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## RENEWING SME – MANUFACTURING COMPANIES TOWARDS CIRCULAR BUSINESS MODELS

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**Abstract:** Climate change, the energy crisis, environmental problems and the availability of raw materials have brought the term circular economy into the daily conversation, which has primarily referred to the recycling of raw materials and the use of recycled raw materials. As an economic theory, the circular economy includes several different circular economy business models that respond to customers' changing purchasing behavior/shopping habits and shift behavior from the ownership of goods to using services. The rapid development of digital technologies and the exponential growth of data volumes as well as the change in customer behavior have enabled completely new opportunities to renew the business operations of SME companies. The goal of the article is to describe the renewal of SME companies' business operations to the challenges of the future, by developing the companies' know-how. The article presents a concept for renewing the company's business by utilizing circular economy business models.

**Key words:** Circular economy, business models, small and medium size companies, change/development

### 1. INTRODUCTION

The circular economy is the new paradigm for business which aims to achieve economic growth through new sustainable business models. The research identifies circular business models that will help decouple economic growth from natural resource consumption while driving greater competitiveness.

The major drivers of change are a concern to combat climate change and the steeply growing amounts of data and their management and utilization across sectoral boundaries, thus enabling the emergence of new innovations and new sustainable business models.

The circular economy's goal of efficient material cycles and extending the life cycle of a product has created new opportunities enabled by digitalization. Digitalization and the demand for a sustainable economy drive

production—from owning equipment to providing services.

This development will lead to significant changes in the manufacturing industry, starting with the design process and the utilization of new technology in manufacturing and supply chains. Traditionally, ancillary services (e.g. maintenance) have been able to improve customer relationships and achieve better and more stable turnover. But the goal has only been to increase turnover.

In a new situation where competition is intensifying, developing new business models around traditional products may become a question of survival for a company. The main reasons for this are changes in customer needs and their acknowledgment, as well as new and relatively long supply chains related to circular economy business models, which

at best utilize the peak of digitalization and new technology.

The challenge of shifting business even partially towards the direction of services means:

- a.) changes in customer behavior should be identified (as well as risks and benefits for the customer),
- b.) the need to change the company's own competence
- c.) reshaping supplier networks.
- d.) utilizing digitalization in all operations (competence)
- e.) changing the organizational culture of the company

The change in the requirements of the circular economy affects the business operations of all companies, so companies must actively take into account the need for change and changes in customers' purchasing behavior in their own businesses. On the other hand, the competitiveness of companies operating in subcontracting chains also depends on the ability to meet the main supplier's requirements, such as achieving sustainable development goals.

The change process based on customer needs throughout the subcontracting chain must also be seen as part of the innovation process, in which new competitiveness is created at the interfaces of different actors and sectors by sharing data and utilizing new technology.

The goal of the article is to describe the renewal of SME companies' business operations to the challenges of the future, by developing the companies' know-how. The article presents a concept for renewing the company's business by utilizing circular economy business models.

## 2. THEORETICAL FRAMEWORK

It is stated that, "there will be no sustainability without competitiveness, and there will be no long-lasting competitiveness without sustainability" [3]. The circular economy is an economic theory that includes different business models. Circular economy business models are often presented as five basic models that provide a starting point for developing and renewing operations (Figure 1) [4].

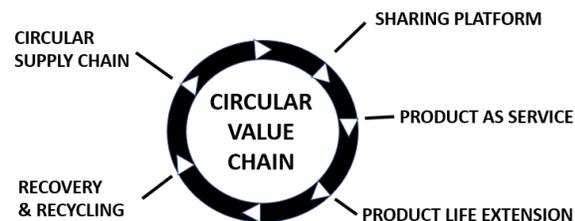


Fig.1 Circular Economy and Five Different Business Models

However, from the perspective of business development, it is important that these models are viewed as activities that utilize and complement the company's current manufacturing business, rather than as a rapid change to a new approach, as it is an extensive joint learning process with actors throughout the supply chain. The paradigm of a sustainable economy based on profitability is giving way to a circular economy, by new business model innovations and cooperation between industries [4].

