Social organisational LCA for the academic activity of the University of the Basque Country UPV/EHU

Artitzar Erauskin-Tolosa, Gorka Bueno, Iker Etxano, Unai Tamayo, María García, Maite de Blas, Estíbaliz Pérez-Iribarren, Iñaki Zuazo, Eduardo Torre-Pascual, Ortzi Akizu-Gardoki

1. INTRODUCTION

The social effects associated with a higher education institution (HEI) are seen as positive (knowledge, culture, human values, progress), and higher education is also relevant in the field of sustainability (research and training, institutional commitment). However, academic activity may have negative impacts not only on its immediate environment but also along its value chain, according to a life cycle perspective.

PURPOSE: to estimate the social footprint of the UPV/EHU and its potential contribution to Sustainable Development Goals (SDGs) under a life cycle assessment (LCA) perspective.

2. MATERIAL AND METHODS

Social organisational LCA (SO-LCA) of the academic activity of the UPV/EHU has been performed in order to estimate its social impacts using openLCA software and supported on the PSILCA-based SOCA add-on for the ecoinvent v3.3 database, covering 53 social indicators.

Goal and Scope

University of the Basque Country (UPV/EHU)

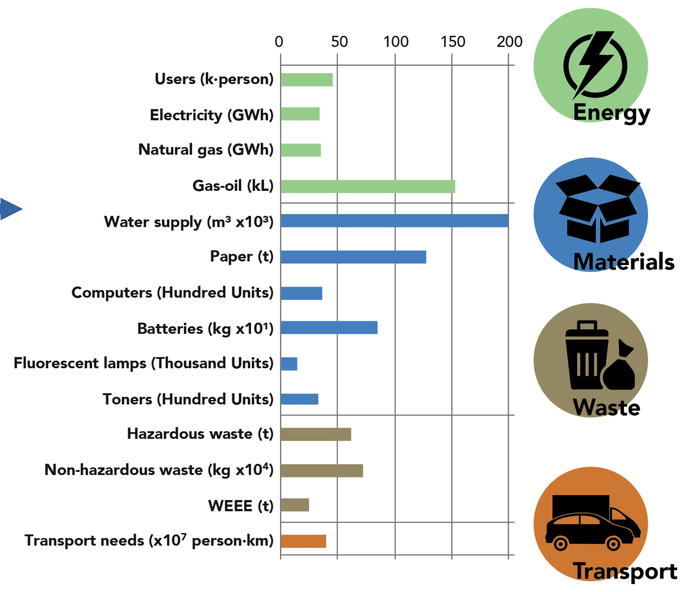
45,306 users

Academic year 2016/17

Social Impact

Ecoinvent + Soca (PSILCA)
53 social impact factors
≈15,000 industrial sectors
189 countries.

