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LIFE CYCLE ASSESSMENT - NEW DIRECTION IN ADDRESSING SYSTEMIC PROCESSES IN FOOD INDUSTRY

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Abstract: *The aim of this paper is to present family standards SR EN ISO 14040 Life cycle assessment as a new approach to food industry processes from design and production to display on shelves and removal / disposal of waste (including packaging). These standards introduce the concept of "system – product" and "cradle-to-grave" to the study of environmental aspects and potential impacts of the product life cycle.*
The first part of the article contains an overview of LCA standards requirements. I presented the five standards that deal with this problem including their principles and some explanatory diagrams.
The five standards are SR EN ISO 14040 - Principles and framework, SR EN ISO 14041 - Define the purpose, scope and inventory analysis, SR EN ISO 14042 - Life cycle impact assessment, SR EN ISO 14043 - Life Cycle Interpretation, SR ISO-TS 14048 - Format of the data documentation. Their name contains the phrase "Environmental management, Life cycle assessment", focusing on environmental standards.
The second part presents some practical ways to apply the LCA standards in food industry. The implications of implementing these standards may bring about the risk for small firms in the food industry to be blocked by brokers and lose their identity.

Key words: *system – product, cradle-to-grave, environmental management*

1. Introduction

LCA - Life cycle assessment is a relatively new standard governed by the terms SR EN ISO 14040 Environmental management - Life cycle assessment - Principles and framework. The approach starts from the environmental management standards and aims to interpret and evaluate inputs, outputs and potential environmental impacts of a "system-product" throughout its life cycle. If all other ISO standards concerned with the system and processes of a firm that produces a product / service, analyze the new standards until the entire system from design to disposal / recycling of waste, with all related issues - "cradle-to-grave" approach.
Key features of an LCA are:
- systematically and adequately addresses the environmental aspects of systems-product, from raw material acquisition to post-use;
-degree of detail and deployment time of a LCA study may vary in a wide range;
-scope, assumptions, description of data quality, methodologies and results are transparent LCA studies;
-provision is determined depending on the intended application of LCA study, to comply with privacy and ownership issues;
-LCA-methodology is open to embrace new scientific discoveries and improvements in technology – BAT;
-LCA is used to make comparative statements further presented to the public;
-commercial activities are complex because there is no scientific basis for reducing LCA results to a single overall score or number;
-there is no single method for conducting LCA studies but organizations should have flexibility to implement LCA practice as stipulated in this International Standard.
Phases of a LCA study are presented in Figure 1.

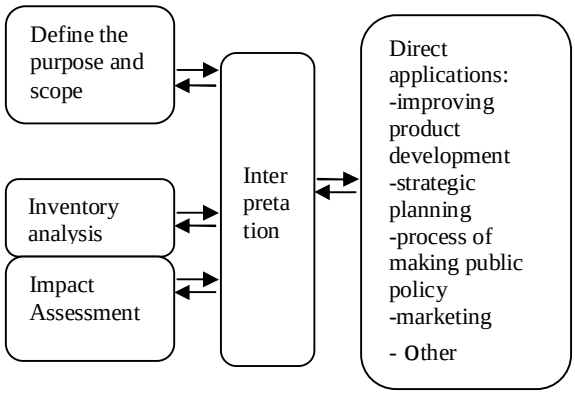


Figure 1 - Phases of LCA

Scope of the study aims - according to standard terms:
-system-product-functions or, for comparative studies, the EIA systems;
-functional unit;
-system-product that is studied;
-product system boundaries;
-allocation procedures;
-type of impact and methodology for impact assessment and subsequent interpretation will be used;
-data requirements;
-assumptions;
-limitations;
-requirements relating to quality of original data;
-type of critical analysis, if any;
-the type and format of the report called for the study.
Reporting the results of LCA must be impartial and complete. Objective reporting is made to a third party; the requirements of the standard should cover at least the following aspects:
a) general aspects;
b) defining the purpose and scope;
c) life cycle inventory analysis;
d) life cycle impact assessment;
e) life cycle interpretation;
f) critical analysis.
Critical analysis is essential and it can be made by an independent internal expert LCA study or by an external expert analysis that will give an Analysis statement.
SR EN ISO 14041 standard - Definition of the purpose, scope and inventory analysis - establishes requirements and procedures for setting up and training the purpose and scope definition for a Life Cycle Assessment (LCA) and for the development, interpretation and reporting cycle inventory analysis Life (ICV).
The product-system is detailed here and the final product is indicated next to intermediates, auxiliary inputs, uncontrolled emissions, data quality, sensitivity analysis, uncertainty analysis, etc.
For Life Cycle Inventory analysis, the "system-product" which is composed of "units of product" must be defined more clearly. It is essential that function, functional unit and reference flow to be clearly defined and to determine the boundaries of the original system.
Inventory Analysis is made according to the logical scheme of Figure 2.

