A review on LCAs of shopping bags alternatives for waste prevention

K. Abeliotis, K. Lasaridi, C. Chroni

Harokopio University, School of Environment, Geography and Applied Economics

- Every year, the average EU citizen uses an estimated 500 plastic bags, 92.5% of which are single-use.
- Around 90 billion single-use plastic bags were used in the EU in 2010.

Aim of the study

The presentation of the results of the review of conducted LCAs for shopping bags alternatives.

Single-use plastic bags

Single-use disposable plastic grocery bags are typically made of thin, lightweight high density polyethylene (HDPE)

Single-use paper bags

- Paper grocery bags are typically produced from kraft paper and weigh anywhere from 50-100 g, depending on whether or not the bag includes handles.
- Kraft paper bags are manufactured from a pulp that is produced by digesting a material into its fibrous constituents via chemical and/or mechanical means.

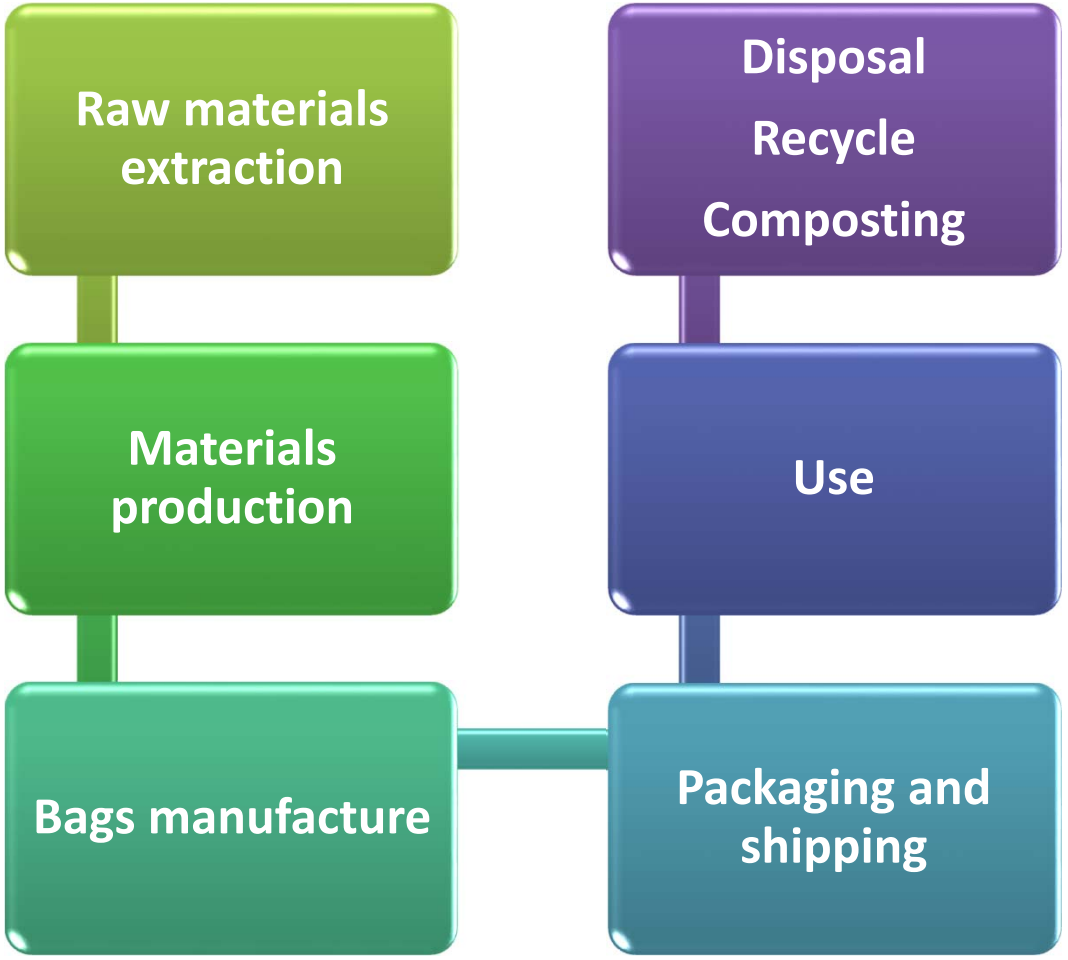
Reusable bags

- Reusable bags can be made of various materials including polyethylene (PE), polypropylene (PP), multiple types of cloth (cotton canvas, nylon, etc.), and recycled plastic beverage containers (polyethylene terephthalate, or PET), among others.
- These bags differ from the single-use bags in their weight and longevity.

Oxo-degradable plastics

- They are not actually considered biodegradable plastics because their degradation process has two steps and requires additives.
- The first step, frequently called fragmentation because it produces microscopically small fragments, is triggered by UV radiation and oxygen.
- The second degradation step is the typical biodegradation of these chains into their original elements by microorganisms.

Typical life cycle of bags



Typical functional units

- The amount of shopping bags consumed by a household to carry 70 grocery items home from the supermarket each week for 52 weeks.

- Carrying one month's shopping (483 items) from the supermarket to the home in the UK in 2006/07.

Key findings

- Reusable bags have lower environmental impacts than all of the bags with only 1–3 typical uses

- A substantial shift to more durable bags would deliver environmental gains through reductions in greenhouse gases, energy and water use, resource depletion and litter.

Key findings

The shift from one single use bag to another single use bag may improve one environmental outcome, but be offset by another environmental impact.

As a result, no single-use bag produced an overall benefit.

Key findings

- The environmental impact of all types of carrier bag is dominated by resource use and production stages.
- Transport, secondary packaging and end-of-life management generally have a minimal influence on their performance.
- The key to reducing the impacts is to reuse it as many times as possible and where reuse for shopping is not practicable, other reuse, e.g. to replace bin liners, is beneficial.

Key findings

The reuse of conventional HDPE and other lightweight carrier bags for shopping and/or as bin-liners is pivotal to their environmental performance and reuse as bin liners produces greater benefits than recycling bags.

Conclusions

- There are a number of LCA studies available that focus on bags.
- However, the results vary widely, depending on the functional unit, system boundaries and the chosen assumptions for the end-of-life.
- Parameters strongly affecting the results of LCAs are the presumed durability of the analysed bags and the particular waste management situation in specific countries or municipalities

Thank you for your attention!

Harokopio
University