Applying Product Social Impact Assessment (PSIA) to services: the case study of a higher education and research institution

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Abstract

Applying the Product Social Impact Assessment (PSIA) methodology to evaluate the social performance of a service such as that provided by a higher education and research institution is not straightforward. This is mainly due to the lack of materiality of the system, which makes it unfeasible to define a typica life cycle with its conventional stages. This investigation proposes to consider three elements in the social assessment: i) the university, primarily focusing on the wellbeing of its workers and users (students); ii) the material products and infrastructures consumed by the university, focusing on local and global companies; iii) the intrinsic value of the function, focusing on society as a stakeholder. The UF proposed is the completion of 1 academic year, which leads to the accomplishment of a university degree. This preliminary study highlights the difficulty in finding specific and generic indicators proposed in PSIA for the analysis of the social behavior of this system.

Keywords: PSIA, Social LCA, university.

1. Introduction

There is a growing awareness of the need for a systematic, objective, and transparent analysis of the sustainability of goods and services. Process based Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) began their development in the late 1960s and are now well-established tools to evaluate the environmental and economic dimensions. Procedures for social assessment have developed at a much slower pace due primarily to historical preferences and to the intrinsic difficulties associated with the quantification of human wellbeing [1].

Social life cycle assessment (S-LCA) is a methodology designed to evaluate the impacts (both positive and negative) generated along the value chain of a product on the wellbeing of a given population. The *Guidelines for Social Life Cycle Assessment*, published by UNEP/SETAC in 2009 and currently under revision[2], have been a fundamental reference for studies aimed at evaluating the social performance of products in sectors as diverse as energy[3][4], paper industry[5], and electronics manufacturing[6]. The UNEP guidelines provide generic advice on how to adapt the social analysis to the requirements of ISO 14040, leaving many aspects up to the decision of each individual analyst.

The Roundtable for Product Social Metrics is a cross-sector initiative led by PRé Sustainability that has been involved since 2013 in the development of a consensus-based methodological proposal for product social assessment. The latest version of this procedure is described in the Handbook for Product Social Impact Assessment (PSIA), that is accompanied by other documents aimed at facilitating its implementation in different scenarios. The procedure works over four stakeholder groups (workers, local communities, small-scale entrepreneurs, and users), the wellbeing of which is defined over a series of social topics that are assessed using quantitative and qualitative performance indicators[7].

Although PSIA guidelines explicitly state that this methodology is intended for both goods and services alike, most of the case studies describe the analysis of manufactured products. Services are, by definition, immaterial items whose life cycles are not necessarily well defined. This piece of research aims to investigate the applicability of PSIA methodology to a service, such as that provided by a higher education and research institution. The case study has been tested on Universidad Politécnica de Madrid (UPM), based in Spain.

2. Methodology

This evaluation is based on the procedures described in the Product Social Impact Assessment (PSIA)[7] methodology. This heading corresponds to the "Definition of goal and scope" stage, as described in the PSIA Handbook.

2.1. Goal definition

The main objective of this investigation is to evaluate the applicability of the PSIA protocol to the service provided by UPM, representing a typical higher education and research institution. Secondary objectives include i) identification of functional unit (FU), ii) system description, including economic and materiality profiles iii) social hotspot analysis; iv) selection of system boundaries, stakeholder categories, and social topics; v)

identification of generic and specific performance indicators; vi) preliminary evaluation of selected topics.

2.2. Scope definition

2.2.1. Functionality and FU

Defining the functionality of a higher education and research system is not a simple task, due to its multifunctional nature and the complexity of its outputs (research, education, personal development). For this investigation, the analysis has focused on the training and education function of the system. An appropriate FU for this purpose could be the completion of a university degree. However, to avert the discrepancies associated with the diversity of bachelor's and postgraduate programs offered by UPM in terms of time extension (4 years for bachelors and PhD and 1-2 years for Masters) and dedication (full vs part time), a more practical variety of this FU has been used in this investigation, which is one academic year completed by a regular student.

2.2.2. System description

The system under investigation is a long-established higher education and research institution based in Madrid (Spain) that focuses on engineering studies. In the academic year 2019-2020, it had 2,969 lecturers and researchers, and 35,738 full-time students.

2.3. Life cycle structure and stakeholders

2.3.1. Life cycle considerations and system boundaries

Owing to its immaterial nature, it is not possible to define an explicit life cycle for the service generated by a higher education and research institution. Hence, one of the challenges of adapting PSIA to UPM is to define the life cycle of the system under investigation.