The world now needs a systemic shift from linear thinking to a new carbon-neutral economic system based on a circular economy. Sitra (2022) has launched a guideline for companies, which introduces a concept by which a company can achieve circular economy business benefits and correct perceived inefficiencies by implementing one or more circular economy business models.

The five circular economy business models help in this. If a company wants to change its

business towards the circular economy, it should be recognized from the vision of circular economy key capabilities and strengthen in particular those where the company still has shortcomings [7]. In a circular economy, expenditure is based on services instead of ownerships: borrowing, repairing, sharing and renting. In circular economy business models, technologies and data act as enablers: digital platforms, sharing platforms, devices, sensors, and the Internet of Things, IoT, is taking advantage of digitalization. Identifying and monitoring inefficiencies has never been so affordable as today. [7]

Transition to a data-based cycles brings many opportunities. The goal of the circular economy is to replace the current linear "take-make-dispose" approach to resources with one where materials are kept at their highest material value and are constantly recycled back into the value chain for reuse, which reduces energy and resource consumption. [1] Participation in circular flows is no longer a "nice to have" - it is an essential source of competitiveness.

Eppinger (2010) has discovered that the connection between innovation and sustainability is usually stated, but not commonly taken into use. [2] Responsible business management needs a democratic culture of innovation as well as joint innovations and joint development processes.

It is assumed and essential to note that business models is changing when a business is in transition from a supply chain to digitalized circular value chain. The success of circular economy co-innovations needs a data-to-service management process and the form of a multidisciplinary cooperation for development.[6]

"Competition in the future will not be determined by the amount of needed information or the knowhow to analyze

collected data, but by the skills to transform it into new business models. These are implemented at the interfaces of different industries so that the real and virtual worlds will blend. People now make decisions in networks in such a way that each party has independently acquired information that each the decision is based." [5]

### **3. RESEARCH QUESTIONS AND FOCUS**

The circular economy works if it is a profitable business at all stages of the value chain. Digitalization provides an opportunity and foundation for streamlining and redesigning value chains. A prerequisite for the success of the circular economy business model is that they become economically profitable businesses for all companies operating in a supplier network. Whole the network is responsible also of good customer experience. The objective of this article is to present a concept for renewing the company's business by utilizing circular economy business models. The main research questions are:

- How is the SME manufacturing industry transforming towards circular business models?
- How to manage changes in value chains under the pressure of the growth of digitalization and circular economy?
- How is systemic innovation managed in the renewed supply chain?
- How is the data economy managed by a layered model in an enlarged value network?

This research is partly constructive and conceptual, as it opens the way to the circular economy for SMEs in the manufacturing industry and presents experiences of various circular economy business models.

Information for this concept building has been collected during years from a few regional development activities.

Interviews and workshops based on foresight and scenario planning have also been sources of information during the projects. Researchers have taken part in regional development during several years.

#### 4. DIGITALIZATION AS ENABLER OF GREEN TRANSITION

Digitalization is a key factor in the development of new circular economy business models that lead to the expansion of the physical product also towards the service product. Data, data availability, data ownership and data utilization are key issues in service production, which is why it is also important to take into account the different levels of digitalization (Figure 2) that enable the proper functioning of services, for example, data transfer (speed and latency), platform solutions, sensor networks, edge computing, and data analytics.

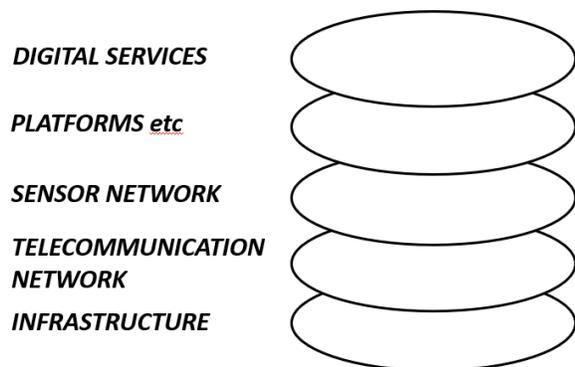


Fig. 2. Layered model of digitalization in solution creation

In addition to data, it is essential to make full use of new ICT technology (eg. AI, VR, XR, 3D printing, etc.) that change the supply chains of the core industry and thereby causes the renewal of the entire business.

