SOCIAL IMPACTS ON CONSUMERS AND ITS MEASUREMENT IN METALLURGY

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Abstract

Information about production and consumption impacts on the workers, the consumers, the local communities, the society and other shareholders represents the most mentioned environmental and social impacts of production processes. Many companies in metallurgy solve environmental tasks of company's production processes, introduces Environmental management systems (EMS) to improve material, energy and economic flows, but social tasks and impacts are often underestimated. Consumers are more and more asking themselves questions about not only environmental but also the social circumstances under which a product is made and companies should improve their processes to ensure the products are produced in a sustainable way. End-consumers as well as the consumers who are part of each step of the supply chain represent important group of stakeholders and social impacts related with consumers must be adequately considered. Social impacts like: Health & Safety, Feedback Mechanism, Consumer Privacy, Transparency or End of life responsibility must be identified and evaluated. The contribution deals with identification and evaluation of relevant social impacts of metallurgical products or metallurgical materials production on consumers. The main objective is to determine possible industry specific social impacts and discuss whether suitable indicators for their measurements can be found. Application of indicators offered by Social Life Cycle Assessment method will be closely tested and discussed.

Keywords: social impacts, life cycle assessment, product sustainability, consumers

1. INTRODUCTION

Social life cycle impact assessment is the process by which companies improve their approach to stakeholders. Measurement of important impacts on the environment and stakeholders and among them consumers along the product life cycle must be verified and standardized for future development and improvement of environmentally and socially responsible and sustainable products.

Goals, scope and Background. There are several life cycle impact assessment approaches that have been proposed, nevertheless currently Social Life Cycle Assessment (S-LCA) probably represent the most viable and suitable tool for selecting stakeholder and impact categories and impact assessment modeling [1]. On the other hand practical attempts for social impact assessment of products suffer by many limitations, beside other things; there are problems with selecting relevant impact categories and indicators according to a specific branch and company's conditions. This paper addresses whether there can be identified branch specific impact categories (offered by Social LCA methodology [2]) related with consumers as very important stakeholder category in metallurgy and whether there are appropriate information bases and conditions for determination and calculation of social impact assessment indicators in metallurgical industry.

Methods. Theories, annual reports, environmental and CSR reports, conference proceedings and empirical findings (realized one-to-one interviews) from relevant fields of research are used to address the validity of theoretical problems and assumptions. Based on theoretical basis concerning selection of relevant impact categories and indicators in metallurgical industry, there was realized preliminary research with managers of metallurgical companies by structured one-to-one interviews. This preliminary research creates foundation for

future quantitative research concerning selection of relevant branch specific impact categories and indicators of selected industries.

Results. Theoretical requirements for identification of relevant branch specific impact categories and indicators based on S-LCA methodology in metallurgy are formulated. Based on structured one-to-one interviews there are identified missing information and structures for social impact assessment of metallurgical products. Consumer impact category was questioned in detail and as surprising results there were identified more important stakeholder categories with branch specific social impacts; workers and local communities.

Conclusions. Selection and "assessability" of indicators is crucial for beneficial use of S-LCA. Empirical and theoretical findings show that there must be improved information bases and structures to ensure S-LCA method should meet requirements of metallurgical industry in the competitive EU environment. Future quantitative research concerning selection of relevant branch specific impact categories and indicators of selected industries should bring more detailed overview of missing information to empower improvement of social impact assessment.

2. PROBLEM FORMULATION

Assessment of social aspects of products based on S-LCA methodology should help company's management considering important social aspect of company's processes [2]. Focusing on social and socio-economic aspects along whole life cycle covering; extraction and processing of raw materials; manufacturing; distribution; use; re-use; maintenance; recycling; and final disposal stages, S-LCA connect at the same time social impact categories related with different stakeholders. Impact categories represent themes of interest stakeholders and usually include: health and safety, human rights, working conditions, socioeconomic repercussions, cultural heritage and governance. Methodology determines specific groups of social and socio-economic impacts on the workers, the consumers, the local communities, the society and other shareholders along the whole life cycle and combination of stakeholder categories and impact categories creates impact subcategories [2]. Consumers represent very important stakeholder category with following impact subcategories [3]:

- Health and Safety
- Feedback mechanism
- Privacy
- Transparency
- End-of-Life responsibility

Improvement of social (and socioeconomic) conditions, consumers' engagement and dialogues with consumers and company for efficient demand planning [4], customers` satisfaction and cooperation are highly important [5].

