

Pallets Make the World Go ‘Round

Circular versus linear economies and their effects on the pallet industry

What are circular and linear economies?

On a fundamental level, the circular economy is a model that portrays economic growth from the perspective of resource constraints. The circular economy is a rethinking of how product materials and packaging can be cycled back into supply chains. **It is a whole systems approach.** A circular economy aims to keep products, components, and materials at their highest utility and value. Resources are utilized for their full life and then they are recovered and recycled. This contrasts to a linear economy, in which resources go through production, use, and then final disposal.⁵

In a linear economy, after a product is used once, it is disposed of without consideration of being put back into the system. This is due to companies looking solely at the front end of their processes. If a product is cheap to produce, there is no focus on where it will end up and if a product does not harm the environment in the beginning, it is seen as sustainable without consideration of the full life cycle. This is problematic as there is little to no regard for any social or ecological concerns.⁶ One main problem with a linear economy is that the planet has a finite amount of resources.⁶ In a linear economy, with such little focus on the post-consumption stage of a products’ useful life, this waste often contributes greatly to environmental contamination and can become hazardous to animals and/or humans.

The best solution? Use a circular economy!

A circular economy contributes significantly to the **reduction of waste**, a **greater productivity** of resources, a **more competitive economy**, and to **reducing the environmental impacts** of production and consumption.⁵ Circular economies utilize the ability to move products between different manufacturing and production areas, while maintaining the same consistency and production outcome as the linear economy. While recyclability is the final goal of a circular economy, the benefits can be seen in not only the environment, but also in **cost savings**. This includes, but is not limited to: reduced material costs, lower initial manufacturing costs, and the retention of products until their life cycle is completed.

One reason there is such a move towards this circular economy is due to the rising cost of new materials.² In past years, new resource deposits were discovered quickly, and there were many advances in technology that helped retrieve these deposits.⁷ However, in the 21st century, new resources have been becoming scarcer and much more difficult to discover, which causes the resource prices to increase at a fast pace.⁷ Due to this, there has been a push towards using a circular economy; since resources are reused, new resources are not as highly demanded. However, there is a point when improving the circular material flow has extra costs and no benefit to society; a circular economy must only promote processes that are both efficient and socially desirable.⁶

Circular economies allow value and supply chains to stay stable while creating revenue through market differentiation as well as new business models.³ Customers are also happier with the improved products; the products survive longer and can be repaired with more ease than products produced in a linear economy.³ The circular economy is a continuous, positive-development cycle that preserves and enhances natural capital, optimizes resource yields, and minimizes system risks by managing finite stocks and renewable flows. There are three **key principles to a circular economy**: **preserving and enhancing natural capital**, **optimizing resource yields**, and **fostering system effectiveness**. These three principles are explained in further detail below.