#### 5. TRANSITION TOWARDS CIRCULAR ECONOMY BUSINESS MODELS IN SME- COMPANIES

In order to develop new circular economy business models, SME companies representing different industries and wanting to develop their own businesses were included in the KIITO-case project. 30 companies representing different sectors started to innovate new supply chains and service opportunities, for the purpose of moving business model by further digitalization and sustainable services thereby enabling the emergence of new circular economy businesses. The development process encouraged companies, to innovate, network, and form new supply chains among themselves (Figure 3).

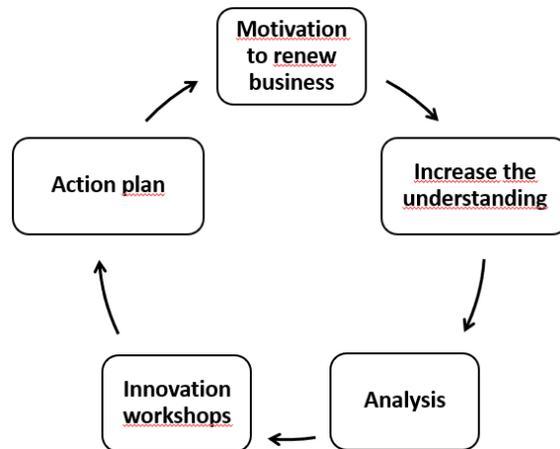


Fig. 3. Development Cycle in the Case- Project

The steps in the development process of circular business can be described as follows:

- a) Identify changes in customer behavior from owning a product to utilizing services.
- b) Familiarization with new business models and analysis of the company's own interests and capabilities. Creating a motivation for the company to develop circular economy business models.

- c) Analyzing changes in the business environment, network capabilities, digital competence
- d) Implement an innovation process in which, together with the actors in the network, sharing of data and the possibility of new technologies for radical renewal of the supply chain are analyzed according to customer needs. In the ongoing innovation process, it is important to provide opportunities for cross-sectoral innovations.
- e) The experiences and competence gained are documented in a development plan.

## 6. CONCLUSIONS

The article described the transformation concept of SME manufacturing companies in the transition towards business models that support the circular economy.

More extensive utilization of data in manufacturing industrial supply chains itself supports the development of operations and the creation of new business models.

On the other hand, alongside the sale of the physical product itself, different types of business concepts are developing, which are based on the provision of the service as part of the physical product.

For this reason, new circular economy business models and the utilization of data in the supply chain must be taken into account in the product design phase. The utilization of data requires consideration of different digital levels (fig. 3) (as example telecommunication requirements in mobile robotics).

The development process, which involves 30 companies creates new supply chains and innovations, thereby enabling the emergence of new circular economy businesses. The most important in this supply chain opportunity creation was the cooperation

between companies representing different sectors.

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### **ÎNNOIREA IMM-urilor – COMPANII DE PRODUCȚIE CĂTRE MODELE DE AFACERI CIRCULARE**

Rezumat: Schimbările climatice, criza energetică, problemele de mediu și disponibilitatea materiilor prime au adus în conversația de zi cu zi termenul de economie circulară, care s-a referit în primul rând la reciclarea materiilor prime și la utilizarea materiilor prime reciclate. Ca teorie economică, economia circulară include mai multe modele diferite de afaceri ale economiei circulare care răspund la schimbarea comportamentului de cumpărare/obiceiurilor de cumpărare ale clienților și schimbă comportamentul de la proprietatea asupra bunurilor la utilizarea serviciilor. Dezvoltarea rapidă a tehnologiilor digitale și creșterea exponențială a volumelor de date, precum și schimbarea comportamentului clienților au oferit oportunități complet noi de reînnoire a operațiunilor de afaceri ale IMM-urilor. Scopul articolului este de a descrie reînnoirea operațiunilor de afaceri ale companiilor IMM-uri la provocările viitorului, prin dezvoltarea know-how-ului companiilor. Articolul prezintă un concept pentru reînnoirea afacerii companiei prin utilizarea modelelor de afaceri ale economiei circulare.

Cuvinte cheie: economie circulară, modele de afaceri, companii mici și mijlocii, schimbare/dezvoltare

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