SALSA

Knowledge-based Sustainable vAlue-added food chains: innovative tooLs for monitoring ethical, environmental and Socio-economic impActs and implementing Eu-Latin America shared strategies

Grant Agreement n. 265927

Report on developing tools for knowledge transfer and exchange

Actual submission date of the document: December 2013
Start date of project: 1st of May 2011
Duration: 36 months
Organisation name of lead author of this document: Campden BRI Magyarország Nonprofit Korlátolt Felelősségű Társaság - CBHU
Responsible partner: CBHU, UFV
Involved Partners: UNIBO, FIBL, EMBRAPA, FSLA, WUR, proQ, UGENT

Level: PU

D 6.2 Report on developing tools for knowledge transfer and exchange

<table>
<thead>
<tr>
<th>Dissemination Level</th>
<th>PU</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>pp</td>
<td></td>
<td>Restricted to other programme participants (including the Commission Services)</td>
</tr>
<tr>
<td>RE</td>
<td></td>
<td>Restricted to a group specified by the consortium</td>
</tr>
<tr>
<td>CO</td>
<td></td>
<td>Confidential, only for members of the consortium</td>
</tr>
</tbody>
</table>
## Deliverable datasheet

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project acronym</strong></td>
<td>SALSA</td>
</tr>
<tr>
<td><strong>Project full title</strong></td>
<td>Knowledge-based Sustainable vAlue-added food chains: innovative tooLs for monitoring ethical, environmental and Socio-economic impActs and implementing Eu-Latin shared strategies</td>
</tr>
<tr>
<td><strong>Project contract No.</strong></td>
<td>GA n.: 265927</td>
</tr>
<tr>
<td><strong>Dissemination level</strong></td>
<td>Restricted to other programme participants</td>
</tr>
<tr>
<td><strong>Official delivery date</strong></td>
<td>December 2013</td>
</tr>
<tr>
<td><strong>Organisation name of lead contractor for this deliverable</strong></td>
<td>CBHU, Hungary</td>
</tr>
<tr>
<td><strong>Authors</strong></td>
<td>CBHU(in collaboration with the members of the SALSA consortium and the WP6 working group)</td>
</tr>
<tr>
<td><strong>Editing</strong></td>
<td>UNIBO, Italy</td>
</tr>
<tr>
<td><strong>Version and date</strong></td>
<td>Final / 20 December 2013</td>
</tr>
<tr>
<td><strong>Approved by</strong></td>
<td>Prof. Cesare Zanasi</td>
</tr>
</tbody>
</table>
### TABLE OF CONTENTS

1. Executive summary ........................................................................................................ 5
2. Introduction ....................................................................................................................... 6

2.1. Project background ....................................................................................................... 6
2.2. Purpose of the report ................................................................................................... 6
2.3. Structure of the report ................................................................................................. 6
3. Knowledge transfer ......................................................................................................... 7

3.1. Knowledge and technology transfer tools ................................................................. 7
3.2. Awareness raising through workshops ....................................................................... 9
3.3. Presentations at industry meetings, personal visits to companies ......................... 10
3.4. Short (1-page) research summary sheets ................................................................. 14
3.5. Newsletters ............................................................................................................... 14
3.6. Posters ......................................................................................................................... 15
3.7. Using the internet/project website ............................................................................. 15
3.8. Training materials ..................................................................................................... 17
3.9. Transfer of personnel - staff secondments .............................................................. 18
3.10. Guidelines ............................................................................................................... 21
3.11. Collection of best practices - inventory of success stories ..................................... 22
3.13. Web-based self-assessment tools ........................................................................... 23
4. Conclusions ................................................................................................................... 23

5. References ..................................................................................................................... 26
6. Annexes ......................................................................................................................... 27

Annex 1. Research Summary Sheets .................................................................................. 27
    RSS WP2 ..................................................................................................................... 27
    RSS 3.1 ...................................................................................................................... 29
    RSS 3.2 ...................................................................................................................... 31
    RSS 4.1 ...................................................................................................................... 37
    RSS 4.2 ...................................................................................................................... 40
    RSS WP5 .................................................................................................................. 43
    RSS WP6 .................................................................................................................. 45

Annex 2: 1st Newsletter .................................................................................................... 47
Annex 3: 2nd Newsletter .................................................................................................. 48
Annex 4: 3rd Newsletter .................................................................................................. 50
Annex 5: General project poster ....................................................................................... 54
Annex 6: Guideline for sustainable assessment tools ....................................................... 55
    Introduction ............................................................................................................... 56
    Objective ...................................................................................................................... 56
    Concept and definition(s) of sustainability ................................................................. 57
    Why we need sustainability ....................................................................................... 57
    Tools for sustainability assessment .......................................................................... 57
    Building up the system .............................................................................................. 57
<table>
<thead>
<tr>
<th>Description of the tool(s)</th>
<th>58</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCA Sustainability assessment tool</td>
<td>59</td>
</tr>
<tr>
<td>Sustainability impact assessment tool-excel base</td>
<td>67</td>
</tr>
<tr>
<td>Glossary</td>
<td>74</td>
</tr>
<tr>
<td>Focus on WP3 and WP4 Sustainability Monitoring and Improvement Options Impact Assessment tools</td>
<td>78</td>
</tr>
</tbody>
</table>
1. Executive summary

This document lists the knowledge transfer tools and related activities implemented in the SALSA project. The main goal of knowledge transfer was to exchange information among researchers, industry partners, including SMEs, farmers, standard setting organizations and in general all the stakeholders involved in the knowledge produced within the project. Strengthening the linkage between Latin-American and European soy and beef chain stakeholders was another main objective of the knowledge transfer activities.

Within the implemented knowledge transfer tools adopted, special attention was given to the web based self-assessment tools for sustainability performance monitoring and improved options assessment. The adoption of these tools provides a quick, transparent and organized access to information about the status of the sustainability performance of the users plus, an innovative practical and user friendly approach to sustainability management, especially for non-expert users from SMEs and farmers organizations.

The extensive range of knowledge transfer initiatives were always discussed with the potential users in order to be adapted to their contexts (geographical, cultural and professional) and create an organic set of inputs avoiding as much as possible to contribute to the present information overloading.
2. Introduction

2.1. Project background

Joint Latin American and European initiatives are necessary to increase the sustainability and competitiveness of the Latin American and EU soy and beef supply chains since these food chains are strategically relevant for the Latin American economic, environmental and social development, and are strongly interrelated.

The aim of the Salsa project is to develop strategies to tackle the eco-challenges of Latin American countries by promoting both social cohesion and economic development through the improvement of the access of SMEs, agro-food producers to local and EU export markets and enhance added value, improve market relationships and competitiveness of EU and Latin American food chains.

WP6 is responsible for knowledge transfer, information exchange and for supporting relationships of different institutional stakeholders, farmers/SMEs, policy makers, extension services, civil society, and consumers. This can be facilitated by involving SMEs and small farmers into the research process by sharing information coming from both sides and getting feedbacks on the SALSA results, in order to adapt them to the different contexts in Latin America and EU.

2.2. Purpose of the report

This report aims to summarize the activities within SALSA project related to developing tools for knowledge transfer and exchange, based on the inventory on technical solutions and management practices prepared in WP3 and WP4, converted to an SME friendly practical tool.

2.3. Structure of the report

In the first part, the deliverable includes a summary of the report followed by a short description of the project background and a description of its objectives of the report.

The second part of the report provides a concise overview on knowledge and technology transfer, including their aims, methods and applications. Following the overview, the related knowledge transfer and dissemination tools and actions used within SALSA are collected and described.

In the last part a series of guidelines describe the structure and the use of the tools developed within SALSA WP2, WP3 and WP4 for sustainability monitoring and sustainability improvement options assessment.
3. Knowledge transfer

Knowledge transfer consists of the range of activities which aim to capture, collect and transmit knowledge (either explicit way, such according to patents or tacit such as know-how), skills and competence from those researcher, owner of the knowledge who generate them towards those who will transform this new knowledge into economic outcomes. This procedure includes both commercial and non-commercial activities such as research collaborations, consultancy, licensing, spin-off creation, researcher mobility and publication (European Commission, 2007). The main focus is on scientific and technological knowledge. The other forms of knowledge such as technology-enabled business processes are also included.

Knowledge transfer includes transfer channels, such as mobility of staff, publications, etc. In other words knowledge transfer is the process of sharing of skills, knowledge, expertise, technology, know-how, practical tools, methods of manufacturing, samples of manufacturing and facilities among companies, research organisations, governments and other institutions to ensure that scientific and technological developments are accessible to a wider range of users, who can then further develop and exploit the technology in new products, processes, services systems, and organisational solutions.
The process of technology transfer typically includes (AUTM, 2006):
• identifying new technologies;
• protecting technologies through patents and copyrights;
• defining development and commercialization strategies such as marketing and licensing to existing private sector companies or creating new start-up companies based on the technology.

The objectives of knowledge transfer are to enhance social and/or economic well-being. The public benefits are derived from products and services that reach the market and jobs that result from the development and sale of products and services. The process of knowledge transfer starts with the creation of awareness and end with the introduction of products and processes onto the market (TEAGASC, 2008).
The organisation, which carries out knowledge transfer, should have a clear view about its own objectives and priorities for carrying out this activity. It should be ensured that the staff responsible for the design and implementation of the knowledge and technology transfer activities and should understand and implement the above mentioned objectives and priorities (TRUEFOOD, 2010). More description can be found on the process and the importance of knowledge transfer in “Guideline on effective knowledge and technology transfer activities to SMEs in the food sector with particular focus on traditional food manufacturers, which was developed within TRUEFOOD FP 6 project.

3.1.Knowledge and technology transfer tools

Knowledge transfer and exchange tools help researchers to enhance the effectiveness how to handle different levels of competence within the companies.
The transfer of activities on new knowledge generated by R&D can be targeted to different objectives which are listed below:
• creating awareness, particularly of industry personnel;
• learning of industry personnel, including the role of the mediators;
• learning of specialists, experts, researchers;
• implementation of the knowledge in practice.

In order to achieve the different objectives, different knowledge transfer tools are applicable. Some of the tools can be applied for more than one purpose. Knowledge transfer tools are based on the use of one or several types of methods, which include personnel contacts, training, written materials, visual aids, practical demonstrations, conferences, seminars.

The combined use of several tools is usually more effective than the use of one tool by itself. The selection of tools should be in line with the knowledge transfer strategy of the transferring organisation and the needs and preferences of the target audience (TRUEFOOD, 2010).

Within SALSA project we have utilized the combined use of several tools. The main focus was given to ensure good access and effective transfer and exchange of knowledge from the project partners, researchers in one side towards the industrial partners e.g. food businesses, local SMEs, both in Latin-America and European Union in the other side. Another objective was to support the improvement and the efficiency of information flow among the supply chains members (SALSA, 2011).

The knowledge transfer and exchange tools which were used in SALSA project are listed below:
• personal visits to companies;
• consultancy;
• short (1-page) research summary sheets;
• newsletters;
• posters;
• web-based self-assessment tools; E-platform, webinars
• training material;
• workshops, presentations at industry meetings;
• transfer of personnel; apprenticeships - staff secondment
• guidelines;
• best practice guides - inventory on success stories;

To achieve the above-mentioned objectives the concept of Industry Platform (IP) operation has was developed. The principles of creating on-going dialogue with practical industry partners were established. An on-going dialogue has been performed between the research partners and the representatives of the food businesses along the soy and beef food chains in Latin America and European Union. The IP was used to involve businesses and other stakeholders along the food chain into the R&D process, to get an assurance that the research was focused on the real priorities of the practical users (SALSA, 2011).

Those findings, which was planned to be public were made publicly available to the interested partners, but additional confidential information was made available only for those partners who signed the confidential agreement of SALSA project and thus became a member of the IP. These members have access to confidential results of the project in return for their invested efforts. The whole process of the establishment of the IP is detailed in SALSA Deliverable 6.1.
The actual number of the IP is twelve and more than 400 is the number of the interested companies (220 are small or large businesses, the rest includes associations (76 including SMEs), policy making institutions, research organizations and consumer associations.

The knowledge transfer and exchange tools were used to achieve the on-going dialogue and to disseminate the projects results to the interested partners and the members of IP and raise awareness related to the SALSA project and its research results. These knowledge transfer and exchange tools are detailed below.

3.2. Awareness raising trough workshops

At the beginning of the research, previous projects or workshops can be used to define the research problem and to raise awareness and motivate the industry partners for participation to the research project. It is a useful opportunity to involve industrial partners in research planning. The target groups are business partners, managers, key staff involved in the topics raised, and researchers (TRUEFOOD, 2010).

Within the SALSA project awareness raising activities a series of workshops were held during the first year in Argentina, Brazil and Mexico to build up the basis for the ongoing dialogue and to design the activities for their harmonisation. See detailed information in Table 1. The discussion part of the workshops aimed to ensure the exchange of information and knowledge with the supply chain members in Latin America, including the collection of their feedback, interest, priorities regarding the project activities and results. The collected information was used as an input for the identification of the potential topics during the following national workshops and six-monthly consultations.

Table 1: Details of the awareness workshops held in Latin America

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Date</th>
<th>Description of the activity</th>
<th>Type of audience</th>
<th>Countries addressed</th>
<th>Approx. size of the participants</th>
<th>Partners involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>31.10.2011 - 01.11.2011</td>
<td>Workshops in – Brazil, Campo-Grande</td>
<td>stakeholders + IP</td>
<td>Brazil</td>
<td>16</td>
<td>Embrapa, UFV, CBHU</td>
</tr>
<tr>
<td>2.</td>
<td>04-11-2011</td>
<td>Workshops in Argentina, Rosario</td>
<td>stakeholders + IP</td>
<td>Argentina</td>
<td>24</td>
<td>RTRS, UNAM, FSLA, , CBHU</td>
</tr>
<tr>
<td>3.</td>
<td>08.12.2011</td>
<td>Workshop</td>
<td>stakeholders</td>
<td>Mexico</td>
<td>52</td>
<td>UNAM, CBHU</td>
</tr>
</tbody>
</table>
3.3. Presentations at industry meetings, personal visits to companies

Presentations
Short presentations at industry meetings are well accepted by the businesses, and other participants who are interested in the topics selected. Short presentations are useful tools to create awareness on the research problem and the solutions which were developed to tackle these problems during the project (TRUEFOOD, 2010).

Within the SALSA project several meetings were held and different presentations delivered during the events in order to transfer knowledge to the industry. These events are summarized in the table below.