Table 1: Proposal of stakeholder groups/processes in the PSIA of a higher education and research institution (green = stakeholders PSIA)

Stakeholder	Processes/components	Scope
Workers	Teach. & research staff	University
	Admin. staff	
	Security, cleaning, leisure, catering, accommodation, etc. staff	
Users	Students: graduate, postgraduate	
Local community	Individuals: consuming services and using new conditions	Local
	Companies, entrepreneurs, employees: providing services	
Society	Educated citizens	Global
Companies	Trained workers	

Table 1 illustrates the proposal considered in this case study that incorporates three elements: i) the main one relates to the operation of the institution itself, which may be related to different stages in a conventional life cycle analysis: fabrication when using a worker's perspective, use when using a student's perspective or raw materials extraction when using an employer's perspective; ii) the life cycles of the material consumptions associated with the operation of the university (water, electronics, paper, electricity, gas, buildings, etc.); and finally, iii) intrinsic social value of the product (university degree), which may be associated with a life cycle stage beyond the use stage. Table 2 illustrates the expenditure items per FU for the first two elements (i and ii) based on an annual budget of 365,493,222 €. These values may be used as activity factors in the description of the significance of each of the processes considered. Element iii) does not incorporate any inherent costs.

Table 2: UPM's economic profile based on its 2020 budget.

SECTOR	Costs/FU (€/student·yr)	Contribution (%)
Teaching and Research Staff	3,544 €	36.6
Admin. and services Staff	2,356 €	32.0
Electronic equipment	378 €	3.70
Paper products	378 €	3.70
Electricity	162 €	1.59
Water	15.6 €	0.15
Gas	48.5 €	0.48
Building Construction	364 €	3.56
Financial services	27.5 €	0.27
Others	2,953 €	17.9
TOTAL	10,227 €	100.0

2.3.2. Stakeholder categories and social topics

The four stakeholder categories proposed by the PSIA have been restructured into three groups, where the small entrepreneurs have been merged with the local community.
i) Workers (university staff): Occupational health and safety; remuneration; discrimination assessment; freedom of association and collective bargaining; work-life balance.
ii) Users (students): Health and safety; responsible communication; privacy; affordability; effectiveness and comfort.
iii) Local communities (local individuals, companies, and entrepreneurs): Health and safety; access to material and immaterial resources; community engagement; skill development; contribution to economic development.

In this proposal, a distinction has been made between local companies (typically suppliers of goods and services to the university, including leisure activities, security, accommodation, cleaning, catering, paper, electronics, etc.) and non-local companies, which would be the manufacturers of such products. A stakeholder category that is missing in PSIA and should be essential in the analysis of an education and research institution would be society. This would include companies that benefit from the availability of well-trained potential employees and society, which benefits from well-educated citizens.

2.3.3. Companies and organizations

The main element of the system relates to the university itself, in this case UPM. To identity social risks and impacts more clearly, the stakeholder category "workers" pertaining to this element has been disaggregated into academic (including teaching and research, which are indivisible since most academics are required to perform both tasks) and administrative staff.
The life cycle of the higher education and research system also considers additional organizations involved in the

provision and production of goods and services, as described above.

2.3.4. Social impact assessment methodology

The methodology considered in this proposal is described in the Handbook for Product Social Impact Assessment published by the Roundtable for Product Social Metrics[7]. The intended benchmark behavior was that of national universities in Spain.

2.3.5. Inventory compilation

Specific social and economic inventory data were obtained from the UPM Open Data Portal. Generic inventory data describing the social performance of Spanish universities was obtained from sources such as Dyntra[8], QS University Ranking[9] and UniversiDATA[10]. In this preliminary exercise, in the absence of a generic benchmark, the social performance of UPM was compared with indicators published by specific universities.

2.4. Social hotspot assessment

As suggested in PSIA, a hotspot social LCA of the higher education and research system has been carried out using the Social Hotspot Database (SHDB)[11]. Since the life cycle of the system is centered around the higher education and research institution (UPM), the inventory data has been structured to identify specific stakeholder categories within this organization. The analysis has been carried out using the sectorial economic inventory described in Table 1, the impact assessment methodology "Social Hotspot 2019 Subcat & Cat Method w Damages" and SimaPro v9.1.1. An exchange rate of 1.2229 U$/€ (European Central Bank) and a general national inflation rate for Spain between 2021 and 2011 of 9.7% (Spain's National Statistics Institute - INE) were used.

The strategy followed was to allocate the core of the budget to the "Public Administration, Defense, Education, Health/ESP U" dataset, except for items where more specific sectors could be identified (e.g. electronics = Electronic equipment/ESP U; electricity = Electricity/ESP U, etc.). The former dataset represents the social risks associated with monetary expenditure in the Spanish public administration, primarily in the form of salaries for teaching and research staff,, administration staff and expenses not considered in "other". Social risks associated with expenditure items related to goods and services distinguishable from those in the public sector (e.g., water, gas, or electricity) were calculated separately.