2.1 Specific social impacts

S-LCA methodology present only common framework for social assessment of products, each particular impact assessment will depend on specific production activity, specific site, specific sector or branch or companies average behaviors in a country so each companies will conduct specific (generic) assessments related to a production technology, site, branch, country and probably other circumstances like supply chain actors [6,7]. There can be identified branch specific more or less important stakeholder subcategories for each production industry. Current metal and steel associations (e.g. Worldsteel Association, Eurometal or International Council on Mining and Metals) offers only limited number of non-specific indicators [8, 9, 10].

Our research should confirm whether there are branch and/or country important specific impact subcategories for consumers and whether there exist appropriate information bases and conditions for determination and calculation of social impact assessment indicators in metallurgical industry. On theoretical basis were selected

relevant impact and stakeholder categories and indicators in metallurgical industry. When final products - steel and metals, are mostly stable, „reversible“ products [11], still can be expected significant impacts on customers. Consumers expect safety products and companies should reveal consumer satisfaction (by feedback mechanism) related to the safety consumption and use of the metallurgical product. Companies should respect and protect consumer privacy and communicate on all issues regarding its product in a transparent way. And last but not least companies should provide complete and clear information to consumers regarding suitable end-of-life options, like product disposal, reuse or recycling [3].

Assessment of social impacts is more or less related with environmental issues and production circumstances and influences other stakeholders. During mining and processing are solid, liquid and gas emissions directly produced, having impacts on health and safety of workers and local communities' members. Mineral resource extraction and processing produces potential releases of gas, liquid and unwanted solid emissions, when ores are physically adjusted and chemically transformed to produce metals and other industrial; again influencing health and safety of workers and local communities' members and overall society. Mentioned emissions contain huge amounts of biologically essential metals and insignificant amount of toxic metals. Mining and wastes generated from production processes changes the environmental and shape of landscape. Deep and wide mines as well as huge hills of slag, ash, cinder or sands, influence directly local communities and society, influencing cultural heritage or access to natural resources. For other supply chain actors there is not expected any significant branch specific impacts as well.

2.2 Theoretical assumptions

According to theoretical studies of primary resources, together with preliminary survey realized in 2012 [12] there were expected important branch specific subcategories for consumers' category (see **Table 1**).

Table 1 Expected important consumers' subcategories (theoretical findings)

Stakeholder categories	Subcategories	Importance
Consumers	Health and Safety	Very important
	Feedback mechanism	Important
	Privacy	Important
	Transparency	Important
	End-of-Life responsibility	Very important

As very important are expected subcategories related with health and safety of consumers and end-of-life responsibility. Feedback mechanism, privacy and transparency were expected as less important.

Alongside with consumers' subcategories was investigated importance of other stakeholders' subcategories. As important were expected subcategories related with health and safety of workers; safe and healthy living conditions and access to material resource for local communities. Other subcategories were considered as less important or unimportant for metallurgy. To confirm these suggestions were realized small preliminary survey based on one-to-one interviews with managers, three of them represent metallurgical companies in the Czech Republic.

3. BRANCH SPECIFIC SOCIAL IMPACTS IN METALLURGY - RESEARCH FINDINGS

Our research focused on specific social impacts of metallurgy into stakeholder's subcategories and its possible measurement. Based on one-to-one interviews we identify following perceived important social impacts/stakeholder subcategories of metallurgical industry (see **Table 2**).

Table 2 Perceived important stakeholder subcategories by companies (preliminary findings)

Stakeholder categories	Subcategories	Importance
Consumers	Health and Safety	Important
Workers	Working Hours	Very important
	Health and Safety	Very important
Local communities	Safe & healthy living conditions	Important
	Access to material resource	Important
	Local employment	Important

Other expected stakeholder subcategories were considered as unimportant or not specific for metallurgical industries. Surprisingly there were identified only limited effort of companies related with consumers. Companies do not solve any problems or excessive effort regarding feedback mechanisms, privacy or transparency. Final products are considered as user-friendly and socially and environmentally acceptable. Only health and safety of consumers is under closer supervision.