Table 2: List of the industry meetings used for presenting SALSA project

<table>
<thead>
<tr>
<th>Event</th>
<th>The titles of the presentation(s)</th>
<th>Topics highlighted during the presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6th International Conference on Responsible Soy (RT6) 15th and 16th of June, 2011 Buenos Aires, Argentina</td>
<td><strong>SALSA project: A contribution to a sustainable development of beef and soy supply chains in Latin America</strong></td>
</tr>
<tr>
<td>2</td>
<td>SALSA meeting January the 14th 2013, Rotterdam-The Netherlands</td>
<td>• Different presentation of SALSA results to EU and Latin American industries</td>
</tr>
<tr>
<td>Task 6.3 – Report on developing tools for knowledge transfer and exchange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>International Symposium on sustainability initiatives and trends in Europe and Latin America: identification and promotion of synergies. Campo Grande MS-Brazil, April the 10th 2013</td>
<td>• Presentations of SALSA results to Latin American industries representatives, farmers’ organizations, standard setting organization and researchers.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Workshop: Clusters for sustainable exports of the beef and soy production chains. April the 11th 2013, Campo Grande, MS-Brazil</td>
<td>• Presentation and discussion of the SALSA E-Platform with Latin American industry Stakeholders</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Workshop: “Propositions for an integrated platform for sustainability analysis for beef and soy chains in Latin America, April the 12th 2013, Campo Grande MS-Brazil</td>
<td>• Presentation and discussion of the SALSA E-Platform results related to the LCA tool for SMEs and farmers organizations</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Introductory workshop, 27th August, 2013, Campo Grande, MS- Brazil</td>
<td>• The European food research innovation strategy of the European technology Platform</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Project Nutrimentum meetings towards the Milan EXPO 2015. Milan- Italy September the 24th 2013</td>
<td>• Sostenibilità: maneggiare con cura. Riflessioni dall’esperienza del progetto SALSA (Sustainability: handle with care. Reflections form the SALSA project experience)</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>SALSA workshops on “Solutions for Sustainability in Food Chains and Bioenergy October 1st- 4th Viçosa- MG-Brasil</td>
<td>• 4 Workshops related to sustainability Presenting different experiences from SALSA and other organizations experiences on</td>
</tr>
<tr>
<td>9</td>
<td>Meeting on Sustainability (SALSA, Meat Chain)– November 14th–15th 2013 Mexico City, Mexico</td>
<td>• Chain management approach of food innovation: good practices, practical experiences, successful cases (based on EU projects TRUEFOOD, Transparent Food– Dr. András Sebők</td>
</tr>
<tr>
<td>10</td>
<td>Meeting on Sustainability (SALSA, Meat</td>
<td>• Resource efficiency and sustainability: results, methods, practical experiences-</td>
</tr>
<tr>
<td>Task</td>
<td>Meeting on Sustainability (SALSA, Meat Chain)– November 14th–15th 2013 Mexico City, Mexico</td>
<td>FoodManufuture, SmartAgriFood, IMSFood, EcoBioCap – Dr. András Sebők</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Overview of European food research and innovation initiatives, ETP Food for Life</td>
<td>Concept of ETP, role, operation and functions of the NTPs, Strategic Research and Innovation Agenda of the ETP, scientific challenges of the ETP Food for Life</td>
</tr>
<tr>
<td>12</td>
<td>Market perspectives: UE market for sustainable food</td>
<td>The main trends in the EU markets and legislation, related to the food chain sustainability implementation and regulation, were described. Insights for the Mexican beef trade implementation to the EU were provided</td>
</tr>
<tr>
<td>13</td>
<td>Results of SALSA projects</td>
<td>The SALSA project results’ contribution to the industries, farmers, policy makers NGO standard setting organizations, and other stakeholders’ sustainability strategies.</td>
</tr>
</tbody>
</table>

Personal visits involve higher costs but face-to-face meetings are one of the most efficient tools for knowledge and technology transfer. This tool can be used for identifying research, and knowledge transfer needs, creating awareness about a topic. Visits by researchers to companies, particularly to production sites, animal husbandry farms, soy farms, agricultural departments, or any other stages of the soy and beef supply chain might contribute to the learning of researchers about the preferences and needs of the businesses and increase their knowledge and understanding of specific practices and problems (TRUEFOOD, 2010). The list of the partners who were visited by the project partners are below:

- Hortobágy Nonprofit Kft. (Hungary) by CBHU
- Magyar Szürkemarhát Tenyésztők Egyesülete (Hungary) by CBHU
- ANNA-Farm – Jászdózsa (Hungary) by CBHU
- Vitafort Zrt. (Hungary) by CBHU
- Zandbergen by WU
- Progeo - Italy by UNIBO
- Amadori - Italy by UNIBO
- Valsoia - Italy by UNIBO
These face-to-face meetings were extended through phone conferences, in order to reduce the travel costs.

### 3.4. Short (1-page) research summary sheets

One-page summaries of the practical results of the research project in most of the times contain the objectives, the main tasks and the achieved and the expected results of research projects. This tool helps to communicate the results at low cost to the industry at low cost through short descriptions. Theoretical descriptions should be ignored and focus shall be made on the practical and applicable results for industry (TRUEFOOD, 2010).

Within the SALSA project, one-page summary sheets were prepared by the project partners, CBHU, UNIBO, FiBL, WU, UGENT, ProQ) (see Annex 1). Simple messages are used. The length is limited to maximum few pages (1 sheet usually contains 2 pages). At the end of the description, the further information is provided on the contacts of the SALSA project. These one-page summaries were prepared for the first results and regularly updated with the periodically achieved results.

### 3.5. Newsletters

Newsletters are usually used to publishing and communicating information to the industry platform (e.g. SMEs) and the partners in order to summarize in an easy to read sheet the main projects’ results, events and news of interest for the stakeholders. It is a low cost mode of
circulating information towards the interested partners, which can be achieved through an electronic media. The disadvantage of newsletters sent via e-mail is that they can easily become part of the rising information overloading characterized by too many newsletters, conferences and meetings invitations. Both the Industrial Platform members and the general public need to receive a more manageable and relevant information, tailored to their needs. To this end, after consulting the Industrial Platform members an agreement on a non-periodic distribution of the SALSA project newsletters was agreed; this to inform the interested partners and the IP members when relevant news emerged. Newsletters were thus distributed in electronic format in, November 2012 April 2013 and December 2013(Annex 2, 3, 4). A more direct contact with the Industrial Platform members took place during the project implementation via direct contacts on specific issues (feedbacks on deliverables and results, test of E-Platform, staff secondment etc.) The same applied to the Advisory Board members who were constantly involved in the project evolution making a newsletter less relevant as a communication tool.

3.6. Posters

Another tool adopted to raise the awareness of the industrial platform members and the other business and research related stakeholders. Posters contain the summary of the research results and examples of practical applications and can be showed to business companies and interested partners, or researchers, e.g. at exhibitions, conferences, open days and public rooms, etc. Usually short and clear messages, concise descriptions and illustrations are necessary to be presented of the research results (TRUEFOOD, 2010).

The general poster of SALSA project is attached in Annex 5. This poster was disseminated at the 8th International conference on Life Cycle Assessment in the Agri-Food Sector on the 1-4 October, 2012 in Saint Malo, France by CBHU and UNIBO. More details about the event can be found at https://colloque4.inra.fr/lcafood2012. A hand-out was made from the above mentioned poster and used as a knowledge transfer tool in several meetings with the industry which are listed below:

- Campden Day Hungary, 16th Nov 2011, 12th March 2013
- Campden Day UK, 12th June 2012, 6th June 2013
- SALSA workshop in Budapest, Hungary, 21st February, 2012
- SALSA workshop in Budapest, Hungary, 28th November, 2012
- VII. Kaposvári Állattenyésztési Napok; Specialized Exhibition for Animal Husbandry, Kaposvár, Pannon Lovas Akadémia, Hungary, 30th August, 2013

3.7. Using the internet/project website

The objectives of web-based tools, are to create interest on the project through the dissemination and discussion related to the project main results; following the dissemination stage the web based tools provided by SALSA allow the potential users to access resources supporting their activities’ management: monitoring their compliance to sustainability and related certifications; access a relevant body of technical, legal and economic information on the soy and beef
sustainable food chains implementation, exchange info and implement networks among stakeholders in EU and Latin America. The target group includes specifically farmers, industries and services companies (processors, input providers, traders) and their organizations, trade unions, policy makers and regulatory authorities; academics, civil society organizations like NGOs, standards setting organizations.

The web-based tools adopted by SALSA are the SALSA website for the general public (www.salsaproject.eu), the web seminars platforms, and the SALSA E-Platform.

**The project website** supports the on-going communication between the project partners/researchers and the general public, including the industry and other business stakeholders. A general introduction to the project, the description of its objective, organization and expected results is provided. More dynamic parts of the Web site are implemented where news and events related to the project topics and its implementation are reported. The dissemination material available is also constantly uploaded; this includes papers, presentations, posters and all the links to useful resources (websites), which provide relevant information within the SALSA project scope. This according to the recommendation coming from previous project where it is specified that a website should contain the final scientific results, and articles prepared and published, and might contain all of the publicly available deliverables which were performed during the project (TRUEFOOD, 2010). The Web sites provides a first stage for the introduction of the project structure and results to potentially interested stakeholders.

**The Salsa E-Platform** serves as a platform addressed both to the public and the SALSA participants (partners, Industrial Platform members and Advisory Board members. The E-Platform provides more in depth analysis and information for the general public who is interested to know more of the project than what is available on the website; the project’s participants, on the other hand, have access to a reserved area where confidential information and decision support tools are present.

The E-Platform is implemented as a system in the ‘internet cloud’ hence users can access from anywhere, irrespective of any local IT infrastructure. It is organized as a multi-lingual system which allows users to select their language of choice upon entering e.g. English, Spanish and Portuguese. This feature is important since the SALSA stakeholders relate to EU and the Latin America, and will be able to read and search in their mother-tongue (SALSA, 2012a).

The details of the project web-based tools are summarized in SALSA deliverables D5.1 and D5.2.

**Web-seminars (Webinars):** in order to enhance the on-going dialogue with the different stakeholders several webinars were carried out. This internet-based tool is relatively simple and cheap to be adopted but proves to be an effective interactive media for discussing the project results. Being a virtual meeting it is particularly useful for a project like SALSA whose global dimension is deeply influenced by spatial barriers to communication among the stakeholders.

The following webinars were carried out:
23rd April, 2013, highlighted topics:
  - Transparency within the food supply chain: The role of transparency related to sustainability
• A novel approach for reducing costs while increase production efficiency
• Namaste: New Advances in the integrated Management of food processing waste in India and Europe: use of Sustainable Technologies for the Exploitation of by-products into new foods and feeds

15th May, 2013:
• Key issues in food manufacture, retailing and end use
• FoodManufuture: General project overview and main results

21st June, 2013:
• Publicly available documents of European SCP Round Table

10th of December 2013:
• Sustainability assessment of food technologies, products and value chains

The presentations were provided in English through webinar and are available at E-Platform for the industry partners in Spanish and Portuguese.

Next planned webinars: January 2014
• Energy saving strategies at the cooling systems in the food factory of the future

3.8. Training materials

Within the SALSA project WP6’s objective is to provide education and trainings for mediators and SMEs for developing local capacities related to the implementation of sustainable food chains approaches. In order to perform these activities training materials were developed and delivered in two phases. The training materials contains theoretical (descriptions of the methods) and practical part (group exercises and practical examples).

The training modules are the followings:
- Knowledge transfer (Module 1) describes general objectives of the SALSA trainings, introduction to Knowledge Transfer, identifying the industry needs, dialogue between the industry and research, matching industry needs and available solutions, protection of intellectual properties, geographical indications, good practices – examples, group exercises.
- Organisation of training courses (Module 2) describes main steps of the organization, presentation skills and visual aids, training methods, evaluation training activities, group exercises.
- EU legal and trade standard requirements on traceability, food safety and quality management and sustainability (Module 3), it gives an overview of the EU legislation requirements for beef (cattle and dairy) and soy, EU import conditions, trade standards and sustainable initiatives. Group exercises were included.
- Measuring chain performance (Module 4), summarizes the introduction to chain management, sustainable chain, members of the chain, chain performance, identification of chain goals, and group exercises.
- Chain strategies (Module 5), contains the chain thinking, chain strategies, innovation within the food chain, chain approach towards innovation in the food sector and group exercises too.
- Application of integrated analytical tools (Module 6) provides a description of the objectives and structure of the LCA tool adopted in SALSA for the beef and soy chain sustainability assessment; based upon the E-Platform web-based tool, the module includes group exercises.
- Application of integrated operational management tools (Module 7). Strictly related to Module 6, describes the objective and structure of the SALSA sustainability improvements’ impact assessment. Starting from the sustainability improvement needs defined according to the LCA tool assessment results, the operational management tool involves the definition of possible sustainability improvement scenarios and allows for assessing the consequences on the sustainability indicators for the beef and soy chains groups’ exercises are included.

In a first phase the courses were provided in English to an audience of trainers and/or expert stakeholders, able to disseminate, in turn the knowledge provided during the training. The training modules 3-7 were also translated by UNAM and UFV into Portuguese and Spanish in order to enhance the involvement of the interested partners during training activities and to enhance the number of the attendances in training in Latin-America. In a second phase the trainings courses were provided jointly by the trainers and the SALSA staff, mainly to potential SALSA users: industry, farmers, producers who have more practical expertise and interested in the SALSA research results. The details of the training courses will be summarized in D6.3.

3.9. Transfer of personnel - staff secondments

To achieve a mutual understanding between the business companies e.g. along the soy and beef supply chain and the research organisations for example in our case the SALSA project partners, members of the research staff can spend some time working in the business company. In this way researchers might have a better understanding of the priorities, needs, practical problems and limitations of the specific industry and might have an overview on the potential uses of the research results and solutions. This might provide an opportunity for more informal discussions and explanation of the research results developed during the project (e.g. new methods) and the potential benefit for the specific industry of the application (TRUEFOOD, 2010).

Within SALSA project in order to enhance the mutual understanding between the members of the soy and beef supply chains and the project partners, researchers staff secondments were organised between EU and Latin American institutions and industries. The aim was to facilitate the exchange of best practices and common protocols for managing the selected supply chains. 8-8 visits were organized from EU and Latin American partners for 1-1 persons for 2-2 weeks each. ProQ, UGENT, CBHU, UFV, FSLA, EMBRAPA and RTRS participated in the staff
secondments. The details of the staff secondment are summarized within the table 3 below and will be detailed in D6.3.

