A Review of Data-Driven Approaches for Circular Economy in Manufacturing for Digital Technologies

Research Aim:
To provide a systematic literature overview of the development of data-driven circular strategies in digital manufacturing.

Objectives:
1. Identify relevant literature which centers on product reuse, remanufacture, redistribution and recycling.
2. To analyse these papers and track the development of circular strategies in digital manufacturing.
3. To identify the use of data in enabling circular strategies.
4. To identify the most used circular strategy in digital manufacturing.

MT1: Identify relevant literature using online database
Identifying and data mining of relevant literature on circular approaches: Product Reuse, Remanufacture, Redistribution and Recycling.

MT2: Analysis of identified papers
Analyze relevant papers based on subject, year of release and journal name to track the development of circularity in manufacturing.

MT3: Circular Approach Identification
Based on the reviewed data, we shall identify the dominant circular strategy in product manufacturing by analysing the numbers.

Results

Key Findings
(1) Circular strategies in digital manufacturing is a growing area. Between 2011 and 2014 there was a 80% rise in research.
(2) 43% of the papers are found to be from engineering-related research driven by the latest advances in digital technologies – e.g. Internet of Things and smart products.
(3) Research on data-driven circular strategy for digital technologies is largely focused on mobile technologies.
(4) In a total of 71 surveyed papers, reuse is found to be the most predominant circular approach.

Key Points:
• Number of Papers reviewed: 51
• By subject, engineering-related papers discussed circular strategies much more than other subjects.
• Product reuse is the most dominant circular strategy in digital manufacturing.
• Overall, there has been a steady increase in data-driven circular strategy research

Further Research
• Research which links digital technologies to specific circular strategies is still a new area of research. There are no papers that offer an overview of the development of data-driven circular approaches for digital technologies within manufacturing.
• Further research could include considering the link of circularity strategies with design. Framework and methodology development can be considered, focusing on questions such as: In what way does product design enable circular strategies? Can product and service design be informed by circularity strategies?

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