Life Cycle Inventory



Social Life Cycle Impact Assessment

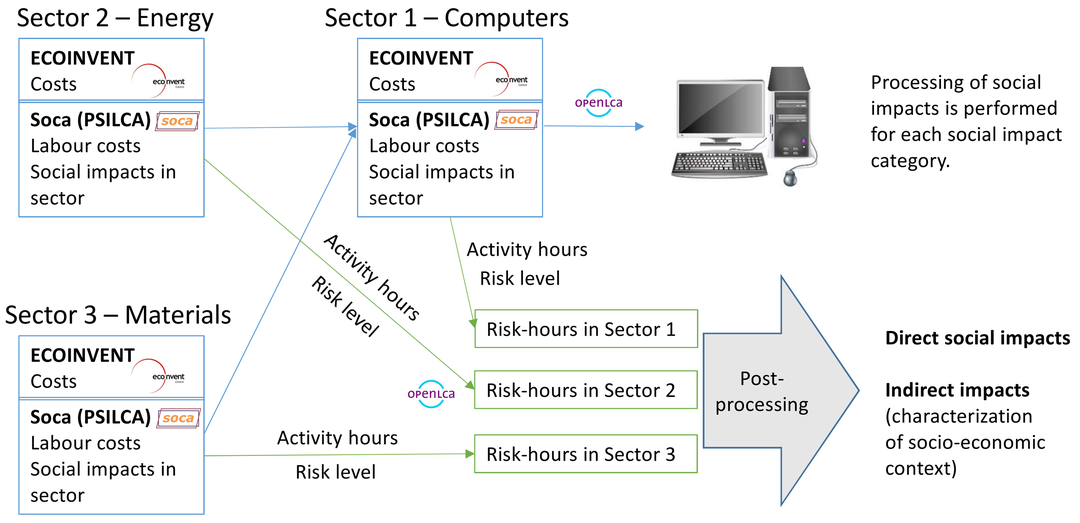


Diagram for the processing of social impacts related to the simplified life cycle of a computer, with only three productive sectors involved (computer production, energy supply, materials supply). Post-processing of risk-hours provided by SOCA and openLCA is performed for each of the 53 social impact indicators.

Social Impact analytical calculus

Indirect Social Impact	$SI_I = \frac{\sum y_i \cdot n_i}{\sum n_i}$	**Y_i: social indicator's central value for risk level i** **n_i: number of activity hours used in risk level i** **d: constant related to the social impact that translates the number of activity hours into # of people**
Direct Social Impact	$SI_D = \frac{\sum y_i \cdot n_i}{\sum n_i} \cdot \frac{\sum n_i}{d} = \frac{\sum y_i \cdot n_i}{d}$	

Social Impact analytical calculus - Example

Rate of fatal accidents at workplace	Risk Level							Indirect Social Impact	Direct Social Impact
	VLR	LR	MR	HR	VHR	No data	No risk		
Y_i (#/yr per 100,000 workers)	3,75	11,25	20	32,5	47,5	-	-	10,03 (#/yr per 100k workers)	0,75 accidents/yr
n_i (hours)	1,08E+07	8,87E+004	3,55E+05	9,42E+05	1,19E+06	1,47E+05	-		

Indirect Social Impact: the working hours that support UPV/EHU's academic activity present, on average, 10,03 fatal accidents per 100,000 workers (annual journeys of 1.800 hours)

Direct Social Impact: 0,75 fatal accidents occur annually, all over the world, in economic sectors that support UPV/EHU's academic activity (d = 100.000 workers ·1.800 hours/worker)

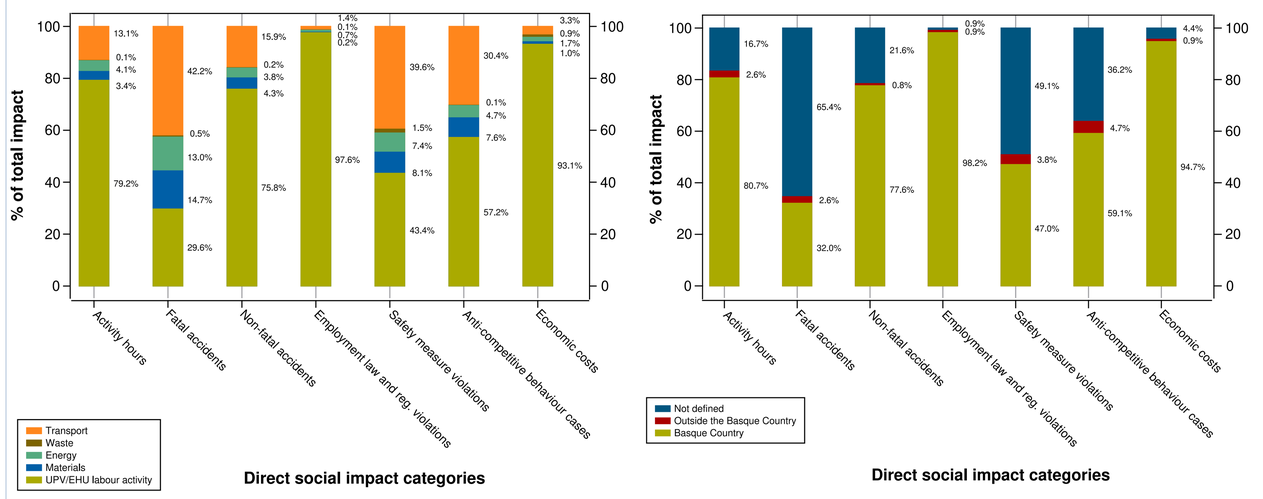
3. MAIN RESULTS

The analysis undertaken reflects social impacts and associated risk levels for four stakeholders: 1) Workers, 2) Local Community, 3) Society, and 4) Value Chain Actors.