Table 3: Staff secondments carried out during SALSA project

<table>
<thead>
<tr>
<th>Hosts</th>
<th>UNIBO</th>
<th>proQ</th>
<th>WUR</th>
<th>UGENT</th>
<th>CBHU</th>
<th>UFV</th>
<th>FSLA</th>
<th>EMBRAPA</th>
<th>RTRS</th>
<th>UNAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIBO</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>proQ</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UGENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBHU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UFV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSLA</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMBRAPA</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTRS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNAM</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

The personnel involved in staff secondment and the details of the staff secondment carried out during the SALSA project are listed below:

**Miguel Hernandez (FSLA hosted by WU): 2-13 September 2013**
Contents of the visit:
- to understand how the soy and beef business work, once imported to the Netherlands and entering the flow from the harbor to the supermarket shelves

**Maria Lourdes Espinoza (FSLA hosted by UNIBO): 28 October-8 November**
Contents of the visit:
- visit companies in the soy and beef sector (traders, processors, feed producers), including the Italian SALSA IP members

**Nelly Peña (UNAM hosted by WU): 30 September-10 October**
Contents of the visit:
- traceability
- sustainable management of livestock enterprises
- experience in sustainable production throughout the meat production chain in the Netherlands. Implementation Strategies. Visit to production units

**Rafael Olea (UNAM hosted by WU): 30 September-10 October**
Contents of the visit:
• visit Brazilian, Italian and Netherland success cases
• to discuss LCA procedures and method steps with European partners and find common interest in data analyses
• to learn more on business integration, food processing and nutrient recycling along the food supply chain.

Richard Lehmann (proQ hosted by WU): 01th October, 2011; 1st May 2012
*ProQ/WU was already done and costs were reported under RTD WP
Contents of the visit:
• visit WU to work together with the WU–INF group on a.o. the SALSA project
• project partners networking for eliciting requirements lately embodied in the E-Platform
• development of the first E-Platform prototype

Veronica Chorkulak (RTRS hosted by CBHU): March, 2014
Contents of the visit:
• producers (soy and beef farms) and Agricultural University

Emanuele Novelli (proQ short visit to CBHU): 15-16 May 2013
Contents of the visit:
• introduction on the e-platform (public and private access) structure.
• provide informative material to industrial partners and the broader businesses audience through the section “Explore Knowledge on Sustainability”

Davi J. Bungenstab (Embrapa hosted by CBHU and proQ): 27 June–6 July 2013
Contents of the visit:
• CBHU: introduction to the institute of CBHU and project specific tasks in Campden BRI Hungary Ltd., knowledge exchange on production methods (highlighting the differences between the two countries), discussion on SALSA project specific tasks, further planning related to task 6.5
• ProQ: detailed presentation of the E-Platform with all its tools. Exaustive discussions regarding details and features of the assessments tools to be made available by the platform i.e Brazilian cattle and soy production systems particularities.

Bruna Do Valle Rodrigues Neves (UFV hosted by RTRS): October, 2013
Contents of the visit:
• umbrella organizations, companies, research centres, farms

Fruzsina Homolka (CBHU hosted by Embrapa): February, 2014
Contents of the visit:
• visit producers (mainly beef), animal husbandry farms in order to get an overview about the difference between the Hungarian and Latin American technology and pastoral farming.

Adrienn Hegyi (CBHU hosted by UFV): November, 2013
Contents of the visit:
• information exchange on the requirement and status between LA and EU and in order to achieve this in efficient way in Brazil I visited the actors along the chain to see the operation in the real environment.
• the staff secondment contributes that I have broader information on beef market in Brazil and Argentina including difficulties, specialties and advantages of supply chain, particularly from the sustainability and integrated system points of view.
• Insights into the beef supply chain

**Claudia Severi (UNIBO hosted by FSLA): 18th September-5th October**
Contents of the visit:
• soy producers and processors, research institutions, NGOs in the core production area and in the Northern region, to assess the resilience of the rural communities interested by the soy cultivation, with a specific focus on social aspects.

**Cosimo Rota (UNIBO hosted by Embrapa): January 2014**
Contents of the visit:
• soy and beef producers and trade associations to understand the workings of the supply chains governance.

**Ray Jacobsen (UGENT hosted by Embrapa): 16-29 August 2012**
*Gent/Embrapa was already done and costs were reported
Contents of the visit:
• data collection and visits of producers/processors and organizations in the soy and beef chains.

**Toon Driesen (UGENT hosted by RTRS): 16-29 August 2012**
*Gent/RTRS was already done and costs were reported
Contents of the visit:
• data collection and visits of producers/processors and organizations in the soy and beef chains.

### 3.10. Guidelines

The guidelines usually contain explanation of the key steps and important elements of the methods and technology that can highlight good practices and typical failures. Practical tools are used to illustrate the methods such as flow-charts, tables, lists of references, Contacts for further information and specialist services might be provided too. Usually the development of a guideline shall be developed through repeated discussions and corrections, but the structure shall be agreed first. Usually a small core team prepares the first discussion material and after discussed by a broader team in several steps and extended if necessary (TRUEFOOD, 2010).

Within SALSA project a guideline was developed on the use of integrated model based on the lifecycle approach covering the entire food chain which includes analytical tools (WP3) with guidance on developing and monitoring key performance impact indicators of sustainable food chains and of the integrated operational tools for a sustainable improvement of technical environmental and economic / financial management of the entire food chain (WP4). This guideline is detailed in Annex 6.
An online training toolset was introduced in D5.2 which was developed to give assistance to the users of the Salsa E-Platform. The document summarizes the selected training functionalities and their adaptation to the specific needs of the participants interested and project partners too. An ‘interactive training guide’ is provided, whose aim is to support the stakeholders in using the platform. Users have access to the training guide at any time through a web link on the platform in an easily understandable way for all stakeholder even non-expert users too. Users are able to intuitively explore all the functionalities of the platform. The training content is provided in a wiki form and helps the users to better explore the results of the SALSA project and search for keywords too (SALSA, 2013).

3.11. Collection of best practices - inventory of success stories

Best practice guides are useful tools in order to summarize practical experiences. These might collect technologies implemented, processes, technical solutions, systems, and business organizational and managerial practices with highlighting the experiences collected in specific areas. It is important that the content shall be based on collective knowledge, experiences (TRUEFOOD, 2010).

Within SALSA project the deliverable D7.6 summarizes the “Inventory of Successful Cases”. The document describes the identification, selection and documentation of successful cases of sustainable food chains. These materials are going to be available in the educational forum and will be presented at conferences and meetings. The inventory provides a first outlook of different successful solutions in terms for increasing environmental sustainability within the soy and beef supply chains and, at the same time, granting competitiveness and social welfare, thus addressing the three dimensions of sustainability. Furthermore, according to the extended approach to sustainability characterizing SALSA, the organizational and governance aspects and their impact on the supply chain relations between agents has been analysed. This provides extra information on how supply chain sustainability can be enhanced by improving sustainable relationships and collaboration between the different agents. Supply chains involving soy and beef in Mexico, Argentina and Brazil were involved in the inventory.

3.12. Collective techniques - using networks

Networking is a useful tool for effective idea generation through mutual learning and sharing costs between the members of the network. A crucial pre-requisite is to consider and keep confidential information about specific R&D ideas, details and figures of business activities in the close-to-market phase of the innovation.

Companies can collaborate with each other in regional networks and clusters along the supply chain, or they are able to collaborate related to specific products and services. The advantage of collaboration is the competitive advantage which they can reach with combining their core competencies. Clusters usually attract the most innovative companies who are able to radically innovative products, processes and services. In order to reduce cultural and managerial barriers
cluster manager operates and carries out effective communication, collaboration and coordination by the use of appropriate communication and networking tools.

Within the SALSA project in order to assure appropriate design of the internet based system and to enhance the effectiveness of dissemination in the E-platform the project has identified 4 clusters of enterprises within 3 different countries whose play important role in beef and soy supply chain. Two of the clusters collect Soybean producers from Argentina and Brazil, and the other two collect beef producers from Mexico and Brazil. Soybean producers are usually larger enterprises and beef producers are in most of the cases small scale producers. These enterprises were the first users of the SALSA E-platform. They are in connection with project partners from the responsible countries. These project partners act as ‘cluster managers’. The details of the clusters and outlines ways on how to get the platform to work are describe in D 5.3 report (SALSA, 2013).

Dedicated training activities are going to be provided in order to make introduction on more complex tools such as life cycle assessment and an audit tool. To assure the improvement of the platform (e.g. appropriate platform design) selected member of each cluster provided feedback to the project related to the platform’s suitability (SALSA, 2013).

### 3.13. Web-based self-assessment tools

Salsa project developed a web based self-assessment tool for measuring the sustainability performance of the soy and beef supply chains. In order to provide a real practical tool for the users the consortium has added innovative software solutions that support the users sustainability performance monitoring and the assessment of the impact of improvement in their sustainability strategies.

These tools are available for the users in a web based platform, the SALSA E-Platform. They are currently tested by selected users belonging to the Industrial Platform and to a cluster of users representing the main food chains agent. The guidelines (see annex 5) were developed on the use of the integrated sustainability assessment model developed in SALSA, based on the lifecycle approach, covering the entire food chain. The guidelines refer to analytical tools (from WP3) with guidance on how to monitor key performance impact indicators of sustainable food chains; it also includes an integrated operational tool for a sustainable improvement of technical environmental and economic management of the entire soy and beef chain (from WP4).

### 4. Conclusions

As shown in scheme 1 below SALSA involves many differentiated activities and tools defined in order to transfer and exchange knowledge among the many stakeholders. The rationale behind this complex structure of communication is that exchanging knowledge does not involve only a simple exchange of data and texts. It is also necessary to create a network of personal relationships and contacts where trust, commitment and in general the willingness to collaborate will be enhanced, reducing the communication barriers that the global and multi-stakeholder
dimension of SALSA necessarily faces. Parallel to this set of initiatives oriented towards encouraging personal contact and knowledge exchange among stakeholders (conferences, seminar, trainings, workshops, secondment, visits to stakeholders) different web-based tool of communication have been created (web sites, E-Platform, sustainability self-assessment tools etc.). The latter can provide a clear, organized, continuously updated and transparent access to the knowledge and info production, which is by its nature, in quick and continuous progress. Last but not least a periodical summarization of the SALSA knowledge production and exchange is provided by newsletters, brochures and posters where some relevant issues can be defined and will guide the SALSA stakeholders through the vast amount of stimuli related to the analysis and implementation of strategies for the soy and beef chains sustainable development in Latin America and EU. The feedback so far obtained confirmed that by improving the personal relationship among Latin American and European stakeholders, farmers, researchers, industry, standard setting organizations, policy makers, the civil society, can strengthen the reciprocal understanding and better clarify effective sustainability strategies where the Latin American and EU contexts are taken into account with an increased awareness of our different views and approaches. As a consequence of this experience the next steps of the project will be directed towards increasing the chances to exchange the knowledge and the different approaches related to the technical, social economic and political dimension of sustainability. During the SALSA General Conference to be held in Brussels on March the 19th 2014 different seminars will be organized towards this end. Last but not least, as a result of the feedback generated by the different knowledge exchange tools adopted, the sustainability analysis of the different Argentinian Mexican and Brazilian soy and beef production systems has been improved by including more context specific technical, social and economic aspects.

Scheme 1) SALSA tools for knowledge transfer and exchange
5. References

- Agrifoodresults (2011). Information provided for preparation of a Dissemination Plan prepared by András Sebők, Campden BRI Magyarország Nonprofit Kft. This template was prepared within the AgriFoodResults FP7 project funded by the European Union, Version 5., May 2011


- European Commission (2007). Knowledge transfer between research institutions and industry - Frequently asked question Memo/07/127 published on 04 April 2007


- SALSA (2012a). Deliverable 5.1 Web-based toolset and prototype communication portals for trade between LA-EU in selected enterprises, November 30, 2012

- SALSA (2012b). Deliverable 5.2 ONLINE TRAINING TOOLSET, November 30, 2012

- SALSA (2013). Deliverable 5.3.Implemented cluster networks with web-based toolset and communication portals, October 31, 2013


- TRUEFOOD (2010). “Guideline on effective knowledge and technology transfer activities to SMEs in the food sector with particular focus on traditional food manufacturers”. TRUEFOOD - "Traditional United Europe Food" is an Integrated Project financed by the European Commission under the 6th Framework Programme for RTD. Contract n. FOOD-CT-2006-016264. 2010 February.
6. Annexes

Annex 1. Research Summary Sheets

RSS WP2

SALSA

Knowledge-based Sustainable y-Alive-added food chains: innovative tools for monitoring ethical, environmental and Socio-economic impActs and implementing EU-Latin America shared strategies

SALSA is financed by the EC under the FP 7 (KBBE-2010-2.5-01).
Project reference: 265027.
Project Coordinator: Prof. Cesare Zanasi – Bologna University – UNIBO (Italy).
Starting date and ending date of the project: May 1st, 2011 - May 1st, 2014.
More information:
Dr. Cesare Zanasi Università di Bologna – UNIBO (Italy);
Tel: +39 0512330041 Email: cesare.zanasi@unibo.it.
Dr. Salvador Garibay Research institute for organic agriculture – INIA (Switzerland);
Tel: +41 02 862 7282 Email: salvador.garibay@fbl.org.

Context and problematic

Beef and Soy products in the EU are mostly imported from Latin America and their production chain has high impacts on social, environmental and economic sustainability.

The overall objectives of the SALSA project are to contribute to efforts in Latin American countries to tackle eco-challenges (deforestation, CO2 emission, biodiversity loss water-air-soil pollution, reduction in food security) that are related to farms, production, and food chain relationships between Latin America and the EU and to enhance the food chains’ added value, sustainability and competitiveness.

One work package of the project (WP2) is intended to assess opportunities for SMEs to increase their chances of entering local and global markets by complying with sustainable standards and regulations. To achieve this, the knowledge of the normative framework related to the sustainable development of soy and cattle/beef trades between Latin America and the EU has to be improved. Furthermore, the perceptions and preferences of non-business stakeholders and consumers, including civil society organisations, of soy and cattle/beef food chains between the EU and Latin America have to be assessed if sustainable improvements to the food supply chains and future trade activities are to be proposed.
Results and Applications

The SALSA Normative Data Base was developed to enhance the interested stakeholders’ knowledge of the supply chain for soy and beef between Latin America and Europe. The intention of the SALSA Normative Data Base is to systematise and select standards and trade regulations according to their specific sustainability performance and to provide additional information in the form of short descriptions and links. Therefore, the database consists not only of soy and beef specific regulations and standards, but also includes regulations and standards in which social, environmental, economic, food quality, food safety, food traceability, and/or animal welfare issues are integrated. More than 600 international private standards and regulations from Europe, Argentina, Mexico and Brazil are included.

