

LCA and distributive justice – a methodological approach of integration

Nathanael Ko (nlwkoo@posteo.net)

PhD candidate at the University of Stuttgart, Institute for Acoustics and Building Physics, Department Life Cycle Engineering – GaBi

Introduction

The environmental impact and financial gain resulting from a global value chain of a product are often distributed unequally amongst the participating countries of the value chain. This leads to the following question:

How can this this unequal distribution be made visible?

The methodological approach

- 3 major ingredients:
 - life cycle assessment (LCA)
 - added value
 - distributive justice
- 2 indicators to indicate the unequal distribution within a value chain:
 - (1) weighted environmental intensity (gUI)

$$gUI_i = \frac{U_i}{WS_i * IHDI(L)}$$

- (2) weighted environmental added value (gUW)

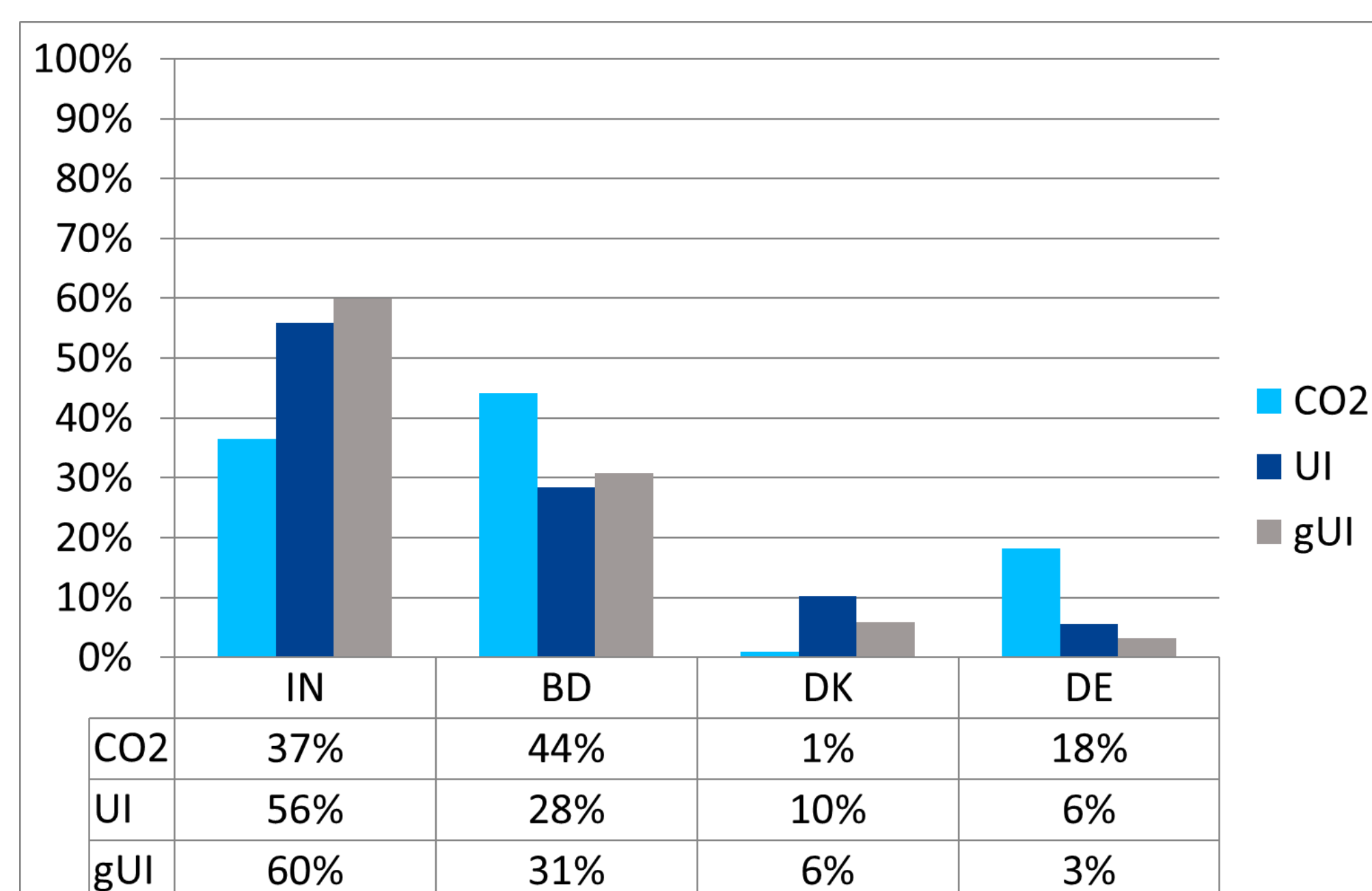
$$gUW_i = U_i * WS_i * IHDI(L)$$

Ingredients: LCA and added value

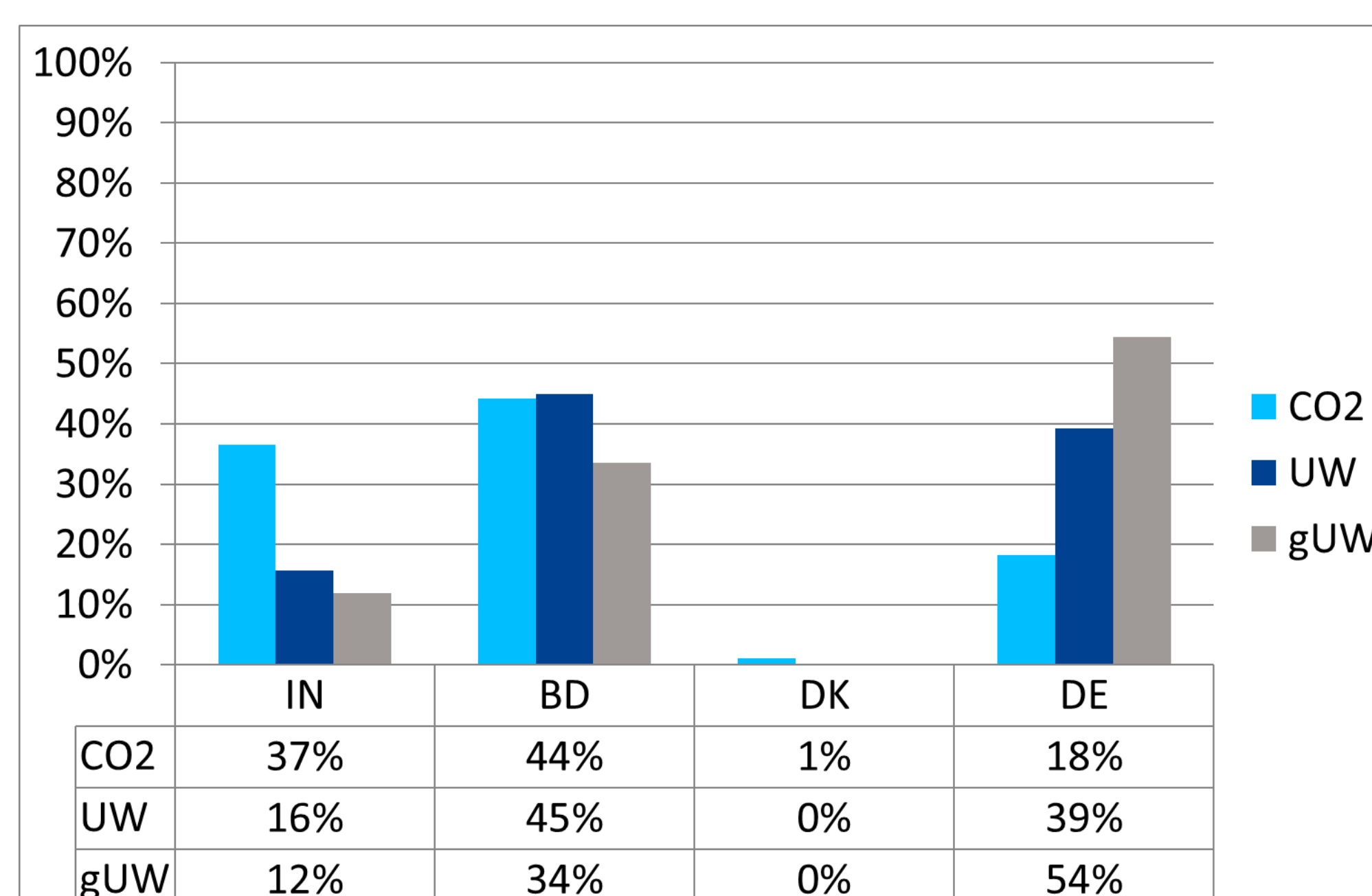
The *life cycle assessment (LCA)* can calculate the environmental impacts over the value chain of products. With a hierarchic LCA-model it is possible to calculate country specific environmental impacts for an entire product, individual life cycle phases or even individual components.

The *added value* in Euro can be calculated based on the LCA of a product. The basis for this calculation can be found in the LCWE-method², which assesses social impacts of a product.