Figure 1 shows that the processes generating most of the social risk are, by far, those intrinsically associated with the running of the university. In particular, the highest risk (in medium risk hours eq) corresponds to the "teaching and research staff" stakeholder, due to the higher share of the budget being devoted to this staff category. This is followed by "administration staff" and "other" expenses incurred directly by the university. The social category generating the highest social risks is health and safety, followed by the other four categories which exhibited similar contributions to each other. The social risks associated with the other expenditure items are significantly lower, due primarily to their reduced share of the budget.

3. Results and discussion

This section describes a first approach on how to approach the specific social analysis of the higher education institution based on PSIA methodology.

3.1. Specific and generic life cycle inventory

For this preliminary analysis, focus has been put on identifying sources and values for key indicators representing UPM's social performance. Although the intention was originally to focus on the most affected impact category (Health & Safety), a more practical approach had to be applied due to a general lack of information in the categories of interest. As shown in Table 2, most of the performance indicators available were related to the Workers stakeholder and Labor rights category.

One of the key findings in the compilation of the social inventory is that the indicators proposed by PSIA to evaluate social topics are usually not documented in the sustainability and/or social responsibility reports of the organization in the same form. For instance, PSIA proposes the use of "living wage" to evaluate the remuneration topic, while UPM sustainability report contains information about average and minimum salaries.

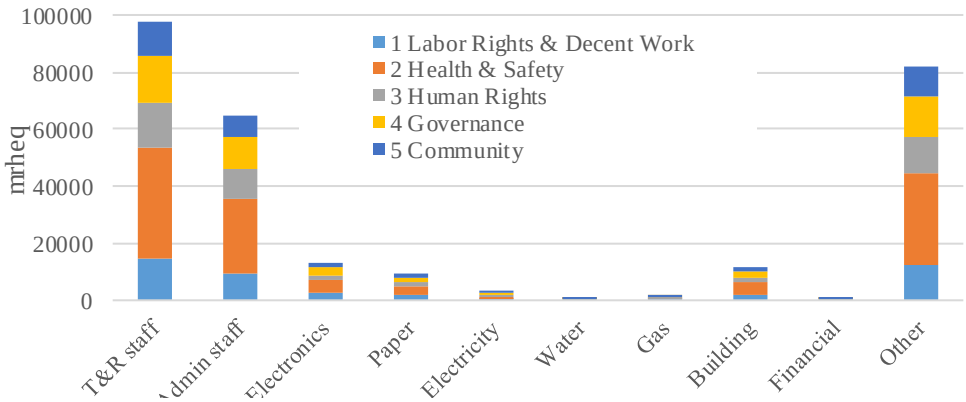

Figure 1: Social Hotspots Assessment of the higher education and research institution UPM

Table 3: Example of specific social performance indicators published by UPM

Stakeholder	Social Topic	Indicators	UPM Value
Workers	Remuneration	Average Salary (teach & research staff)	State official: 40,591 € Non-Official: 26,536 €
		Average Salary (admin. staff)	State official: 11,762 € Non-Official: 28,284 €
	Work life-balance	Free days per year	22 working days
Users	Responsible Communication	Transparency Index	56.2%
	Affordability	Budget (%) for scholarships	4.22%
		Tuition fees per ECTS credit	26.14 €
	Effectiveness and Comfort	Employability Ranking (global)	#79
Local Communities	Contribution to economic development	No. of patents	530
		Scientific articles published (2020)	2343
		Budget (%) for research	19.9%

Furthermore, these same indicators are often not easy to find at a generic level, making it difficult to evaluate the potential impacts against a reference value.

3.2. Social assessment

The preliminary nature of this assessment and the lack of uniformity in the social performance indicators proposed by PSIA, and those made available by UPM (specific) and other institutions (generic) made it unfeasible to carry out this final stage.

4. Conclusions

- PSIA methodology may be used for the analysis of services provided by a higher education and research institution. However, some changes need to be made to adapt the original procedure to the immaterial nature and intrinsic value of this service.
- A higher education institution is a multifunctional system (training, research, education), and it is required that the social assessment focuses on one of these functions. The FU of the system may be the completion of a university degree. However, to facilitate the analysis of degrees of different time extension, a more practical FU may be the accomplishment of one full-time academic year.
- The immaterial nature of services makes it impossible to define a life cycle structure for a higher education and research system. The alternative approach proposed involves considering three elements (assimilated to life cycle stages): i) the university itself, where the training and research takes place, ii) consumption of material goods associated with its operation (water, electronics, paper, electricity, gas, buildings, etc.), iii) intrinsic social value of the education and research service provided.
- Due to the weight of this stage and the different working conditions of university staff, there is a need to disaggregate this category of stakeholders to analyze them separately, both in the hotspot assessment and in the PSIA.
- Many of the social indicators proposed by PSIA are not documented in the sustainability reports published by UPM. The application of PSIA should incorporate a commitment from the organization to produce the indicators proposed by this methodology and identify generic indicators that could be used as a reference.

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