The opinions of 48 non-business stakeholders from Latin America (LA) countries and the EU on sustainability aspects of the soy and beef supply chains from Latin America to the EU were identified by means of an online survey. Within this survey, stakeholders were asked to rank different environmental, economic and social impacts and the priority with which they should be addressed under consideration of sustainable development. In the case of the LA stakeholders, the problem of Land Use Change (LUC), from natural to agricultural land, was identified as the most important aspect that needs to be addressed. Other environmental aspects were ranked in the second position, i.e. water footprint and soil quality. The economic dimension, i.e. value added in the local chain and community was considered to be a third priority. In the case of the EU stakeholders, five indicators were equally ranked as first priority; three of which belonged to the environmental dimension (amount of energy used, soil quality and LUC within agriculture) while the remaining two were part of the economic dimension (value added in the local chain and community and the impact on farm income). The impact on biodiversity was considered as a second priority whereas the impact on labour rights was ranked as a third priority and is the only social impact that is considered to be among the three most important issues. Overall, the results reflect a more holistic conception of sustainability by the EU stakeholders as opposed to those from LA.

According to the non-business stakeholders in LA countries and the EU, one of the most important barriers to the implementation of sustainability initiatives was the inefficient and insufficient regulatory framework. Furthermore, the dominating economic and particular interests of governments and big corporations, including the big providers of genetically modified (GM)-seeds, result in strategies that are not based on the population needs, and have negative environmental and social costs. Finally, the positive potential of sustainable labels seems to be limited by the wide array of labels in the market which confuses consumers. Policy makers have, according to the non-business stakeholders in LA and EU, the highest capacity for removing many of the barriers.

This survey provided interesting aspects for a consumer survey that was conducted in LA countries and the EU, which is currently being analyzed.

Novelties, benefits and added value

The SALSA Normative Data Base gives an overview of different sustainability requirements and the opportunity to choose standards according to their potential to improve the competitiveness of different sustainability performances. It is the first collection of sustainability standards and regulations that is focussed on the soy and beef supply chain between LA and the EU countries. The Data Base, along with further interesting information, is available at the SALSA E-platform www.salsaplatform.eu.

Until now, literature has mainly provided insights into the experiences and perceptions of business stakeholders on sustainability aspects. Within this project, the experiences and perceptions of non-business stakeholders and also those of consumers on sustainability aspects were analysed. Through this linkage, a comprehensive view on improvements for the sustainable development of the soy and beef supply chains is possible.
RSS 3.1

Call identifier: FP7-KBBE-2010-4

Deliverable 3.1: Improved LCA Framework for Performance Assessment of LA-EU Food Chains

Starting date and ending date of the project: October 2011, July 2012

Project coordinator: Prof. Cesare Zanasi - Alma Mater Studiorum Università di Bologna – UNIBO (Italy) Tel. +39 0522 290411; Email: cesare.zanasi@unibo.it

Contacts: Prof. Patrick Van Damme and Prof. Xavier Geilich Ray Jacobsen (ray.jacobsen@ugent.be) and Toon Driesen (toon.driesen@ugent.be), Ghent University

1. Context and problematic

A simultaneous quantitative assessment of triple bottom-line impacts on food chains in general and on soy and beef chains in particular, is currently lacking. The aim of this study is to contribute to an improved analytical tool suitable for integrating environmental, socio-economic and governance impacts in one consistent model to evaluate the sustainability of Latin-American-EU soy and beef chains.

The analytical tool, an extended LCA framework, can be used to evaluate the sustainability of food chains, including the assessment of both quantitative and qualitative aspects of the chain.

2. Results and Applications

Through literature review and interviews with relevant stakeholders and experts in the soy and beef supply chains, we defined sustainability indicators to evaluate the social, economic, environmental and governance impacts of the soy and beef supply chains. The resulting framework integrates all actors and processes of the supply chain and consists of quantitative ‘core’ indicators extended with qualitative indicators identified and selected through semi-structured interviews and surveys with stakeholders in the chain (including business stakeholders, non-business stakeholders and consumers), thereby increasing the relevance of the framework to the needs and preferences of all stakeholders involved.

The framework consists of a set of quantitative ‘core’ indicators for a transparent and objective evaluation and comparison of food chains, extended with a set of qualitative indicators, allowing for a qualitative comparison and evaluation of food chains beyond what’s quantifiable.
3. Novelties, benefits and added value

The novelty of the framework is that it offers a tool to simultaneously assess the triple-bottom line impacts of food chains. Through the set of qualitative indicators, it gives the opportunity to go beyond a quantitative assessment by adding expert opinions to broaden the comprehensiveness of the framework.

The benefits will be a better and more comprehensive understanding of the environmental, socio-economic and governance impacts of food chains. The analytical tool can help stakeholders and policy makers in identifying bottlenecks in food chains and inform actions to improve the overall sustainability of the chain.

4. Successful applications, success stories

In WP3 we will use the analytical framework to evaluate the performance of representative soy and beef chains, in which Latin American products are exported to EU.

SALSA project (GA n.: 265927) is funded by the European Commission under the theme FP7 KBBE (Knowledge-Based Bio-Economy), topic KBBE.2010.2.5-02 ‘Eco-challenges in the food chain of the Latin American region – SICA (Latin America)’
Deliverable 3.1: Integrated performance assessment of Latin American-EU food chains and improvement needs

Extended LCA

Starting date and ending date of the project: October 2011, July 2012

Project coordinator: Prof. Cesare Zanini - Alma Mater Studiorum Università di Bologna – UNIBO (Italy) Tel: +39 0522 292411; Email: cesare.zanini@unibo.it

Contacts: Xavier Gellyick (Gent), Alfonso Oude Lansink (WU)

Context and problem statement
In recent years, concerns about the sustainability of soy and beef supply chains have been growing. The Latin American-EU trade in soy, mainly for the EU feed and the biofuels industries, has raised questions, especially in the EU, about its social and ecological impacts. Criticisms also involve the beef production and trade for, among others, its impact on global climate change and deforestation in Latin America. On the other hand, the agribusiness, including the soy and beef sectors, is contributing to strong economic growth in a number of emerging Latin American economies (Argentina and Brazil). An evaluation of a complex concept such as sustainability therefore requires a critical evaluation of a number of social, economic, environmental and governance impacts, which is in turn a precondition for sustainability initiatives claiming legitimacy, authority and neutrality. The objective of this project is (i) to quantitatively and qualitatively assess key performance indicators along beef and soy supply chains, and (ii) to identify improvement needs for the various chains involved.

Approach
Various analytical approaches have been used. At first, the design of an improved LCA framework integrating social, economic, environmental, as well as institutional aspects and its application to selected case studies in the Latin America-EU soy and beef chains. The choice of case studies, selected on the basis of their orientation towards sustainable productions, also considered the necessity to a) compare conventional and sustainability standards related production systems; b) compare smallholders and larger farming systems; and c) consider farming, processing and transport typologies either related to widespread conventional or sustainable standards related systems with potential for growth. This approach was chosen to improve the information content and relevance of the results obtained, i.e. to better orient the local chain agents’ and the other related stakeholders’ strategies for improving the chain sustainability and access to the global market for sustainable soy and beef. To this end an assessment of the business stakeholder’s awareness and preferences on sustainability was also
performed to match the results obtained in the quantitative case study assessment with the stakeholders' goals. This leads to the last issue considered in the present study: the definition of an integrated sustainability performance assessment considering the different economic, environmental, social as well as institutional dimensions of sustainability. An MCA (multi-criteria assessment) was used to integrate different groups of stakeholders’ preferences and perceived sustainability performance, also supporting the definition of a set of sustainability improvement needs.

The quantitative assessment focuses on Brazil as a main exporter of beef and soy to Europe. With regard to soy, the mainstream genetically modified (GM) chain was selected as well as a non-genetically modified (non-GM) and organic production system. The latter two are examples of niche chains with a strong growth potential. The sustainability indicators assessed in the quantitative LCA for soy include global warming, land use change, land use, water deprivation, fossil energy consumption, operating profit, price volatility, employability and working conditions per ton of soybean meal. With regard to the beef chain, a specialized beef production system was selected as well as an organic and a mixed crop-beef production system. The indicators assessed through a quantitative LCA analysis are global warming, land use, water deprivation, fossil energy consumption, operating profit, price volatility, food safety, food quality and animal welfare. Data have been gathered partly directly and partly based on secondary sources. Methods of analysis include LCA, volatility assessment and Likert-scale scoring. The qualitative assessment covers more LA areas and production systems, considering the soy also tillage versus non-tillage systems and including Argentina. For beef, qualitative assessments include intensive (flooded) versus extensive systems and also refer to Mexico. Qualitative data were gathered through semi-structured and open interviews with experts from science, business, NGOs and governments and through web-based surveys.

Improvement needs follow from the quantitative and qualitative LCAs. Furthermore, a multi-criteria assessment (MCA) was performed in order to identify the priorities among the improvement needs. The latter focused on Brazil, where both the quantitative and qualitative LCA assessment was performed. As far as the integrated sustainability performance analysis is concerned the results from the MCA integrate the results obtained by the quantitative and qualitative LCA analyses. As far as Mexico and Argentina are concerned the qualitative sustainability assessment provided a context analysis which will be integrated in the further steps of SALSA where other production systems related to beef and soy chains will be analyzed in those countries.

Results

With regard to the quantitative assessments of soy in the selected chains, results showed for all the chains and most of the indicators analyzed the relevance of the farming stage contribution to the soy cultivation sustainability. Domestic logistics and the processing stage are the second contributors to the overall chains sustainability. Soybean transport overseas, from Latin America to EU ports, confirms its relatively minor role. When comparing the different sustainability indicators for the selected chains, the impact on environmental performance in terms of farm greenhouse gases (excluding land use change and land use), water consumption and energy consumption per ton of soybean meal are relatively lower in the organic system than in the conventional system. However, emission of greenhouse gases related to land use change and the amount of land use for the production of one ton soybean meal are higher for the organic than for the GM and non-GM systems. This is mainly due to a lower yield per hectare of organic soy. The economic performance is better for the organic than for the conventional soy due to, among others, higher market prices for organic soy products. With regard to the volatility assessment, lack of data only enabled an assessment for...
GM soy (which hampers a comparison across systems). Regarding the social issue of employability based on FTE, organic farms are more labour intensive than the other systems. With respect to working conditions, the three systems had a similar performance. Contrasting results in terms of sustainability indicators and the difficulty in managing and certifying organic farms represent a major constraint to organic soy development. No significant differences resulted when comparing the selected small farm system to the larger one.

With regard to beef, results show that the highest environmental impacts occur at the farm for the conventional and organic beef production systems. Differences in environmental performance for specialised and mixed crop beef systems are highly dependent on farming practices and management decisions. The length of the fattening period before pregnancy and before slaughtering is an important factor influencing the differences in environmental performance between systems. The organic system is slightly more profitable than the other systems. Whereas organic beef production requires less energy and water, it produces more GHG than conventional beef production systems. Animal welfare across slightly higher in organic beef production systems than in other systems. Concerning food safety and food quality, it needs to be recognised that organic systems in general use less veterinary drugs, which may reduce food safety and food quality (but also reduces the risk of residues). Organic cattle farming often needs specialist knowledge and special management strategies to cope with animal disease without using e.g. preventive antibiotics. Regarding the mixed crop-beef farm, the combination can greatly improve the productivity of a system by improving the productive potential and producing higher quality feed. Since crop residues provide better feed quality than grasses, cattle grows faster and the lifespan of slaughterhouses decreases considerably.

Findings from the qualitative assessment illustrated various issues and bottlenecks along the chain. For soy, main issues seem to refer to the need to improve waste management (e.g. with respect to empty containers of agrochemicals), improve the in-till system by adopting crop rotation and integrated pest management, develop more local value-added systems, improve the access to capital especially for smallholders, improve infrastructure, enhance product certification (but pay attention to increasing costs of segregation), and solve conflicts over land use. With regard to beef, main issues include a need to improve compliance and efficiency of monitoring small-scale farms performance, waste management in slaughterhouses, and information sharing among stakeholders. Results also indicate that the growing dominance of the Asian market for soy seems to reduce the demand for sustainability, which is strong in Europe, in favor of more traditional aspects of quality. European business stakeholders experience decreasing deliberative power to make strong sustainability demands, while being confronted with critical civil society groups, criticizing the mainstream soy complex for a wide variety of reasons.

Further interesting results come from the joint interpretation of the quantitative and qualitative ICA sustainability assessment. The main aspects influencing food chain sustainability, its assessment and the implementation strategies were:

- The opportunity for SMEs and small farmers to be certified for sustainability standards (e.g. organic beef or soy) to improve their competitiveness through a product differentiation strategy.

- The possible constraints for a sustainability strategy implementation through standards adoption:
  - Importance of scale economies for the SMEs and smallholder access to sustainability.
Task 6.3 – Report on developing tools for knowledge transfer and exchange

- consequent influence of sustainability implementation on the food chain governance in terms of necessity to increase horizontal as well as vertical coordination along the soy and beef chains;
- high transaction costs for the farmers and other chain agents related to sustainability standards and legal regulations' compliance, monitoring and enforcement (costs of monitoring and enforcement apply also to the different government agencies in charge of sustainability policies' implementation).
- The trade-offs between sustainability indicators influencing the comparison among production systems.

Assessing the overall sustainability performances and comparing them within and between the selected chains proved somewhat difficult. This difficulty was not fully overcome by the integrated sustainability performance assessment of the different production systems provided by the MCA. The relatively small number of experts and stakeholders involved, the unbalanced spatial distribution, and the difficulty to fully represent the different potential interests at stake, affected the possibility to provide a highly representative set of relative importance weights and performance scores. Bearing these limitations in mind the overall integrated sustainability scores showed a relatively better performance of organic soy and beef compared to the conventional systems. Non-GM soy resulted slightly less sustainable than GM soy. When analyzing the weighted sustainability performance of the subset of the different stakeholders no significant differences emerged. The environmental indicator weights, in particular global warming, showed, apart from few exceptions, lower values than social, economic and institutional aspects. These findings confirmed the difficulty for sustainability to be effectively and objectively measured, given its intrinsic complex nature. The approach adopted in SALSA is to be as transparent as possible in communicating this complexity.