	IMPACT CATEGORY	SOCIAL IMPACT INDICATOR	REFERENCE VALUE	RESULT	RISK LEVEL (*)
Workers	Working time	Weekly hours of per employee	36 h	36.3 h	Medium Risk (same)
	Child Labour	Child Labour, total	0 %	2.76 %	Low Risk (higher)
	Discrimination	Gender wage gap	24.3 %	23.4 %	High Risk (same)
	Forced Labour	Forced Labour Frequency	1.5	1.42 (10.7)	Very Low Risk (same)
	Fair salary	Minimum wage	803 USD	394 USD	Medium Risk (higher)
	Health and safety (Workers)	Fatal Accidents	2.19	10 (0.75 #/year per 100k)	Very Low Risk (same)
	Social benefits, legal issues	Violations of employment laws and regulations	17.96	44.7 (336 # per 1000 employees)	Medium Risk (same)
Local Community	Safe and healthy living conditions	Pollution	31.98	51.61	Medium Risk (higher)
	Migration	International Migrant Stock	8.76 %	14.96 %	High Risk (higher)
	Local employment	Unemployment	13.4 %	24.06 %	Very High Risk (higher)
Value Chain Actors	Fair competition	Anticompetitive behaviour	0	0.034 (0.026 # per 10k employees)	Very Low Risk (same)
	Corruption	Public Sector Corruption	65	67	Medium Risk (same)
Society Stakeholder	Contribution to economic development	Illiteracy rate, total	0.36 %	5.84 %	Medium Risk (higher)
	Health and safety (Society)	Public Health Expenditure	70.27 %	67 %	Low Risk (same)

(*) in relation to reference value risk level

The processes that contribute most and the location of social impacts have been identified; e.g., the socio-economic context that supports the academic activity of the UPV/EHU shows traces of illiteracy and child labour. 70% of fatal accidents and 23% of non-fatal accidents occur outside of the UPV/EHU.



Labour activity in the UPV/EHU is the sub-process with the greatest social impact. Social impacts are mainly located in the Autonomous Community of the Basque Country (ACBC).

4. DISCUSSION

The effort to achieve a more sustainable academic activity in HEIs could benefit from the application of tools and methods, like SO-LCA, capable of analysing the geographical distribution and the most significant sources of social risks in the upstream chains.

Social impact indicators presenting a higher social risk level in the UPV/EHU are related to SDG1, SDG4, SDG5, SDG8 and SDG10. The implementation of a series of measures to improve the performance of the UPV/EHU in the aforementioned SDGs could compensate for the social debt generated by the social footprint.

The methodology applied still presents some challenges: 1) the results are based in the social information gathered within the SOCA add-on; 2) all processes and products within a country or region belonging to the same category are assigned the same social information.

5. CONCLUSION

-Both the proposed methodology and the set of conclusions could be applied to other HEIs and organisations.

-The analysis has contributed to methodological advancements in SO-LCA: For the calculation of final direct impacts and equivalent risk levels, we have carried out an alternative strategy consisting in applying the ratio between the central values of each value range considered by the PSILCA database for each level of risk.

-While for some social impact categories the risk level of the social footprint remains as in the ACBC, there are some social impact categories where the social footprint presents a higher risk level.

-Labour activity at the UPV/EHU is the most significant sub-process within the social footprint, followed by transportation related sub-processes.

-Further challenges: 1) to try to determine the geographical locations of impacts more precisely within SO-LCA; 2) further development of the theoretical corpus around the concept of social debt also poses a challenge for future research.

-The methodology applied has limitations in measuring how much an organisation contributes to the fulfilment of the SDGs, but it is already useful to give an indication of which SDGs can be influenced the most.

Publications (open access):

1- Social organisational LCA for the academic activity of the University of the Basque Country UPV/EHU, 2021, **The International Journal of Life Cycle Assessment**, 26(8)

2- Dataset on the environmental and social footprint of the University of the Basque Country UPV/EHU, 2022, **Data in Brief**, 41(26)

3- The environmental and social footprint of the University of the Basque Country UPV/EHU, 2021, **Journal of Cleaner Production**, 315(30)