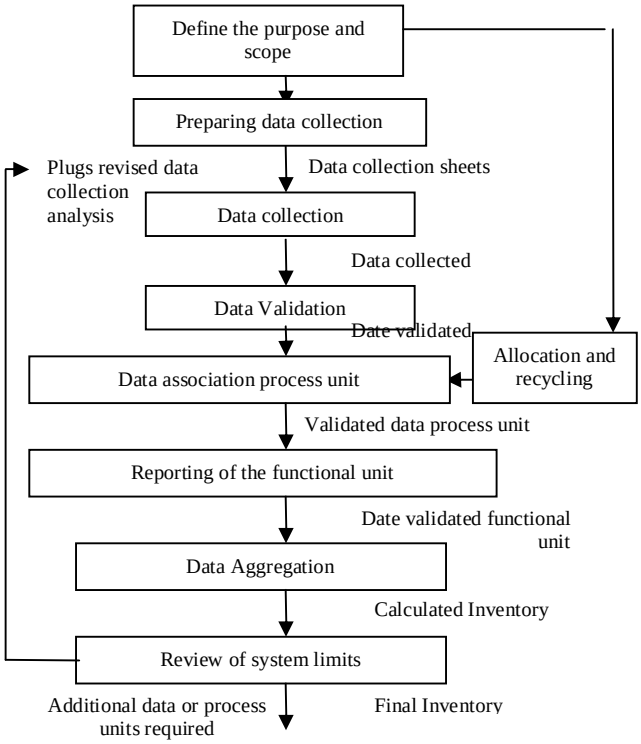
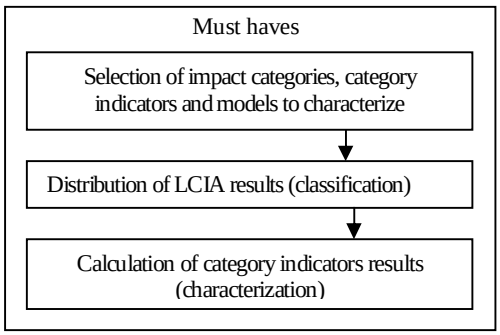


Figure 2- Simplified procedures for the analysis of inventory

2. Experimental

The standard model detailed Report of the study. In the annexe, examples of Data collection sheets can be found.
SR EN ISO 14042 - Life cycle impact assessment constitutes the third stage of the process LCA and

is to assess the Life Cycle Inventory Analysis results of a "system-product" to better understand their environmental significance - it prepares the stage for Life-Cycle Interpretation.
The data obtained are used:
-to identify opportunities to improve product and system-to help determine their priorities;
-to characterize or evaluate the performance (benchmark) of a system-produced and its units in the long run;
-to make relative comparisons between systems-based product category indicators selected; to indicate environmental problems for which other techniques can provide complementary environmental data and information useful for decision makers.
LCIA phase elements are illustrated in Figure 3.



Category indicators results (LCIA profile)

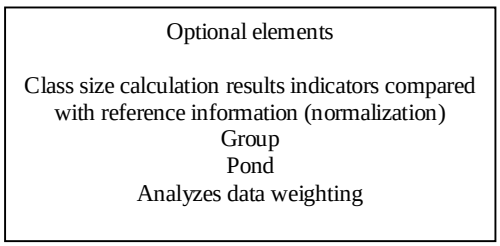


Figure 3 - Elements of LCIA phase

SR EN ISO 14043 - 2002 LCA - Life Cycle Interpretation - provide requirements and recommendations for conducting life cycle interpretation in LCA and LCI studies. Identification and structuring of information are suggested in Figure 4.