<table>
<thead>
<tr>
<th>INTEGRATED SUSTAINABILITY PERFORMANCE</th>
<th>SOY CHAINS¹</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GM</td>
<td>Organic</td>
<td>Non-GM</td>
</tr>
<tr>
<td>Total weighted - LA</td>
<td>4.2</td>
<td>4.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Total weighted - EU</td>
<td>4.0</td>
<td>4.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Total weighted - Business</td>
<td>4.0</td>
<td>4.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Total weighted - NGO</td>
<td>4.0</td>
<td>4.2</td>
<td>4.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTEGRATED SUSTAINABILITY PERFORMANCE</th>
<th>BEEF CHAINS²</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional</td>
<td>Organic</td>
</tr>
<tr>
<td>Total weighted - LA</td>
<td>4.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Total weighted - EU</td>
<td>4.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Total weighted - Business</td>
<td>4.5</td>
<td>4.6</td>
</tr>
<tr>
<td>Total weighted - NGO</td>
<td>4.5</td>
<td>4.5</td>
</tr>
</tbody>
</table>

¹Measured on a scale from 1 (much worse) to 7 (much better) with "4" representing the benchmark, i.e., a conventional beef chain in Brazil.
Improvement needs were identified in three steps: (i) by summarizing quantitative LCA outcomes of core indicators and comparing them across chains, as well as with literature; (ii) by summarizing qualitative LCA outcomes of extra indicators with respect to environmental, economic, social and institutional issues; and (iii) by prioritizing improvement needs for a subset of core and extra indicators through the MCA. Key findings are listed in the table below, illustrating the complementarity of the various analytical methods applied. The table shows that, overall, priorities for soy chains are in the field of biodiversity, human health and safety and barriers to entry into the chain. For beef, these are in the areas of food safety, food quality, degree of chain coordination and, also, barriers to entry into the chain. Nevertheless, findings also show that careful consideration is needed with respect to the other environmental, economic, social and institutional issues. Such a list of improvement needs is expected to enhance decision making on sustainability issues both in Latin America and the EU. Also, findings can be linked with results from WP2 to identify standards, which possibly already address (part of) the improvement needs. Furthermore, the results obtained will provide a basis for WP4 to identify concrete improvement options and scenarios, and estimate the impact on sustainability. Considering the unavoidable complexity of the results obtained, the next steps of the SALSA project will be aimed at directing towards providing different stakeholders in the beef and soy chains and the general public, a clear communication of the WP3 results. The aim is providing simple, manageable and non-eradicating communication. Fundamental support will be provided by the Industrial Platform and other stakeholders’ feedback.

### Summary of improvement needs from different analytical approaches

<table>
<thead>
<tr>
<th>Improvement Needs Assessment</th>
<th>Quantitative LCA</th>
<th>Qualitative LCA</th>
<th>Prioritized Improvement Needs from Multi-criteria Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total consumption across all chains</td>
<td>Benchmark against literature (only environmental indicators)</td>
<td>Stakeholder preferences, such as divergent views and aspects</td>
</tr>
<tr>
<td>Soy</td>
<td>Water consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-GM</td>
<td>Nitrogen leaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>Land use</td>
<td>Organic worse than non-GM</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ICY</th>
<th>Indicators potentially involving improvements</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>Common to all systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-GM</td>
<td>Nitrogen leaching more into chain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>Organic worse than non-GM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The novelty of this project includes the integration of multiple environmental, economic, social and institutional issues into one framework leading to an integrated assessment of sustainability along food supply chains.

SALSA project (GA 261927) is funded by the European Commission under the theme FP7 KBBE (Knowledge-Based Bio-Economy), topic KBBE 2010 2.1.02 “Eco-challenges in the food chain of the Latin American region – SICA (Latin America)”
Deliverable 4.1:

Literature review on chain governance, quality management, traceability and logistics management to improve sustainability in supply chains

Starting date and ending date of the project: October 2011, July 2012

Project coordinator: Prof. Cesare Zanesi - Alma Mater Studiorum Università di Bologna – UNIBO (Italy) Tel: +39 0522 290411; Email: cesare.zanesi@unibo.it

Contacts: Jacqueline Bloemhof, Mehmet Soyasal (WU)
Wageningen University
PO Box 8130
6700 EB Wageningen
Phone: +31 (0) 317 45 4726
Email: jacqueline.bloemhof@wur.nl
http://www.id.wur.nl/

Context and problem statement

Eco-challenges are related to improvements in all kind of aspects of the supply chain. If these are a need for certification schemes, it might imply a need to develop better traceability systems, if footprints have to be reduced it might imply logistic networks redesign or use of more advanced production methods, if waste is to be reduced it might imply improving handling procedures or cold chain management practices. This document reviews the literature with respect to sustainability improvements in the supply chain focusing on four topics: a literature review on chain governance issues (UNIBO), a literature review on quality management (CBEU), including brand based controls and certification schemes, a literature review on logistics management (WU), for example, network design, inventory management or transportation issues where policies and means can be changed, and a literature review on traceability (proQ). The literature review guide the reader into which modeling approaches or concepts have been researched in the four different fields in order to assess and improve sustainability in supply chains. This knowledge can help to develop tools and methods to support decision makers in their improvement strategies.

Approach
The aim of the Logistics Review is to identify key logistical issues, analyze currently available quantitative methods and point out quantitative modeling challenges in sustainable food logistics management. We conduct a literature review on quantitative studies concerning food logistics management and also review qualitative studies to broaden the discussion and to understand logistical trends from practice more clearly.

The traceability review introduces the topic of traceability through a discussion of the specifics of the food sector, a list of tracking and tracing technologies and the introduction of a tracking and tracing process model, leading to suggesting a decision model with its complexities and empirical relevance.

The governance literature review aims to define an extended theoretical framework integrating different approaches to the study of the relation between governance structure and collaboration along the food chain.

The aim of the quality management related to sustainability in the EU -review is to identify key quality management issues related to sustainable challenges.

Results

Logistics review:
Research on sustainable food logistics management has been developing according to the needs of the food industry. The arguable point is about its adequacy of aiding decision making process and capturing food supply chain (FSC) dynamics. It is important to highlight that currently the food logistics management literature is insufficient to respond to those practical needs. Result of the literature review shows that to obtain sustainability while considering intrinsic characteristics of FSCs, new and advanced models are required for sustainable food logistics management:
- 36 papers have been screened on characteristics of tools, key performance indicators and logistical scope issues.
- Current food logistics management literature is insufficient to respond to practical needs.
- Better logistics models can improve food safety, availability of food and sustainable and efficient networks which are the current issues facing stakeholders in food supply chains.

Traceability review:
- Tracking and tracing can only be effective if it is implemented as a sector encompassing systems approach.
- Emerging technologies in networked devices and functionalities of future internet can open the way for concepts and system implementations that lower implementation barriers and open opportunities for large scale acceptance in the sector.
- Sustainability signals such as food miles and carbon footprint all depend on the availability of batch based tracking and tracking schemes inside enterprises but also throughout the food supply chains.

Governance review:
- Two prevailing theories have been reviewed: transaction cost economics and the resource based view.
• A third perspective focusing on collaboration is considered as a hybrid combination of the mentioned theories.
• Through these models, the partners can define an empirical model describing the influence of food chain governance on collaboration in soy and beef food chains and perform impact analysis on sustainability mitigation measures on the food chain governance and level of collaboration.

Quality review:
Research on quality management related to sustainability issues support the needs of the food industry. The use of the quality management principles can significantly contribute to the successful and systematic application of the sustainability aspects and requirements in the activities along the entire food supply chain. The quality management principles provide the framework for planning, implementation, monitoring and evaluation and systematic improvement of the sustainability management systems.

Results of the literature review show that to achieve sustainable supply chains quality aspects have to be considered, hence there is a need for quality management systems within the supply chains to give attention to challenges of sustainable development.

• There is a need for quality management systems within the supply chains to tackle the challenges related to the enhancement of sustainable development.
• Quality management helps businesses along the supply chains to identify the critical points where environmental, social, economic and governance impacts can be reduced.
• The continuous improvement which is a key issue in sustainability can be achieved by the use of PDCA cycles in Quality Management.

Novelties, benefits and added value
This study has the potential to provide perspectives on future efforts of sustainable food logistics system modelling. Better logistic models can improve food safety, availability of food, and sustainable and efficient networks. So far, no literature review covered the contributions considering the development from Traditional Supply Chain Management towards Sustainable supply chain management.

Also, an integrated analysis of the different factors influencing food chain collaboration has not been developed yet. Existing perspectives need to be integrated to assess e.g. the governance structure of the supply chain. Future research will empirically verify this approach.

This study has a potential to provide perspectives on future efforts and practical inputs on the establishment of sustainable quality management systems such as “HACCP system by interpreting hazards as “environmental hazards” and “sustainability hazards factors””, “identifying cause-effect relationships for those environmental issues”, “preparing an inventory and assessment of the inputs and outputs of the processes” and “Life Cycle Assessment” (Foster, 2010) considering the status of the sustainability of activities of the businesses. Up to now, there is no publicly available review on the aspects of regulation, sustainability standards, practical applications, sustainability management etc. Better quality management systems will lead to improvement of food safety and quality, food security, sustainable production, processes and eco-efficiency.

SALSA project (GA no. 265927) is funded by the European Commission under the theme FP7 R & D & I Knowledge-Based Eo Economy, topic R & D & I 2010.2.5-02 “Eco-challenges in the food chain of the Latin American region – SICA (Latin America)”
Deliverable 4.2: Report on Improvement Scenarios

Starting date and ending date of the Task 4.2 and Task 4.3: August 2012-October 2013

Project coordinator: Prof. Cesare Zanasi - Alma Mater Studiorum Universita di Bologna – UNIBO (Italy) Tel: +39 0522 280411; Email: cesare.zanasi@unibo.it

WP4.2 Coordinator: Dr. Jacqueline Bloemhnoit-Wageningen University, The Netherlands; Email: jacqueline.bloemhnoit@wur.nl

Context and problem statement

This report deals with the question how to make soy and beef chains more sustainable. We propose a framework for Sustainable Supply Chain Management together with a step-wise approach to apply this framework for real-life cases. Following from previous SALSAs Deliverables Del4.1 and Del4.1, this document describes the food chain sustainability improvement options aimed at improving the value of selected performance indicators for different scenarios for soy and beef chains. The objective of this deliverable is i) to provide a methodology to come to improvement scenarios and options for the various soy and beef chains involved, ii) to list the most promising actions to improve the performance of particular performance indicators, and iii) to calculate the impact of these actions on the performance of all performance indicators to evaluate a scenario as a whole. This methodology is a general methodology that needs specifications for different users in different contexts to be applied; the cases analyzed in the present deliverable show relevant examples of how the SALSAs protocol for sustainability improvement works. The results obtained are mostly oriented at showing the different stakeholders how to use the methodology and allow for the possibility to adapt to their specific context.

Approach

To help decision-makers select among various sustainability improvement steps, a comprehensive assessment regarding the performance is needed. Figure 1 presents an overview of our sustainability performance framework for food chain logistics; a framework that can be used to redesign the supply chain resulting in improved overall performance.

For the SALSAs soy and beef chains. Steps 1 to 4 are based on the information from Deliverable 3.2 and are operationalized in the WP3 tool. Steps 5 and 6 are described in this deliverable.
Results

The improvement options for soy and beef chains are related to four focus areas in the supply chain, which are:

i) Technological area (farm/ slaughterhouse/ crushing plants),
ii) Logistics area (transportation, storage, allocation, slaughterhouses),
iii) Food quality/safety,
iv) Institutional – supply chain governance.

The Life Cycle Inventory tool on the SALSA platform is used to calculate the impact of farm related actions on the chosen sustainability impacts. An optimization model is used to calculate the impact of modality shifts, better infrastructure, fuel use, fleet age, port improvements and network improvements on global warming and profits. Governance improvement options have been assessed using literature review, expert panels, structured interviews, exploratory factor analysis, confirmatory factor analysis and statistics. The effect of quality improvement actions has been defined by professional auditors with industry practice. Figure 2 shows the assessing and monitoring tool and Table 1 shows the improvement impacts tool.

Novelties, benefits and added value

The innovative aspect of this deliverable is the introduction of an impact assessment on sustainability involving different stages of the beef and soy chain both at the single agents’ and at the whole chain’s level. Furthermore the impacts of the improvement options on different key performance indicators (KPIs) not only include parameters related to the technical/ dimension of the production processes (farm, processing, transport) but also to the logistics, product quality and chain institutional improvements’ impact on their sustainability.

SALSA project (GA no. 265927) is funded by the European Commission under the theme FP7 KBBE (Knowledge-Based Bio-Economy), topic KBBE.2010.2.5-02 “Eco-challenges in the food chains of the Latin American region – SICA (Latin America)”

![Figure 1: Sustainability assessment framework](image-url)
### Assess Current Sustainability of the supply chain

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Weight</th>
<th>Source</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global warming</td>
<td></td>
<td></td>
<td>0.40</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>Energy efficiency</td>
<td></td>
<td></td>
<td>0.50</td>
<td>0.55</td>
<td>0.60</td>
</tr>
<tr>
<td>Water consumption</td>
<td></td>
<td></td>
<td>0.45</td>
<td>0.50</td>
<td>0.55</td>
</tr>
<tr>
<td>Waste</td>
<td></td>
<td></td>
<td>0.40</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>Emissions</td>
<td></td>
<td></td>
<td>0.35</td>
<td>0.40</td>
<td>0.45</td>
</tr>
<tr>
<td>Pollution</td>
<td></td>
<td></td>
<td>0.30</td>
<td>0.35</td>
<td>0.40</td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td></td>
<td>0.25</td>
<td>0.30</td>
<td>0.35</td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td></td>
<td>0.20</td>
<td>0.25</td>
<td>0.30</td>
</tr>
<tr>
<td>Governance</td>
<td></td>
<td></td>
<td>0.15</td>
<td>0.20</td>
<td>0.25</td>
</tr>
</tbody>
</table>

### Figure 2: Assessment and monitoring tool

**Table 1: Impact of improvement actions on sustainability indicators**

<table>
<thead>
<tr>
<th>Improvement Action</th>
<th>Long-term</th>
<th>Medium-term</th>
<th>Short-term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved processes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New investments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New policies</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**SALSA**

SEVENTH FRAMEWORK PROGRAMME

European Commission
Task 6.3 – Report on developing tools for knowledge transfer and exchange

RSS WP5

Knowledge-based Sustainable A+lue-added food chains: innovative tools for monitoring ethical, environmental and Socio-economic impActs and implementing EU-Latin America shared strategies

Call identifier: FP7-KBBE-2011-4

WP5

Development of a web-based platform supporting the creation of sustainable value added food chains

Starting date and ending date of the project: October 2011, July 2012

Project coordinator: Prof. Cesare Zanasi - Alma Mater Studiorum Università di Bologna – UNIBO (Italy) Tel: +39 0522 290411; Email: cesare.zanasi@unibo.it

Contacts: Prof. Gerhard Schiefer, Emanuele Novelli (proQ2) proQUANTIS Ltd. & Co. KG Postadresse Nippenstr. 10, 53125 Bonn Email: schiefer@uni-bonn.de; novelli@uni-bonn.de

The first activities of WP5 were directed towards the establishment of relations with all project partners in order to elicit the internal and external projects’ needs necessary to deliver a new system for the support of sustainable activities of SMEs in LA for beef and soy chains. This step involved a continuous exchange of communications (emails, phone calls, video conferences) with every WP member. The outcome of this process corresponds to the development of a first prototype of an electronic platform. The later, in its first stages had the following characteristics:

1. On the cloud system accessible through an internet connection
2. Secure access to the online system’s services by means of personalized users credentials
3. Presence of a document management system in which both project partners and external users could store and manage sensitive documentation in form of links, pictures or files from an office software suite

In a second phase the several members of WP5 provided inputs on the folder structure of the document management system in order to support its future use under the several Latin-America scenarios. Moreover, the electronic platform is developed in a multi-language system allowing content access in the two most spoken languages of Latin-America: Spanish and Portuguese. In addition to the document management system, it is provided the access to several databases as knowledge bases for the support of quality and sustainability compliance of SMEs:

1. Database of regulations on beef and soy derivatives in Argentina, Brazil, Mexico and Europe
2. External database of the major quality system certification schemes utilized in the European and global food sector, including GlobalGAP, IFS, BRC, SQF etc. At the same time a supplementary web link is added to the main web page of the electronic platform. The web link leads to a new web area named “Public access”. The latter has the specific objective to make future users more easily acquainted with the projects’ outputs and therefore support information exchange on sustainable production methods and related certification schemes.