For other stakeholders e.g. workers or local communities were surprisingly perceived more important social impact subcategories (see **Table 2**). Many non-consumers stakeholders' subcategories were considered also as unimportant. Companies do not register any problem with missing freedom of association and collective bargaining - the workers are free to form and join association, have the right to organize unions, to engage in collective bargaining and to strike. For fair salaries subcategory under conditions of Czech Republic are workers' salaries slightly above an average and respect current economic crises and national and branch performance. Companies do not register any excessive demands related with social benefits or social security. Level of engagement of local communities seems to be sufficient, companies demonstrate willingness to cooperate closely with local communities and protect cultural heritage if necessary. Czech Republic is situated traditionally in secured and stable region.

For each important stakeholder subcategory was discussed available indicators and information sources for measurement and assessment. Following chapters summarized preliminary research findings.

3.1 Health and Safety (Consumers)

Companies monitor and respect consumers' rights to be protected against products. Any abuse of these rights has negative impacts on an organization's image, the organization's economic performance due to recall campaigns or the loss of consumer. To avoid negative consumers' circumstance companies use following indicators:

- Quality of information on product health and safety
- Number of consumer complaints
- Labels of health and safety requirements on products

As a data sources companies used review of enterprise-specific reports, products documentation and labels on products. Managers consider those information bases and conditions as appropriate for assessment.

3.2 Working Hours (Workers)

Companies registered problems mostly with working hours, psychological working conditions is not considered as problematic area. Rising intensification of competition have had a large impact on production methods, organization and flexibility of work [13]. On the other hand in Czech Republic are problems with workers' sickness, idle times or non-productive times during production process. To secure labor productivity companies use indicators like: excessive hours of work and overtimes; number of hours effectively worked by employees or number of holidays and breaks used by employees.

As a data sources companies used review of time records, review of internal audits, review of organization-specific conditions for overtimes, mandatory breaks and holidays. Managers consider those information bases and conditions as appropriate for assessment.

3.3 Health and Safety (Workers)

Solid, liquid and gas emissions produced during resource extraction and processing directly influence health and safety of workers. To prevent rising rate of sicknesses, number of injuries and occupational diseases companies use following indicators: Number/percentage of injuries or fatal accidents in the organization by job qualification; hours of injuries/occupational diseases per level of employees; preventive measures and emergency protocols regarding accidents and injuries; number of Occupational Health and Safety Administration (OHSA) violations; education, training and prevention programs for workers.

As a sufficient data sources companies considered review of organization-specific reports and audits, exceptionally questionnaire filled by management and human resources.

3.4 Health and Safety (Local communities)

Companies registered problems with effective communication with local communities; in some cases there is no serious interest of local communities to establish regular communication and engagement. Assessment of social impacts related with local communities is mostly driven by an effort to avoid complaints and company's negative perception. Companies for securing health and safety of local communities try to avoid equipment accidents or structural failures and monitored following: use of hazardous substances; number of safety and risk technology; amount of produced hazardous wastes and emissions.

As a sufficient data sources companies considered review of organization-specific reports and audits, technological documents and materials, exceptionally questionnaire filled by management and industrial pollution areas reports.

3.5 Access to material resource (Local communities)

Deposits of slag, ash, cinder or sands, influence directly local communities' access to material sources, although mostly those wastes are environmentally neutral and often "reusable" for other industries (e.g. construction), huge amount of wastes represent problem with the quantity and quality of local resources and infrastructure. Companies use following indicators for evaluation: extraction of material and energy resources; changes in land-use; amount of produced and deposited wastes in environment; industrial water use.

As a data sources companies used site visit or site-specific audit and review of organization-specific reports, like CSR reports and audits.

3.6 Local employment (Local communities)

Surprisingly important social aspect represents local employment, because metallurgy represent traditional industry branch with long-term tradition in Czech Republic. Most of local community members or their relations are or were employed as workers or managers in metallurgical companies. Companies empower local employment to avoid migration of workforce and improvement of positive image of corporations. Indicators used: unemployment statistics by country and region and percentage of workforce hired locally.

As a sufficient data sources companies considered reviews of Ministry of Labour and Social Affairs of the Czech Republic, review of organization-specific reports, exceptionally questionnaire filled by management, workers and human resources managers.

CONCLUSIONS

Theoretical and preliminary empirical findings and research found only limited effort of companies related with consumers and on the other hand surprisingly many social impacts specific for metallurgy considered as important are related with workers and local communities but at the same time identified insufficient information data for their evaluating. Social impacts related with customers, society or other supply chain participants seem to be underestimated or completely ignored. Companies use mostly internal information sources: review of organization-specific reports, audits, but barely use regular interviews or questionnaires filled by managers, consumers, workers or members of local communities. EU reports, national or regional data sources are used marginally. National branch specific reports have only limited information concerning social aspects and its evaluation. Therefore it is necessary continuously improve information data sources and their utilization.