Results



(1) weighted environmental intensity (gUI)



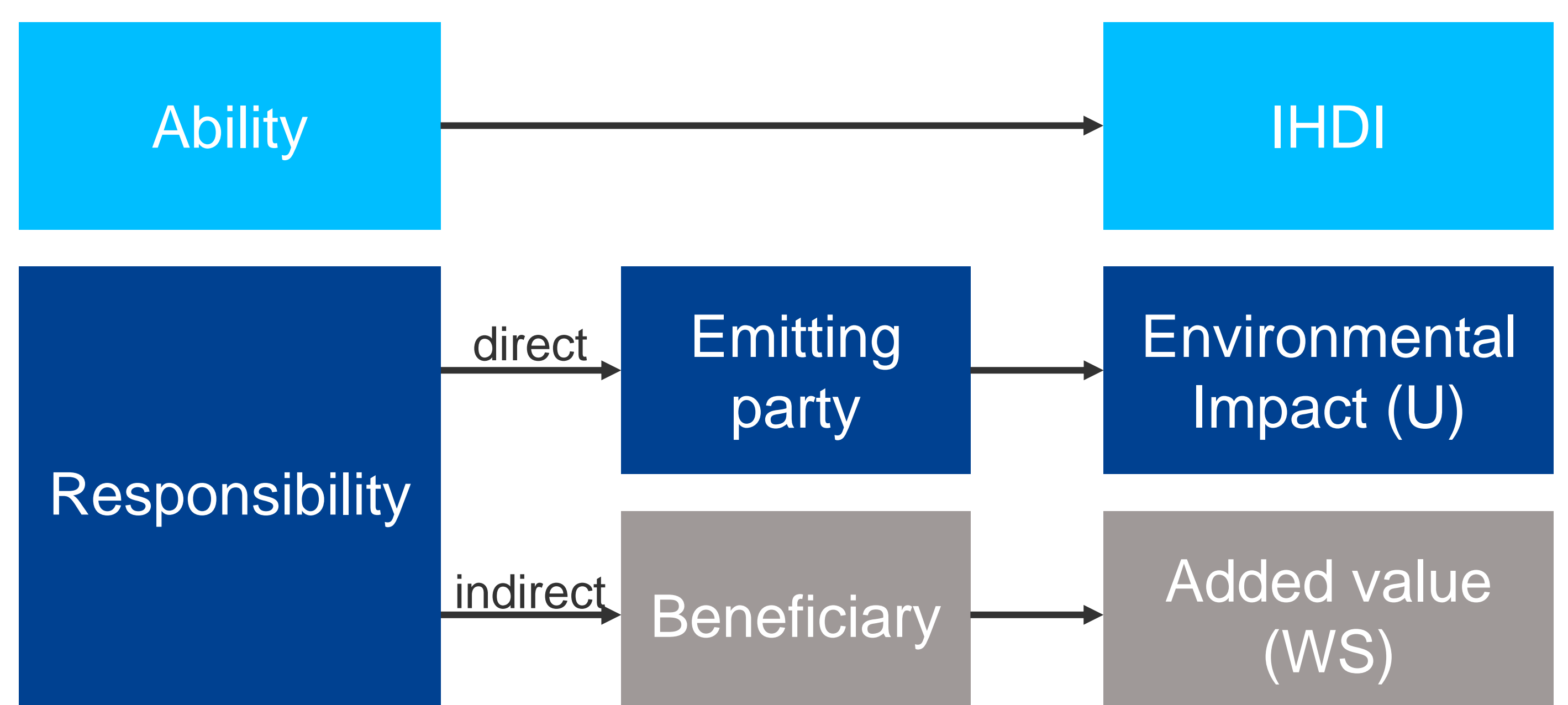
(2) weighted environmental added value (gUW)



Global Wealth Distribution 2018¹

Distributive justice

Distributive justice is split further into three aspects: *ability*, responsibility as emitting party (*direct responsibility*), responsibility of the beneficiary (*indirect responsibility*). Three indicators are assigned to the three aspects. The ability of each country is represented by the inequality-adjusted human development index (IHDI). The responsibility as emitting party is quantified through the results generated in the LCA. The added value represents the responsibility of the beneficiary.



Quantification of distributive justice

The following steps of the product life cycle of a t-shirt are assessed:

- Cotton production in India (IN)
- T-shirt production in Bangladesh (BD)
- Transport with a shipping company from Denmark (DK)
- Point of sale in Germany (DE)



Sources:

¹ Davies, J.; Lluberas, R., et al.: Global Wealth Report 2018 (2018)

² Life Cycle Working Environment (LCWE) by Barthel, L.-P.: Methode zur Abschätzung sozialer Aspekte in Lebenszyklusuntersuchungen auf Basis statistischer Daten, (2015)