Parallel to the upload of documentation and inputs of project partners in the several folders of the document management system there is the drafting up of the first manual of the electronic platform. Among the inputs of partners supporting the establishment of an on-line training tool set there are webinars provided by work package 6 members explaining real cases of applied measures for sustainability of the food sector.

After the collection of a critical mass of project partners’ inputs, the translation process started. Procedures in order to ensure the quality of the translated material are in place and the overall translation process is monitored and constant for the whole project duration.

The “Public access area” of the electronic platform is partly restructured, mirroring the needs of producers accessing and using it. Therefore four main functions are identified:

1. Documentation research in a repository of selected literature for producers and chain actors.
2. Analysis of beef and soy supply chains for specific impact categories.
3. Monitoring and auditing to provide recommendations on adequate production practices and support their implementation.
4. Communication of achieved sustainability performances and adequate production practices.

Every function is related to a set of operations that a user can perform to strengthen its sustainable processes. The user profile (e.g. project partner or enterprise or researcher) defines the degree of access to above mentioned functions and operations.

The analysis function is enriched by the life-cycle integrated assessment module, the latter allows in few steps to discover potential hot spots in soy and beef production processes.

Additionally, several recommendations are uploaded in the form of a checklist, giving to users the possibility of self-assessment and improvement. Many checklists refer to sustainable standards schemes and therefore prepare a fertile ground for the market recognition of producers’ efforts towards sustainability.

In order to refine the operational efficacy of the electronic platform and meanwhile disclose it to future potential users, clusters of enterprises are constituted. In every cluster it is identified a manager as facilitator for the knowledge transfer on the electronic platform. Users, clusters managers received a training elucidating the working of the e-platform and its usage potential in the Latin America scenario. One outcome of the process is that all operations of the electronic platform are currently under review due to the proactive feedback of many stakeholders taking part to the trainings.
Task 6.3 – Report on developing tools for knowledge transfer and exchange

RSS WP6

SALSA

WP6:
“SME-oriented training and exploitation”

Knowledge-based Sustainable Value-added food chains: innovative tools for monitoring ethical, environmental and Socio-economic impacts and implementing EULatin America shared strategies

SALSA is financed by the EC under the FP 7 (KBBE-2010.25-02, Project reference: 206927)
Project Coordinator: Prof. Cesare Zanasi – Bologna University – UNIBO (Italy)
Starting date and ending date of the project: May the 1st 2011 - May the 1st 2014

The overall objective of the WP6
To support exploitation of the SALSA results for the business partners through education and knowledge exchange.

Specific objectives of the WP6
To provide education and training for mediators and SMEs for developing local capabilities on implementation of sustainable food chain approach,
To encourage knowledge transfer and exchange
To improve the feasibility of adoption of the tools developed within the project

Expected results of WP6
- Setting up of an Industrial Platform
- Development of training materials
- Staff secondments
- Training courses
- Guideline on the use on integrated model based on the lifecycle approach covering the entire food chain
Potential for stakeholders involvement:

- Participation in the Industry Platform
- Participation in testing of the integrated tools developed in the project on the selected soy bean and cattle/beef chain.
- Participation at training courses
  - Target audience will be:
    - EU and Latin America partners
    - Local mediators for the SMEs, small farmers and policy makers

Results of WP6

- Awareness raising workshops were held in Latin-America (Brazil, Argentina, Mexico)
- National Workshops in Latin-America and EU
- Setting up the Industry Platform (in Hungary has already started)
- Industry Platform Recommendations were made
- Information materials were collected related to soy and cattle/beef supply chains, EU regulations, legislation, requirements related to beef industry, etc.

More information:
Prof. Cesare Zarasi - The Alma Mater Studiorum Università di Bologna - UNBO (Italy)
Tel +39 0522 290411; Email ccesare.zarasi@unibo.it

Dr. András Sebők - Campden BRI Magyarország Nonprofit Kft. (Hungary)
Tel +36 1 433 1470; Fax +36 1 433 1480; Email a.sebok@campdenhlt.com
Annex 2: 1st Newsletter

Industry Platform Newsletter

5th November 2012

SALSA PROJECTS’ UPDATES AND FIRST RESULTS

• SALSA E-Platform
  The SALSA E-Platform is ready. The Platform structure is available in English, Spanish and Portuguese. As an Industry Platform member you can access the reserved area. Your username and password will be sent separately via e-mail.
  Inside the SALSA E-Platform you’ll find
  - The Legal Regulations database for beef and soy in EU and Latin America
  - The Private Standards section containing:
    - Fact sheet related to the main standards characteristics
    - The Qualit platform: analyze requirements of agri-food quality systems to support enterprises in planning the implementation of new quality systems
    - NEXT addition: Results of the beef and soy stakeholders surveys on their preferences and awareness on sustainability.

Your feedback on the Platform contents and accessibility are welcomed; they will help us improving the E-Platform quality and make it more user-friendly.

• SALSA public Web site
  The SALSA web site www.salsaproject.eu has been updated with:
  – main events (Seminars, conferences etc.) related to sustainability in the agro-food system
  – news on SALSA participation to conferences and other events
  – news on events organized by SALSA project

• Progresses in the SALSA project
  - Defined the list of indicators for the LCA analysis
  - Started data collection in Latin America and EU
  - Results dissemination:
    - participation to the LCA food 2012 conference in S. Malo
    - organisation of the SALSA results presentation conference in Budapest on November the 28th
Annex 3: 2nd Newsletter

SALSA PROJECTS’ UPDATES AND RESULTS

• **SALSA E-Platform**
  By the end of May the [SALSA E-Platform](http://www.salsa-project.eu) updated version will be available for the IP members.

  *Your feedbacks on the E-Platform contents and accessibility will be welcomed; they will help us improving the E-Platform quality and make it more user-friendly.*

• **SALSA public Web site**
  The SALSA web site [www.salsa-project.eu](http://www.salsa-project.eu) has been updated with:
  - New references to Seminars, Conferences and Workshops related to sustainability in the agro-food system
  - News on SALSA participation to conferences and other events
  - News on events organised by SALSA project
  - Presentations and brochures on the main SALSA results in English, Portuguese and Spanish

• **Other dissemination activities:**
  - *During the International symposium on sustainability initiatives and trends in Europe and Latin America: identification and promotion of synergies*, the recent results of SALSA were presented and discussed with the main representatives of the Agro food sector stakeholders ([more news](http://www.salsa-project.eu/newsdesk))
  - A webinar promoted by SALSA, will take place on Wednesday, May 15, 2013 at 1:00 PM - 4:00 PM (Central Europe Time) in order to disseminate results and discuss sustainability in the Food chain. [Please click here to join this meeting](http://www.zoommeeting.com/sitzendetial)
  - A second webinar on Environ protocol will take place on 21st June, 2013 at 3pm(GMT+1, CET). More info will be provided as soon as possible

• **Recent results**
  - Delivered the LCA analysis and integrated sustainability assessment results to the EU commission
  - A tool for the user's sustainability performance assessment is under construction and will be soon provided to the IP members as a Beta version for testing.
Industry news

*UK retailers 'misled' about tight non-GM feed supply, say suppliers*

*Brazil and EU to co-operate on animal welfare*
  
  Brazil and the EU have signed an agreement to share knowledge and expertise on animal welfare.

*China concerned about food security*

*Two interesting web resources on sustainability*
  
  1. Guardian sustainable business
  2. 2degrees: the global community for sustainable business

New IP members the following companies (in bold) joined SALSA in the last months

<table>
<thead>
<tr>
<th>Country</th>
<th>Name</th>
<th>Website</th>
<th>E-mail</th>
<th>Main business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>AMADOR</td>
<td><a href="http://www.amador.it">www.amador.it</a></td>
<td><a href="mailto:paolo.muntesi@amador.it">paolo.muntesi@amador.it</a></td>
<td>Poultry and beef breeder and processor (integrated production system)</td>
</tr>
<tr>
<td>Italy</td>
<td>PROSOIO</td>
<td><a href="http://www.prosoio.net">www.prosoio.net</a></td>
<td><a href="mailto:geminardon@mac.com">geminardon@mac.com</a></td>
<td>Feed manufacturer</td>
</tr>
<tr>
<td>Italy</td>
<td>VALESOIA</td>
<td><a href="http://www.valesoia.it">www.valesoia.it</a></td>
<td><a href="mailto:tech@valesoia.it">tech@valesoia.it</a></td>
<td>Soy food producer</td>
</tr>
<tr>
<td>Netherlands</td>
<td>ADRIANAR</td>
<td><a href="http://www.adrianar.com">www.adrianar.com</a></td>
<td><a href="mailto:jgliszczek@adrianar.com">jgliszczek@adrianar.com</a></td>
<td>Multi-activity cooperative of farmers</td>
</tr>
<tr>
<td>Brazil</td>
<td>EBBOS Indústria e Comércio de Biodiesel S/A</td>
<td><a href="http://www.ebbos.com">http://www.ebbos.com</a></td>
<td><a href="mailto:samuel.bortolin@bbios.com">samuel.bortolin@bbios.com</a></td>
<td>Soy processor</td>
</tr>
<tr>
<td>Brazil</td>
<td>Grupo Patagen (GRUIPA)</td>
<td></td>
<td><a href="mailto:antonietti@grupopatagens.com.br">antonietti@grupopatagens.com.br</a></td>
<td>Soy processor/trader</td>
</tr>
</tbody>
</table>

ON HOLD

| Mexico | Rancho e17 | www.ranchoe17.com | ranchoe17.com | Beef producer and processor |

More companies will soon join the SALSA Industrial Platform

Your contribution to the SALSA project dissemination is important:
You are kindly asked to provide us any news, weblinks, or requests to the SALSA network that you think relevant to the SALSA project or to your organization.
Annex 4: 3rd Newsletter

SALSA Newsletter - Industry Platform  n.3 December 2013

SALSA PROJECTS’ UPDATES AND RESULTS

NEWS

The Final General Conference of the SALSA project will take place in Brussels on March the 19th.

The SALSA final results will be shared. Discussions on the development of sustainability in the food chains focused on the Latin American and EU relations will involve the main international actors from the business, policy, media and civil society side.

From the beginning of next year more details on the Conference program and organization will be notified to the Industrial Platform members.

If you need more info and/or want to reserve in advance your place at the Conference, please contact the SALSA project coordinator: esmeralda.mai@unibe.ch

- Recent results
  - Extended LCA analyses have been performed for Argentinean soy and Mexican Beef and are currently updated:
    - The relevance of the farm as main impacting stage in the food chain sustainability was confirmed
    - The overall positive impact of organic and in general extensive production systems on sustainability are partially offset by:
      - Problems related to land consumption, and greenhouse gases emissions;
      - the difficulty, mainly for smallholders and SMEs, to comply with sustainability related certification schemes;
    - In general sustainable products are in need of reaching a critical mass allowing an easier logistical and administrative management of the access to global markets
    - SALSA is providing tools and dissemination strategies oriented towards proactively increase the support to sustainable beef and soy development and trade in Latin America
    - To this end the LCA analysis and integrated sustainability assessment tools have been included in the E-Platform. They are currently tested to be adapted to the different Latin American contexts.
## Industrial Platform Membership

**Updated List of the SALSA Industry Platform members (in bold new members)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Name</th>
<th>Website</th>
<th>E-Mail</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Pampa orgánica</td>
<td><a href="http://www.mapo.org.ar/">http://www.mapo.org.ar/</a></td>
<td><a href="mailto:crestaenrico@gmail.com">crestaenrico@gmail.com</a></td>
<td>Organic producers association</td>
</tr>
<tr>
<td>Brazil</td>
<td>Grupo Peñarol (GRupal)</td>
<td><a href="http://www.grupal.com.br/">http://www.grupal.com.br/</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>Sepé Agropecuária</td>
<td><a href="http://www.sepae.com/">http://www.sepae.com/</a></td>
<td><a href="mailto:artur@sepae.com.br">artur@sepae.com.br</a></td>
<td>Soy processor/trader</td>
</tr>
<tr>
<td>Italy</td>
<td>Quintis</td>
<td><a href="http://www.quintis-intl.com/">http://www.quintis-intl.com/</a></td>
<td><a href="mailto:sebastian.humbert@quintis-intl.com">sebastian.humbert@quintis-intl.com</a></td>
<td>ICT company</td>
</tr>
<tr>
<td>Italy</td>
<td>AMADONI</td>
<td><a href="http://www.amadoni.it">www.amadoni.it</a></td>
<td><a href="mailto:paolo.montagni@amadoni.it">paolo.montagni@amadoni.it</a></td>
<td>Poultry and beef breeder and processor</td>
</tr>
<tr>
<td>Italy</td>
<td>PROGEA</td>
<td><a href="http://www.progea.net">www.progea.net</a></td>
<td><a href="mailto:gianluca.parrini@mac.com">gianluca.parrini@mac.com</a></td>
<td>Feed manufacturer</td>
</tr>
<tr>
<td>Italy</td>
<td>VALDOIA</td>
<td><a href="http://www.valdoia.it">www.valdoia.it</a></td>
<td><a href="mailto:tech@valdoia.it">tech@valdoia.it</a></td>
<td>Soy-based food producer</td>
</tr>
<tr>
<td>Italy</td>
<td>ICEA</td>
<td><a href="http://www.icea.info/">http://www.icea.info/</a></td>
<td><a href="mailto:a.compassoni@icea.info">a.compassoni@icea.info</a></td>
<td>Organic - Fair Trade - Ethic Certification Body</td>
</tr>
<tr>
<td>Mexico</td>
<td>RANCHO EL 17</td>
<td><a href="http://www.ranchoel17.com/">http://www.ranchoel17.com/</a></td>
<td><a href="mailto:r.montana@ranchoel17.com">r.montana@ranchoel17.com</a></td>
<td>Beef breeder and processor</td>
</tr>
<tr>
<td>Netherlands</td>
<td>AGRIFirm</td>
<td><a href="http://www.agrifirm.com">www.agrifirm.com</a></td>
<td><a href="mailto:r.klissens@agrifirm.com">r.klissens@agrifirm.com</a></td>
<td>Multi-activity cooperative in feed and plants fields</td>
</tr>
</tbody>
</table>

### Expand the Industrial Platform network!

Please suggest SALSA contacts with potential IP members

### SALSA E-Platform

The SALSA E-Platform has been substantially improved by adding different functions related to the Food chains certification management and the sustainability assessment.