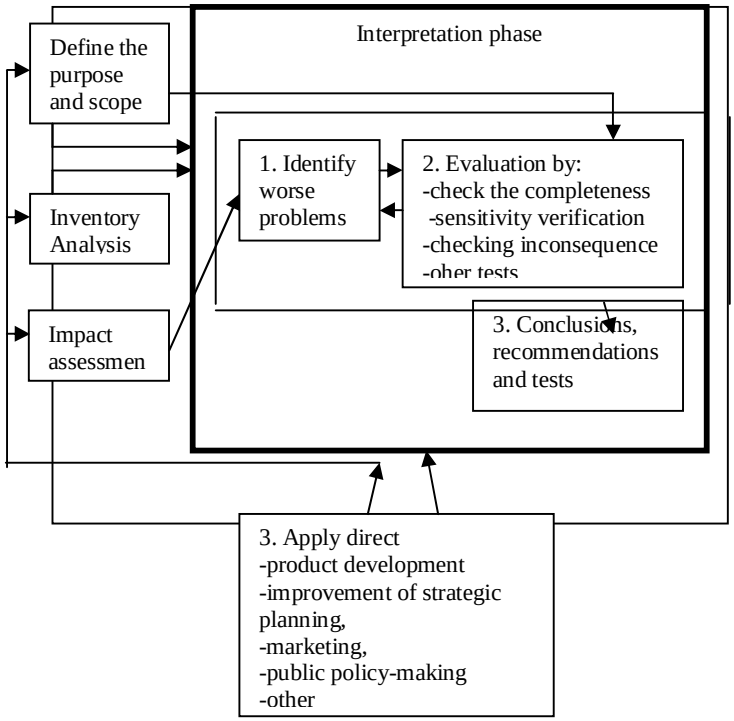


Figure 4 - Relations between elements of the interpretation phase of LCA and other phases

The standard annexes find several examples of forms for the interpretation of LCA.

ISO-TS 14048 Data documentation format - provide a framework and clear documentation of data requirements for life cycle inventory analysis (LCI). Data documenting a process is illustrated in Figure 5.

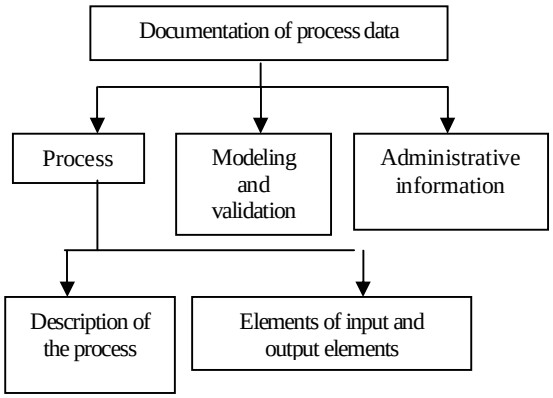


Figure 5- General knowledge about the data documentation format

Standard forms offer models that describe processes, input-output elements, modelling and validation, etc. being explained in the annexes.

3. Results and Discussion

In practice, this new approach to the food industry is extremely important. For the first time we see that a company that manufactures, for example traditional products - cheese, cooked pork, smoked trout, etc. - to be integrated into a "system – product" including product packaging, storage, demonstrating a raw material traceability (cows, pigs, fish tank, etc.) with food, medical tests, etc. needs to have control of the transport machinery (accreditation, washing, disinfection, maintenance, ...), intermediaries and wholesale deposits democrats, shelf presentation, labelling, etc. [1] Packages involve chemical triple laminated polyethylene film, low permeability to CO2 aluminium foil, cans technologies, insulating varnishes, technological lines for manufacturing stainless steel, etc. [2] [3] [4] All they bring their own carbon footprint and loads of pollutants with cumulative LCA studies. [5] [6]

So we see when it comes to a chain of companies – each one with its own management systems implemented and their own LCA studies, that there is a possibility and opportunity to join a system that produces something marketable. If we implement these standards management system in that company, there will have its own carbon footprint, tables and other pollutants, and will be able to access a viable globalized system. This is the only chance. [7] [8] If the manufacturing company can not provide this LCA study, it will not have access to supermarkets.

Although the product is good looking and with a price planes. [9] [10] Then, an intermediate properly packed product will emerge, organize and monitor the labeling, transport, storage, marketing, distribution, sale, and keep most gain with low price to the vendor.

The next step will be to require amounts of increasingly large and globalized market to meet increasing profits.