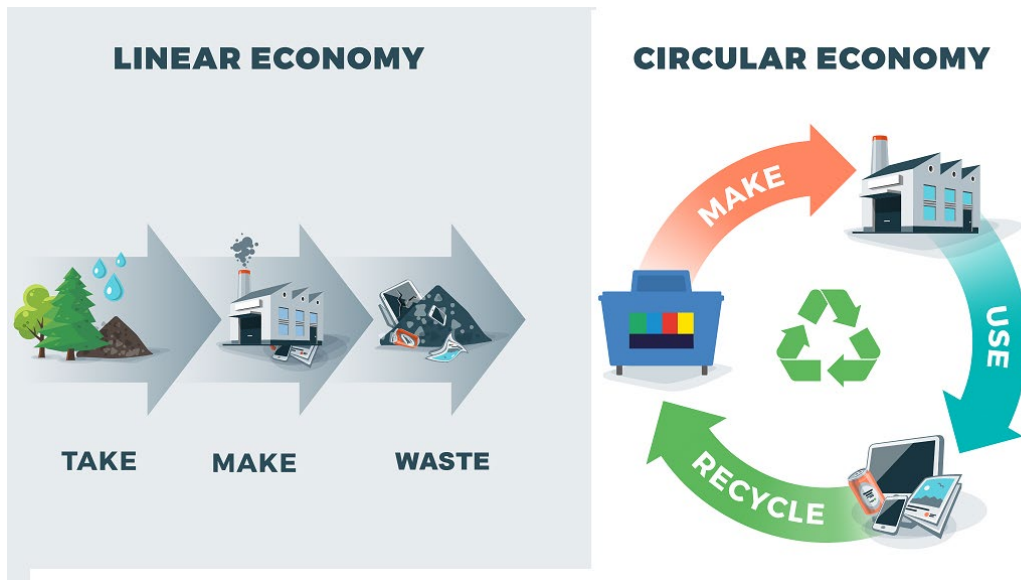


Figure 1. Depiction of the basic concepts of linear economies in comparison to a circular economy.¹⁵

- Preserving and enhancing natural capital:** This is done by controlling finite stocks and balancing the renewable resource flow; starting by dematerializing utility. When resources are needed, a circular system selects them wisely, and technology processes the use of those renewable resources. It also enhances natural capital by encouraging the flows of nutrients within the system and creating good conditions for regeneration.
- Optimizing resource yields:** This is done by circulating products, components, and materials at their highest utility in both technical and biological cycles. This means initially designing the product for remanufacturing, refurbishing, and recycling at the end of its useful life cycle in order to keep the components and materials circulating in and contributing to the economy.
- Fostering system effectiveness:** This is done by finding and designing out negative externalities such as damage to human utility, food, mobility, shelter, education, health, and entertainment. And/or managing the externalities such as land, air, water, or noise pollution, the release of toxic substances, and climate change.

Pallets and the Pallet Industry

Pallets are ubiquitous in the modern supply chain. It is estimated that we have **2.6 billion pallets in use throughout the United States**. They act as the interface between the product packaging and the unit load material handling equipment. Pallets can be made of many different materials such as wood, plastic, corrugated board, and metal. They can be manufactured using both virgin and/or recycled materials. Wooden pallets can be fixed by stripping off the broken components and replacing them with new ones. It is not uncommon for wooden pallets to be used for 30 years before completely being scrapped. Corrugated pallets are collected and recycled in industrial and residential recycling streams. Meanwhile, once plastic and metal pallets are broken, they can be ground up or melted and resulting raw material can be used to make new pallets.

Pallets are unique in that they can be part of both technical and biological circular economies. Non-wood pallets, with the right infrastructure in place, can be recycled, reused, or remanufactured; they can be part of an intricate, technically-designed circular lifecycle. Wood pallets, in particular, can also be bio-cycled and hence contribute

to the replenishment of the biosphere. Pallets are a particularly interesting study in circular economies due to the fact that they are one of the very few products in our global economy that have the opportunity to cycle in both technical and biological systems.

Wood can be harvested sustainably in managed forests and wooden materials can **easily be repaired, reused and recycled** or used as biofuel.¹ That being said, pallets and packaging made from wood or wood materials are the ultimate example of circular thinking.¹ For example, pallet pooling companies such as CHEP and PECO Pallet repair and reuse pallets, as opposed to sending broken pallets to landfills.² They follow an inner circle approach. They design their products allowing for the components to be refurbished or recycled individually in order to minimize the need for virgin materials.² This can again correlate to cost reductions within the pallet industry as new materials are not required to make new pallets, and instead used components are able to replace broken components.

Plastic pallets also can be an example for circular economy because due to their material and structure they **are designed for continuous use**. It is not uncommon for a plastic pallet to **last for 15 years without any repair** in select supply chains¹⁰. Therefore, these pallets are ideal for closed loop systems or captive applications. The beverage and automotive industry frequently use plastic pallets because of their reusability. Once a plastic pallet is damaged, there are many plastic pallet manufacturers who are standing in line to buy the broken pallet and use it as cheap raw material to make new pallets.