In particular, the Salsa E-Platform has been launched in Brazil and promotes capacitation to different organizations. The platform is currently tested in other countries of Latin America (Mexico and Argentina).

Your feedbacks on the E-Platform contents and accessibility will be welcomed; they will help us improving the E-Platform quality and make it more user-friendly.
**SALSA public Web site**
The SALSA web site [www.salsaproject.eu](http://www.salsaproject.eu) has been updated with:
- New references to Seminars, Conferences and Workshops related to sustainability in the agri-food system
- News and events organized by SALSA project
- A new section on Resources, reporting relevant links to on-line organizations, companies and knowledge material on sustainability.

**Other dissemination activities:**
- The **Salsa Project General Conference for Latin America** took place in Buenos Aires - Argentina on November the 21st. The results of the project were presented to an audience of businesses, civil society and public administration representatives involved in the soy and beef food chains.

- A **SALSA specific meeting** discussing the SALSA software for assessing the consequences of sustainability improvement options on the soy and beef food chain took place in Buenos Aires on November the 22nd.

**An Educational Forum** has been implemented. Within this framework, from the 1st until the 3rd of October 2013 a series of lectures and workshops on: "Solutions for Sustainability in Food and Bioenergy Chains" took place in Brazil at the Federal University of Viçosa (Minas Gerais).
• **Trainings:**
  - Training courses in Mexico, Argentina and Brazil have been delivered to local experts on the SALSA approach to Supply chain sustainable management, the use of the E-Platform and of the sustainability assessment and management tools. The many and highly qualified participants granted a good chance of success for the SALSA project’s results further dissemination and exploitation.

  ![Training image](image)

  - Webinars on two focused sustainability areas:
    - **Sustainability assessment of food technologies, products and value chains**
      Tuesday, December 10, 2013; 3:30 PM - 4:30 PM Budapest
    - **Energy saving strategies at the cooling systems in the future food factory**
      (estimated time: end of January 2014)

---

**Your contribution to the SALSA project dissemination is important**

You are invited to provide us any news, web-links, or requests for the SALSA network, that you think relevant to the SALSA project, also concerning your organization.
Task 6.3 – Report on developing tools for knowledge transfer and exchange

Annex 5: General project poster

The overall objective of the SALSA Project is to design and implement a series of innovative analytical tools, managerial strategies and technical solutions for a sustainable integration of SMEs and small scale farmers based in Latin American food chains into the global markets. SALSA aims also at enhancing the EU industry competitiveness, by supporting its relationship with Latin America in terms of mutual knowledge generation and education, innovation sharing, staff exchanging and technology transfer.

Novelties, benefits and added value

Results and Applications

Results achieved
Annex 6: Guideline for sustainable assessment tools

SALSA

Knowledge-based Sustainable vAlue-added food chains: innovative tools for monitoring ethical, environmental and Socio-economic impActs and implementing Eu-Latin America shared strategies

Guideline on the use of integrated model based on the lifecycle approach covering the entire food chain

Actual submission date of the document: December 2013

Authors:
Cesare Zanasi, UNIBO
Cosimo Rota, UNIBO
Aziz da Silva, UFV
Miranda Meuwissen, WUR
Ray Jacobson, Ugent
Farahnaz Pashaei Kamali, WUR
Jacqueline Bloemhof, WUR
Emanuele Novelli, proQ
Sebők András, CBHU
Fruzsina Homolka, CBHU
István Gábor, CBHU
Adrienn Hegyi, CBHU
Introduction

Objective

The objective of this document is to provide guidance for the web based sustainability assessment tools for users. Two tools, LCA assessment tool and Sustainability impact assessment, are shown in this guideline. The aim of the first LCA assessment tool is to be able to carry out simple, sustainability assessment in order to compare, benchmark their competitiveness in the market. The second one, Sustainability impact assessment tool concentrates on the improved options, so the users can get guidance what might cause the bad performance value and if they use any of the improved options or the combination of the improved options how the performance value will change. They could easily model their proposed, planned options for their improvements.

The advantages of the tool:

- The market players require the compliance with the different standards and the content of the standards are not unique. As a result of it the web based tool developed by us give the opportunity to change the weight of the four main sustainability pillars (economy, environmental, social and institutional).
- The tools are not just dedicated to farmers, it covers the chain from the farms, and processing and transport to port in soy and beef agro-chains to overcome the eco-challenges in their activities and in marketing.
- The tool is not just simply shows the status of your sustainability performance, but also benchmarks your performance. In the comparison the benchmark value is based on the real dataset and also consulted with experts if the value has showed big deviation the value from the literature.
- The tool can be used very well in Argentina, Brazil and Mexico, but it gives a good indication for EU users to see the differences in their performance on sustainability compared to LA players.
- The tools will be available under E-Platform, Salsa. (www.salsa.eu.)

The web based tools are under further development, because the experience of the testing (WP 6.5.) will be built in the tool.
Concept and definition(s) of sustainability

Why we need sustainability

The reduction of the global and local environmental and social problems is one of the major challenges for agriculture and the food industry. Together with a specific focus on the influence of emerging market trends which affect the economic aspects, to improve the sustainability is a crucial point.

What sustainability is?

Although at the moment there is not a globally recognized sustainability standard, many certification schemes aim to integrate the environmental impact considered in the LCA (Life Cycle Assessment) and improved sustainability in the agro-food system by addressing one or more of its dimensions. According to SAFA we concentrate on the following dimensions are:

• Environmental integrity
• Social well-being
• Economic resilience
• Good governance

However, the main question for food producers is not what is sustainability, rather what the market ask in term of sustainability. Food sustainability is therefore a driver for entering interested markets but it is related to the capacity of different sustainability schemes to be understood and appreciated by the market.

Tools for sustainability assessment

Building up the system

For increasing the sustainability and competitiveness of the Latin American and EU soy and beef supply chains joint Latin American and European initiatives are necessary since these food chains are strongly interrelated.

The aim of the Salsa project was to develop strategies to tackle the eco-challenges of Latin American countries by promoting both social cohesion and economic development through the improvement of the access of SMEs, agri-food producers to local and EU export markets and enhance added value, improve market relationships and competitiveness of EU and Latin American food chains.

Sets of tools and/or methods are available to assess the sustainability and related impacts, however, the access, the use or the implementation of these tools may be not easy for end-users in the supply chain. Therefore, in order to reduce time and costs in managing sustainability, SALSA
1. aimed to provide analytical tools for defining and monitoring the different sustainability dimensions of a food chain and to allow the users involved a deeper understanding of what sustainability is and what it impacts

2. developed and provides a web based self-assessment toolbox of support - an operational computerized system that could be accessed by enterprises and other stakeholders with a specific emphasis from the soybean and beef sector

In order to provide a real practical tool for the users the consortium have added new, innovative solutions part that support the users with such options with change(s) their performance value(s) can be improved.

**Description of the tool(s)**

Based on the FAO/ SAFA framework, SALSA extends the LCA by adding Economic–Social and Institutional dimensions for assessing the soy and beef chain sustainability.

The whole framework departs with the definition of the supply chain and related performance indicators. The framework comprises six steps (Figure 1): step 1 starts with the selection and definition of the relevant sustainability Key Performance Indicators (KPIs). KPIs can be used to measure whether targets have been realised in practice; they refer to a relatively small number of critical dimensions, which contribute more than proportionally to the success or failure in the marketplace (Gunasekaran and Kobu, 2007). A well-defined set of supply chain KPIs will help establish benchmarks and assess changes over time. This is done respectively in step 2 (where the current performance is measured) and step 3 (where the performance is benchmarked). The benchmark results in improvement needs, which can be aligned to available improvement options. These are defined in step 4 and assessed in step 5 using sophisticated modelling tools. According to Dekker et al. (2012) improvement options in sustainable logistics focus particularly on inventory, transportation and facility decisions. Finally, redesign strategies can be defined that – after implementation – improve the sustainability performance on the chosen indicators (step 6). After such an assessment, redesigns can be proposed, piloted and finally implemented if they turn out to be a successful business case.

*Figure 1: SALSA extended LCA protocol*
LCA Sustainability assessment tool

**THE TOOL IN PRACTICE - THE SALSA E-PLATFORM**

- Go to E-platform under Salsa website

  ![E-platform screenshot]

- Go to Analysis and choose the relevant LCIA soy or beef
Select the country, part of the supply chain (farm; farm, processing facility and transport to port)

The module Sustainability Integrated Performance Assessment aim is to support production units in the soy supply chains in assessing the environmental, economical and social performances of their activities. The module offers two types of performance indicators, quantitative and qualitative. Qualitative indicators display information through dimensionless values following the rule "the higher the value, the better the performance".

The module allows also comparisons with alternative production methods' performances (genetically modified; non-genetically modified and organic). The intent is to stimulate considerations on the different performances deriving from the qualitative aspects proper of every type of production method. Nevertheless the module use is intended only for self-assessment purposes as the values of alternative production methods refer to single case studies.
and not to statistically representative samples. Use of it for comparative analysis among different production units should be avoided.

- Select and define relevant KPIs

In this framework a number of indicators were selected to cover sustainability in all dimensions based on SAFA and survey (Table 1). The final list of these ones appears on the web (Table 2).

*Table 1: KPIs in soy chain*

<table>
<thead>
<tr>
<th>Sustainability Key Performance Indicators</th>
<th>Sustainability dimensions</th>
<th>Soy</th>
<th>Beef</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global warming potential</td>
<td>Environment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Energy consumption</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Water consumption</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Land use efficiency</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Profitability</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Barriers to chain entry</td>
<td>Economic</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Employability</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Food safety</td>
<td>Social</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Working conditions</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Degree of chain coordination</td>
<td>Institutional</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*Table 2: Choices of indicators on the web-tool*
➢ Fill the KPIs indicator with data

After you completed the sheet with the data you will see your result on graph in each indicator.

We present the global warning in this guide.

➢ Measure & calculate sustainability performance per indicator
Task 6.3 – Report on developing tools for knowledge transfer and exchange

**Global Warming: Farm**

<table>
<thead>
<tr>
<th>Type</th>
<th>CO₂ eq. / t of soymeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>My case</td>
<td>432.81</td>
</tr>
<tr>
<td>Genetically modified</td>
<td>360.00</td>
</tr>
<tr>
<td>Non genetically modified</td>
<td>370.00</td>
</tr>
<tr>
<td>Organic</td>
<td>135.00</td>
</tr>
</tbody>
</table>

**Notes on E-platform:**
For comparisons with literature values download the document "Soy and Beef Life Cycle Impact Assessment values from literature review.pdf" in the folder "05_(ENG) Literature on LCIA"(section Explore Knowledge on Sustainability of the SALSA Docu System). For identifying which certification schemes consider the same impact categories of the LCIA Module, please refer to the document "Requirements of standards for soy and beef chains.pdf" in the same folder above mentioned.

- **Benchmark the performance per KPIs indicator and Overall sustainability scores**
You can benchmark your performance per indicator and as an overall sustainability score as well.
In Annex 1 there is a detailed explanation on how we calculate the overall sustainability score.

- **Benchmark the performance per KPIs indicator and Overall sustainability scores**

**Global Warming: Farm**

<table>
<thead>
<tr>
<th>Type</th>
<th>CO₂ eq. / t of soymeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>My case</td>
<td>432.81</td>
</tr>
<tr>
<td>Genetically modified</td>
<td>360.00</td>
</tr>
<tr>
<td>Non genetically modified</td>
<td>370.00</td>
</tr>
<tr>
<td>Organic</td>
<td>135.00</td>
</tr>
</tbody>
</table>
Benchmark the performance per overall sustainability scores

- Allows comparing the overall sustainability scores among beef or soy production systems.
- The output can be seen in 2 ways:
  1. either the sum of the dimensions in bars per production, or
  2. the dimensions in bars next to each other. This latter allows comparing among dimensions within the same production system.

**Overall sustainability score: Farm**

![Graph showing overall sustainability score for a farm with dimensions for economy, environment, and society.

**DEMO OUTPUT: overall score weighted**

- Allows comparing the overall sustainability scores among soy production systems.
- The output is the sum of the dimensions in bars per production systems. The users’ evaluation can be compared to the other stakeholders’
Overall sustainability score: Farm

➢ Weighting Preferences

The software gives the opportunity to change the weights. The weights are assigned by dividing 100 points across the sustainability dimensions Economy, Environment, and Society on the base of their relative importance for sustainability along the soy and beef chain. You as user can change according to your preference.

OVERALL SUSTAINABILITY SCORE: Farm

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVIRONMENT</td>
<td>33.33 %</td>
</tr>
<tr>
<td>ECONOMY</td>
<td>33.33 %</td>
</tr>
<tr>
<td>SOCIETY</td>
<td>33.33 %</td>
</tr>
</tbody>
</table>

[Edit category weights]
Finally, joint consideration of weights and scores facilitates the prioritization of improvement needs which will be detailed in the next chapter.

