

Overview

According to the Environmental Protection Agency, Americans throw out more than 12 million tons of furniture and furnishings each year. Europe generates just about the same amount (10 million tons). Because of the complexity of furniture structure, only a small percentage of used furniture is recycled. Upholstered furniture is especially a problem. Rapid growth of furniture waste is linked to the fast population growth and unsustainable consumer practices. In the last decade, furniture became a commodity with low value, cost, and quality. Fast fashion trends are pushing the manufacturing of new stylish products quickly and cheaply and it is also true for the furniture industry and their products.

To remedy this growing problem in furniture sector, there is a need to address each aspect of product life cycle. The framework of circular economy can produce alternative pathways that will reduce the end-of-life options that have negative impacts on the environment. Not only can alternative pathways be discovered, but products can also be produced in a way that initially prolongs their life span. There are furniture companies out there already incorporating circular economy principles: using recycled material, developing innovative products for easy recycling, and extending product lifespan by applying strength design. However, in general, we still have ways to go to implement true sustainability practices in the furniture production sector. This project is researching and benchmarking circular economy efforts in the furniture industry in the US and Europe and pointing out successful examples. The supporting policies and their synergies are also evaluated with addressing circular economy model and its relevance for forest products/furniture production sector.

Furniture Industry and Waste

Similar to the phenomenon occurring in the fashion industry, where clothing is being made at much faster rates than in the past and resulting in a vast amount of waste. These increased waste streams are prevalent in the primary resource and extraction stages and also at the end of products life. Thousands of pounds of clothing are sent to landfills or burned overseas because of lack of options for recycling.

The furniture industry is following a similar path. Many prominent companies are producing cheaply made furniture, usually made from composites, that have shorter lifespans. Because of their weak construction and lack of alternative pathways, these products are now filling the landfills. The benefits of using wood as biodegradable and recyclable material are lost in these cases because the wood products aren't able to fully decompose in landfill. However, companies concern about EOL options are rising.



1960–2017 Data on Furniture and Furnishings in MSW by Weight (in thousands of U.S. tons)

Management Pathway	1960	1970	1980	1990	2000	2005	2010	2015	2016	2017
Landfilled	2,150	2,830	4,670	5,640	6,550	7,640	8,900	9,690	9,800	9,790

Company Examples

1. Room and Board- <http://mspmag.com/home-and-design/room-and-board-cambria-furniture-collection/>
2. Steelcase- <https://www.steelcase.com/eu-en/products/office-chairs/think/>
3. Circle- <https://www.circlefurniture.com/about-circle-furniture/sustainability.cfm>
4. Cisco- <https://cisohome.net/pages/inside-green>
5. Wehlwr- <https://lastenvironmentalist.com/discover-stylish-eco-friendly-and-sustainable-furniture-brands-and-products/>
6. Vepa- <https://www.detail-online.com/artikel/chairs-made-of-pet-felt-33038/>
7. Rype- <https://www.rypeoffice.com/>
8. Arcadia- <https://www.arcadiya.net/>
9. CaReWood- <https://www.carewood.iam.upr.si>

Positive Examples in US&EU

USA



(1) Room and Board - Company include pieces that are made from recycled materials to reduce waste going to landfills. They also offer products made from reclaimed wood.



(2) Steelcase - Along with products made from minimum parts for recyclability and responsibly sourced material, they offer services for consumers that minimize furniture waste.



(3) Circle Furniture – Member of the Sustainable Furnishings Council, commits to sourcing sustainable materials and making products easily recyclable.



- 1 - Organic Cotton
- 2 - All-Natural Wool
- 3 - Organic Latex
- 4 - Jute Webbing
- 5 - FSC™ Certified Wood
- 6 - Low VOC Stain

(4) Cisco Furniture - Utilizes natural materials and sustainably sourced wood. Better and easily recycled material add to an increased product life and its sustainability.



Europe

(5) Wehlers - Company in Denmark that incorporates circular economy practices by making furniture pieces composed of ocean plastic and recycled metal. The infamous R.U.M chair is assembled so that it can be easily taken apart and reused or refurbished.



(6) Vepa - Company in Holland that creates the majority of their products from renewable materials that are responsibly sources and use a lot of post-consumer plastic products.



(7) Rype Office - UK based company that incorporates circular design concepts like remanufacturing and creating furniture from waste.

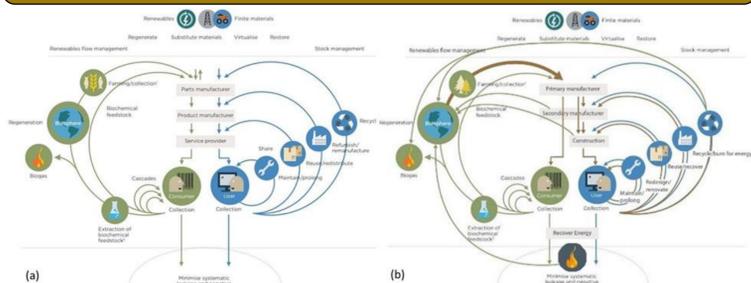


(8) Arcadia Design - Italian furniture company that creates modular children's furniture from responsibly sourced solid wood and use of non-toxic finishes.



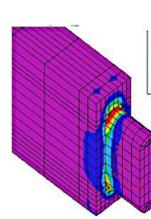
(9) CaReWood – Slovenian company, EU project to innovatively recapture, reuse and recycle wood products.

Circular Economy Models



- Adjust Circular Economy Model to accommodate wood products and conduct case studies to prove concept
- Promote CE concepts that will extend product lifespan (recycle, refurbish, repair)
- Find solutions for solid wood vs. composite materials
- Develop circular design ideas for manufacturers
- Promote local and small custom manufacturers
- Educate consumers on waste habits
- Consider EOL options in manufacturing stages

Extending Product Life: Education



One aspect of furniture design that impedes the circular design concept is a short lifespan that leads to the accumulation of waste products. Developing products with the strength design concept in mind can lead to a product with a prolonged use phase that deters it from waste cycles. Studies conducted at Purdue WRL supports these ideas. Example: Uysal et al, concluded multiple design options for joints that would lead to a prolonged lifespan and easy repair.