Importance of a Circular Economy to the Pallet Industry

The pallet industry is shifting toward a more sustainable future. They are choosing to use new lumber that is sourced from **forests certified by the FSC⁸** (Forest Stewardship Council) **or SFI⁹** (Sustainable Forest Initiative). This means that the rate of trees taken from the forest is lower than that of the new trees being produced. Hence, they are **enhancing the natural capital**. These forests are sustainable and are responsibly managed so that they provide environmental, social, and economic benefits.¹⁷

The circular economy is all about reducing waste, maximizing the number of times a resource can be used, and adding value to a resource. Applying these concepts

to pallets is important for the creation of a sustainable circular economy. **Broken pallets are no longer just being put in landfills** as they are in a linear economy. There are many companies in the world that purchase old pallets, as these broken pallets can be bought cheaper than new pallets. Once purchased, the damaged components are stripped and replaced. Then the defective pallet components can also be repurposed. Many companies are now using these defective components as a source of mulch production. **To find wood pallet recyclers near your location**, you can use the search tool on the website of the National Wooden Pallet and Container Association (<https://www.palletcentral.com/page/palletrecyclers>).

The wooden pallet industry wants to optimize their resource yields by **utilizing every bit of material they purchase**. They are finding ways to use their wood scraps for new products such as mulch. They even can use the sawdust produced when sawing new lumber as fuel. Wooden pallets, in particular, are important in a circular economy as they can be multi-use and can be reused up to ten times.¹⁰ Another benefit of a wooden pallet is that once a pallet, or one of its components, can no longer be reused, **wood pallets can be grinded into chips that can then be used as mulch or biofuel**.¹⁰ The mulch can be used for landscaping, wood shavings can be used for



biofuel, and wood dust can be used for animal bedding. All of these solutions provide further use of the wood fibers as opposed to throwing the pallets into the landfill and then requiring new wood to reproduce a new pallet. Overall, by 2016, the percent of wood pallets ending up being landfilled was only 2.6%, while 3.1% were recovered; this is over a 90% decrease in landfilled pallets from previous studies in 1995 and 1998.¹⁶

The pallet industry has the opportunity to benefit greatly from utilizing circular economy principles, beginning with pallets' design. Pallets that are designed from the start with the idea of being recycled or remanufactured at the end of their initial useful life, will contribute to more streamlined reuse capabilities. This will help reduce environmental impacts as well as cut down on the time and effort previously required for determining end of life procedures for a company's pallets.

The industry, as a whole, is also shifting towards **integrating more lean manufacturing processes** into their businesses to foster system effectiveness^{13, 14}. Other ideas, such as having a better layout of equipment within a pallet warehouse, will also result in less waste, more productivity, and higher safety.

Conclusions

With the lack of consideration for post-consumption materials, the linear economy approach is harmful for both the economy and the environment. In contrast, a circular economy considers all aspects of the product, from production to end-life, and it encourages reuse and recycling until the product can no longer perform its purpose. In the pallet industry, the circular economy has become very important due to the fact that wood is versatile in both its uses and its ability to be easily recycled. They're also one of the few products that can cycle in both technical and biological circular economies. Through an industry-wide transition to a circular economy, wooden pallets can be produced at cheaper prices and cause less environmental damages or contamination.

The circular economy model is a more sustainable and potentially profitable way of thinking compared to traditional models. It affects the pallet industry in these ways:

- Preserving and enhancing natural capital by **using lumber from certified forests**.
- Optimizing resource yields by finding ways to **repurpose and add value to lumber by creating new products** such as mulch or by using the sawdust produced as fuel.
- Contracting with wooden pallet recycling companies to **avoid sending broken wooden pallets to the landfill**.
- Identifying opportunities to **use reusable wooden or plastic pallets** in the appropriate parts of your supply chain
- Fostering system effectiveness by **adding lean manufacturing principles to increase productivity**, reduce waste, and design out negative externalities.

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