Small traditional producers are unable to finance an increase in capacity implies: an average production line automation with an increase in raw material supply base (cows, pigs, fish), that would increase demand for feed (by increasing the number of farms in the area), etc. They are attracted by the appearance of the equipment maintenance companies, sales of agricultural machinery factories, production recovery profiles, steel and mining industry refreshing transport or ship or train. [11] This means jobs, development, living standards but also structuring and strengthening the brand country.

As these approaches have not solved out all these problems in appealing to the best suppliers more environmentally friendly, from China ,Germany, Poland, etc. - this is due to globalization. Taking control of all traditional product information broker will record it. [12]

To implement LCA in companies in Bukovina and Romania, we offer a soft ware application that contains all the forms required by the standards of SR EN ISO 14040.

I also created a framework for promoting these concepts and supporting information in an NGO - Bukovinean Society for Management J.M. Juran.

We can provide a LCA certification of management systems from a regional certification body regarding the access to this organized framework based on local expertise in the implementation of LCA .

In this way we can impose on the European market its own certification.

4. Conclusion

Integration of companies from various parts of the world in production and distribution of ordinary products (salad, fruit, flowers, etc..) is a globalized phenomenon. Of course, transportation is no longer a problem, technology on a bed of closed-circuit water, organic loading is widely controlled. Disputes of GM food technology have social implications in employment in overcrowded areas. To gain access to these disputes the only way is to implement LCA management systems. So we have the technical data and even the possibility of participating in the dialogue provided by the policy in the field.

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5. Abbreviations

IMS - Integrated Management Systems
LCA - Life Cycle Assessment
SR - Romanian Standard
EN - European Norm
ISO – International Standardization Organization
ICV - Cycle Inventory analysis Life

6. References

1. A.M. ERG, M. JOHANSSON, G. FINNVEDEN, A.JONSSON - *Screening environmental life cycle assessment of printed*, web based and tablet e-paper newspaper - 2007
2. Y. KOBAYASHI, H. KOBAYASHI, A. HONGU, K. SANEHIRA - *A Practical Method for Quantifying Eco-efficiency Using Eco-design SupportTools*
3. Commission du Codex Alimentarius - CODEX ALIMENTARIUS - *Etiquetage des denrées alimentaires- Textes complets* - Programme mixte FAO/OMS sur les normes alimentaires
4. *Etiquetage des Denrees* - Direction générale de la concurrence, de la consommation et de la répression des fraudes -http://www.minefe.gouv.fr/directions_ services/dgccrf/documentation/fiches_pratiques/fiches/ etiquetage_alimentaire.htm
5**.** FRIDGE: *Socio-economic impact assessment of the proposed plastic bag regulations* - Life cycle assessment of paper and plastic checkout carrier bags
6. *Guidelines for Social Life Cycle Assessment of Products* - Belgian Federal Public Planning Service Sustainable Development - Copyright © United Nations Environment Programme, 2009
7. S. JOSHI, J. MADISON - *Product Environmental Life-Cycle Assessment Using Input-Output Techniques* - College Michigan State University East Lansing, MI USA
8. R. P. HENSON, A. B. CULABA, G. A. MENDOZA - *Evaluating Environmental Performance of Pulp and Paper Manufacturing Using the Analytic Hierarchy Process and Life-Cycle Assessment*
9. Opinia Comisiei Ştiinţifice asupra aditivilor alimentari, aromelor, materialelor şi accesoriilor utilizate în prelucrarea alimentelor (AFC) - *Recomandări pentru întocmirea unui dosar pentru evaluarea de către EFSA a siguranţei procesului de reciclare în producţia de materiale plastice reciclate utilizate în materiale şi obiecte ce vin în contact cu produsele alimentare*, Jurnalul EFSA (2008) 717
10. Guidelines for Social Life Cycle Assessment of Products - *Belgian Federal Public Planning Service Sustainable Development* - Copyright © United Nations Environment Programme, 2009
11. K.A. BARNES, C. R. SINCLAIR, D.H. WATSON - *Chemical migration and food contact Materials* – CRC Press - Boca Raton Boston New York Washington, DC - WOODHEAD PUBLISHING LIMITED Cambridge, England
12. Y.KOBAYASHI, H. KOBAYASHI, A. HONGU, K. SANEHIRA - *A Practical Method for Quantifying Eco-efficiency Using Eco-design Support Tools*
- http://mitpress.mit.edu/jie - 2005 by the Massachusetts Institute of Technology and Yale University