing industry-specific KPI's for each sustainability dimension. This is because circular solutions in manufacturing companies are not necessarily sustainable, even though many companies may perceive and communicate their CE initiatives as such (Allwood, 2014; Andersen, 2007; Murray et al., 2017).

Thus, the *research assumption* is, firstly, that circular solutions are not necessarily sustainable and therefore, there is a need for a framework (tool) to assess their potential sustainability contribution; secondly, existing tools for assessing sustainability on a corporate level often under-prioritize assessment of a social aspect (most are focused on environmental performance and financial benefits); thirdly, there is no complete system of sustainability indicators that a company could select from and implement (most performance assessments

employ lagging KPI's (i.e. focus on past performance assessment and are used for corrective actions), not leading, and are again heavily rely on environmental indicators, as those are widely investigated in terms of approaches and tools; furthermore, most indicators are related to assessments on national or regional levels).

The *hypotheses* are:

- it is possible to interconnect three sustainability dimensions with corresponding indicators in a framework for sustainability assessment that aims to support companies in choosing a circular strategy from a sustainability point of view by diagnosing the current company's profile and strategic sustainability objectives;
- It is possible to select and chart KPI's within each sustainability dimension for each business process

Key activities of the research will be:

- Systematic literature review (existing sustainability assessment frameworks, leading KPI's for sustainability assessment)
- Interviews with key stakeholders to identify requirements for the assessment framework (Nordic companies and researchers)
- Multiple case studies for theory testing (framework application in the Nordic companies involved in CIRCit)

Main outputs of the PhD project will be:

- A database that consists of the list of KPI's for each sustainability dimension that are linked to different business processes and CE strategies
- Sustainability assessment framework to measure the potential impact of Circular Economy initiatives
- Specific guidelines for the use of the framework based on companies characteristics (e.g. sector, type of projects, etc.)
- Dissemination (roll out) of the framework in Nordic manufacturing companies

Ultimately, it is expected that the developed framework can effectively support Nordic Industry in the transition to a Circular Economy.