Our future quantitative research concerning detailed branch specific impact categories and indicators of selected industries should: verify extent of social impacts monitored by companies; verify necessity of improvement of information bases and structures to provide available regional, national or EU specific data sources and bring more detailed overview of missing information.

Improving social conditions with consumers as well as other stakeholders in metallurgical industry requires further development of social impact assessment as well as development of national information structures and branch specific databases in EU area. Branch specific conditions of assessment is still on the beginning of scientific research, different production conditions, location, size and ownership of a company and different conduct of the companies arouse new research problems and questions. To improve company's social assessment processes it is necessary continuously collect national and branch specific data.

REFERENCES

[1] JØRGENSEN, A. Social LCA - a way ahead? *International Journal of Life Cycle Assessment*, 2012, Vol. 18, No. 2, pp. 296-299.

[2] BENOÎT, N.C., MAZIJN, B. (eds) *Guidelines for Social Life Cycle Assessment of Products*, UNEP-SETAC Life-Cycle Initiative, 2009, ISBN 978-92-807-3021-0.

[3] BENOÎT, N.C. et al. *The methodological sheets for subcategories in Social Life Cycle Assessment (S-LCA)*, UNEP-SETAC, 2013, [online] [accessed 2 February 2014] Available from Internet < http://www.lifecycleinitiative.org/wp-content/uploads/2013/11/S-LCA_methodological_sheets_11.11.13.pdf >.

[4] PATAK, M., VLCKOVA, V. Demand planning specifics in food industry enterprises. In Business and Management 2012: *7th International Scientific Conference on Business and Management*, 2012, May 10-11, 2012, Vilnius Gediminas Tech Univ, Vilnius, LITHUANIA, pp. 1168-1175. ISBN 978-609-457-116-9.

[5] PECINOVA, Z., LOSTAKOVA, H., BRANSKA, L. Barriers to the development of cooperation with the value with a low level of cooperation. In Metal 2013: *22nd International Conference on Metallurgy and Materials*. Ostrava: TANGER, 2013, pp. 2006-2012. ISBN 978-80-87294-41-3.

[6] HAUSCHILD, M.Z., DREYER, L.C., JØRGENSEN, A. Assessing social impacts in a life cycle perspective - lessons learned. *CIRP Annals - Manufacturing Technology*, 2008, Vol. 58, No. 1, pp. 21-24.

[7] BENOÎT, N.C. Data for social LCA. *International Journal of Life Cycle Assessment,* 2014, Vol. 19, No. 2, pp. 261-265.

[8] WORLD STEEL ASSOCIATION *Sustainable Steel Policy and Indicators 2013*, 2013, ISBN 978-2-930069-75-3, [online] [accessed 10 March 2014] Available from Internet <http://www.worldsteel.org/dms/internetDocumentList/bookshop/Sustainable-Steel-Policy---Indicators-2013/document/Sustainable%20steel:%20Policy%20and%20indicators%202013.pdf>.

[9] EUROMETAL *Health and Safety* [online] [accessed 12 March 2014], Available from Internet <http://www.eurometal.net/index.php/health-and-safety>.

[10] INTERNATIONAL COUNCIL ON MINING AND METALS *Sustainable Development Framework* [online] [accessed 10 March 2014] Available from Internet <https://www.icmm.com/our-work/sustainable-development-framework>

[11] NORGATE, T.E., RANKIN, W.J. The role of metals in sustainable development. *CSIRO Minerals*, 2002, [online] [accessed 8 March 2014] Available from Internet <http://www.minerals.csiro.au/sd/CSIRO_Paper_LCA_Sust.pdf>.

[12] VAVRA, J., BEDNARIKOVA, M., MIKOLAJKOVA, M. Determination of environmental aspects in metallurgical industry. In Metal 2012: *21st International Conference on Metallurgy and Materials.* Ostrava: TANGER, 2012, pp. 1715-1721. ISBN 978-80-87294-31-4.

[13] DREYER, L., HAUSCHILD, M., SCHIERBECK, J. Characterisation of social impacts in LCA. Part 1: development of indicators for labour rights. *International Journal of Life Cycle Assessment,* 2010, Vol. 15, No. 3, pp. 247-259.