**Benefits of the LCA Sustainability Assessment Tool**

i. Compare for each indicator
   - to find hot spots within the chain:
     *(Eg. Who is the most impacting chain stage when considering Global warming or land consumption?)*
   - to be able to compare the different production systems:
     *(Eg. How does my production perform when compared to others in terms of Global Warming, land consumption, profitability?)*

ii. Compare between indicators
   - Asses the different indicators’ impact
     *(Eg. Where the major contribution to environmental problem lies?)*

iii. Causes of different performances

iv. Compare between production systems
   - Define an aggregated score using weights from experts or supply chain partners then
     Benchmark towards other production systems
     *(Eg. Which system is more sustainable in terms of environment?)*
## Sustainability impact assessment tool-excel base

### Basis of the tool

The improvement needs link the previous LCA sustainability assessment tool (3.3.) with the sustainability impact assessment tool presented in this, 3.4. section. The details of the development are in annex2.

*Table 2: Output tool of LCA assessment (Improvement needs)*

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td></td>
</tr>
<tr>
<td>Global warming</td>
<td>X</td>
</tr>
<tr>
<td>Energy consumption</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
</tr>
<tr>
<td>Water consumption</td>
<td></td>
</tr>
<tr>
<td>Land use</td>
<td></td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td></td>
</tr>
<tr>
<td>Barriers to entry</td>
<td></td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td></td>
</tr>
<tr>
<td>Employability</td>
<td></td>
</tr>
<tr>
<td>Working conditions</td>
<td></td>
</tr>
<tr>
<td>Food safety</td>
<td></td>
</tr>
<tr>
<td><strong>Institutional</strong></td>
<td></td>
</tr>
<tr>
<td>Chain coordination</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Our Chain Average: <strong>3.5</strong></th>
<th>Benchmark Average: <strong>4.5</strong></th>
</tr>
</thead>
</table>

With managing the sustainability impact, one can evaluate how different improvement options can influence the change in sustainability performance of the different chains in the technical and economic/managerial areas.

The tool:

i. Allows calculating the overall sustainability performance deriving from the impact of improvements options on chosen sustainability indicators by:
   - providing a list of the most promising actions aimed to improve sustainability related to different aspects of the chain management, such as logistics, quality, governance.
   - measuring the relations between the improvement opportunities and the key sustainability performance indicators

ii. Allows impact assessment at individual, single agent and chain level

iii. Covers a broader 4 dimensional sustainability impact assessment including the following indicators:
- Environmental: *global warming, energy consumption, water consumption, land use*
- Social: *food safety, working conditions*
- Economic: *profitability, barriers to entry*
- Institutional: *supply chain coordination*

**Overview of the Excel Tool**

Open the Excel file “Improvement_options_Tool_beef.xlsx”, “Improvement_options_Tool_soya.xlsx”, and select the sheet “Performance overview”. This sheet should look like Figure 2.

**Figure 2 Performance overview of beef**

<table>
<thead>
<tr>
<th>Scores</th>
<th>Weights per dimension</th>
<th>Weights</th>
<th>Benchmark</th>
<th>Current</th>
<th>Scenario impacts</th>
<th>Scenario A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Global warming 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy consumption 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Consumption 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land use 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td>2 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Profitability 3 0.50</td>
<td>A</td>
<td></td>
<td>4</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Barriers to entry 0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Working conditions 0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food safety 0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional</td>
<td>degree of chain coordination 0.25</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainability</td>
<td>Total score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D</td>
</tr>
</tbody>
</table>

Several numbered rectangles can be distinguished in 2, which indicate the cell values that can be adapted by the user. The respective numbers indicate:

1. The selected benchmark option. By selecting a benchmark option between 1 and 4 the performance data of the corresponding option will be displayed in the “Benchmark” column (rectangle A).
2. The weights per dimension. This column indicates the relative weight of each of the four performance dimensions in the total sustainability score. Note that the total weight should add up to 1.
3. The weights column. This column indicates the relative importance of the different performance criteria within their respective performance dimension. Note that, for each of the four performance dimensions the total sum of weights should add up to 1.
4. In the “Current” column the performance of the scenario elaborated upon in the online platform LCIA is provided. This is used as the basis for the assessment of potential improvement opportunities.
Several outputs are presented in Figure 2 as well. These are

A. The benchmark column. This column indicates the performance of the benchmark scenario selected in rectangle 1. The presented data can be used as a reference for your own scenario.

B. The scenario impacts. This column shows what the overall effect of the selected improvement opportunities in the “improvement opportunities” sheet is. This impact ranges from +++ for a very big positive impact to --- for a very big negative impact.

C. Scenario A. This column presents the performance of the current scenario (rectangle 4) after the improvement options have been considered.

D. Total score. The numbers in this column presents the overall sustainability performance of the benchmark scenario, the current scenario, and scenario A.

In the “improvement opportunities” worksheet you will find an overview comparable to Figure 3. In this worksheet, the user can select improvement opportunities, and he may indicate the expected impact degree on a number of relevant performance indicators. The different improvement opportunities are listed, and are subdivided into four categories (logistics, governance, farm level, and quality). In the top-row the four considered performance dimensions are indicated (Environmental, Economic, Social, and Institutional), which are subdivided into a number of performance criteria.

**Figure 3 Improvement opportunities**

<table>
<thead>
<tr>
<th>Logistics</th>
<th>Environmental</th>
<th>Economic</th>
<th>Social</th>
<th>Institutional</th>
</tr>
</thead>
<tbody>
<tr>
<td>New fleet (fuel efficient)</td>
<td>+++++</td>
<td>+++++</td>
<td>+++++</td>
<td>+++++</td>
</tr>
<tr>
<td>Infrastructure improvement</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Use software for planning</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Multi-modal network</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Other transportation alternatives</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Increasing fuel efficiency</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Funds to mitigate emissions</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Network re-design</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Port efficiency improvement</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Less overweight trucks</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Joint planning of different transportation modes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Driver training on eco-driving</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Fleet management systems</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Use of information technologies and decision support tools</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

The two rectangles in Figure 3 indicate the fields that users may be adapt:

A. In this column the user can select a certain improvement opportunity by adding “yes” to this column. An empty cell or any other value will indicate that this improvement opportunity is not used.

B. In this rectangle the user may indicate what effect the respective improvement opportunity will have on that specific performance dimension by adding an impact score. Impact scores between +++ (for a very big positive impact) to --- (for a very big negative impact) can be used. For some combinations between improvement opportunities and
performance dimension the impact of a number of improvement opportunities has been determined by previous research. A bold border indicates the respective cells and the cell content are protected.
A WORKED-OUT EXAMPLE

In this example you will fill out the excel tool to assess the sustainability performance of a custom scenario. After

1. Select the case scenario for ‘Beef, mixed crop’ by setting the benchmark option to 2.
2. Set the relative weights per dimension to 0.25, indicating that each performance dimension is equally important while determining an overall sustainability score. (Alternatively: use weights indicated in TOOL_FILLIN_BEEF.xlsx: (0.5, 0.2, 0.3, 0.0).
3. Select the weights of the performance criteria for each performance dimension such that all performance criteria are equally important. In this case this can be achieved by selecting weights of 0.25, 0.5, 0.5, and 1.00 for the performance criteria under the environmental, economic, social and institutional performance dimension. (Alternatively: use weights indicated in TOOL_FILLIN_BEEF.xlsx.
4. Enter the following performance weights, which you would normally obtain from the LCIA tool:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sustainability score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global warming</td>
<td>3.94</td>
</tr>
<tr>
<td>Water consumption</td>
<td>6.18</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>7.59</td>
</tr>
<tr>
<td>Land use efficiency</td>
<td>6.29</td>
</tr>
<tr>
<td>Profitability</td>
<td>2.10</td>
</tr>
<tr>
<td>Barriers for entry</td>
<td>3.10</td>
</tr>
<tr>
<td>Food safety</td>
<td>4.25</td>
</tr>
<tr>
<td>Working conditions</td>
<td>3.50</td>
</tr>
<tr>
<td>Degree of chain coordination</td>
<td>4.12</td>
</tr>
</tbody>
</table>

5. Your aim is to improve the impact score of the “Current” scenario with respect to the Global Warming Potential to a value of at least 5. You therefore go to the “Improvement opportunities” worksheet, and select the “Increasing fuel efficiency” improvement option by typing ‘yes’ in the ‘improve’ column.
6. Go back to the “Performance overview” worksheet, and observe what effect the improvement opportunities have on the performance overview.
7. To reach your objective with respect to Global Warming Potential, also select the “Port efficiency improvement” improvement option, and observe the effect of the selected improvement opportunities on the ‘Performance overview’ sheet.
HELP, EXPLANATION OF THE SCORE AND COLOURS

- The circles in the “Performance overview” worksheet take a red color if the performance score is below 3, a yellow color for scores between 3 and 5, and a green color if the score is above 5.
- The scenario impact score displayed in the “Performance overview” worksheet is used to determine a multiplication factor with which the current scenario score will be multiplied. The selected multiplication factors are: --- = 0.4, -- = 0.6, - = 0.8, + = 1.2, ++ = 1.4, +++ = 1.6.
- The impact of the selected improvement options (worksheet “Improvement opportunities”) are added and subtracted to form an overall Scenario impact ranging from +++ to --- in the “Performance overview” worksheet.
- An impact score of +++ indicates a very big positive impact score, whereas --- indicates a very big negative impact. In case the total impact score of the selected improvement opportunities would exceed three minus or plus signs this is rounded to either --- or +++.
- Those impact scores that are fixed within the “Improvement opportunities” worksheet have been previously determined within the SALSA project. More detail on their respective values.

RESULTS INTERPRETATION

One can compare each improvement’s score (current and scenario) with:
- the related overall dimension’s score
- the overall sustainability score

![Figure 3: Interpreting the results](image)

One can compare the own situation with the preferences of another group of stakeholders (to be selected in the tool).
- This allows farmers or other people in the chain to compare their situation with the ones from others, and
- to adapt their sustainability score in order to comply e.g. with the demands from the retail sector.
ASSESSING FUTURE PERSPECTIVES

After the results interpretation, one can:

• Introduce new improvement options
• Comply with the improvement options requirements
• Retest the own situation using the tool
### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agents:</strong></td>
<td>Supply chain agents are the businesses participating in a supply chain. In agriculture: input providers, farmers, traders, processors, transporters, retailers and any other stakeholder involved in the management of the goods and services flow along the chain.</td>
</tr>
<tr>
<td><strong>Barriers to entry chain:</strong></td>
<td>This indicator evaluates the extent to which new participants are able to enter the value chain, so it is referring to issues of participation and inclusion in the value chain. Specific characteristics of the chain that can influence entrance of new participants are: (i) market-characteristics (market concentration, economies of scale, cost-structures, etc.); and (ii) costs and difficulties of compliance with and enforcement of specific legal and extra-legal requirements (related to certification schemes, standards and monitoring).</td>
</tr>
<tr>
<td><strong>Certification schemes:</strong></td>
<td>Voluntary certification schemes for agricultural products and foodstuffs provide assurance that certain aspects of the product or its production method, as laid down in a specification, have been observed. They cover a wide range of different initiatives that function at different stages of the food supply chain. They can operate at the business-to-business (B2B) level or at the business-to-consumer (B2C) level. They can make use of logos but, especially at the B2B-level, many do not. Certification schemes for agricultural products and foodstuffs in the EU range from compliance with compulsory production standards to additional requirements relating to environmental protection, animal welfare, organoleptic qualities, &quot;Fair Trade&quot;… Scheme owners are equally varied, covering the whole range from farmers and producers, through NGOs, interest groups and retailers, to public authorities.</td>
</tr>
<tr>
<td><strong>Dimensions of sustainability:</strong></td>
<td>Refer to the different pillars characterizing sustainability. According to the SAFA approach, adopted in SALSA as a conceptual reference, these dimensions are: Environmental, Social, Economic and Governance. Each dimension of sustainability can be assessed by using sustainability indicators.</td>
</tr>
<tr>
<td><strong>Degree of chain coordination:</strong></td>
<td>This indicator evaluates the degree of collaboration and coordination between chain actors towards effective sustainability improvements. Specific characteristics of the chain that can influence chain coordination are: (i) transparency towards different actors in the chain including information sharing and communication; (ii) accountability of the actors in the chain referring to responsibility of different actors in improving the sustainability of the whole supply chain; and (iii) participative decision-making, i.e. the involvement of all relevant chain actors.</td>
</tr>
<tr>
<td><strong>Energy consumption:</strong></td>
<td>Primary energy use for producing soybean meal is estimated based on total energy consumption in each phase.</td>
</tr>
<tr>
<td><strong>Employability:</strong></td>
<td>Hours of work per weight unit (t of soymeal and kg of boneless beef).</td>
</tr>
<tr>
<td><strong>Food safety:</strong></td>
<td>Food safety is a fundamental public health concern and achieving a safe food supply poses major challenges for national food safety officials.</td>
</tr>
</tbody>
</table>
Increasing international food trade and public expectation escalate the importance of food safety. In meat production, food safety can refer to a broad variety of aspects such as food borne diseases and antibiotic resistance.

**Global warming:**  
According to IPCC (2006), global warming (GW) of each process is quantified by considering the mass (kg) of greenhouse gas (GHG) emitted in each activity and their respective global warming potential (GWP).

**Improvement options:**  
An improvement opportunity is a change in a specific element of the SC scenario (as configuration, control, etc.) related to a specific business process (as logistics, quality, information or governance).

**Improvement scenario:**  
An improvement scenario is a combination of multiple improvement opportunities, resulting in specific defined settings of all the elements of the SC scenario.

**Indicators of sustainability:**  
Quantitative and qualitative measures aiming to capture the different – economic, environmental, social and institutional – dimensions of sustainable development. They provide a tool for assessing and monitoring sustainability performances, allowing for supporting sustainable development strategies.

**Land use:**  
Reflects the physical occupation of land and is measured as the area (m2) used for production of 1 kg PCB during one year.

**LCA:**  
Life cycle assessment: According to the ISO norms 14000 The goal of LCA is to compare the full range of environmental effects assignable to products and services in order to improve processes, support policy and provide a sound basis for informed decisions.

**Profitability (beef)**  
The operating profit of the beef chain was examined by comparing the components and distribution of farm-level production costs, road transportation costs to the port in Latin America. Operating profit was calculated as total revenue minus operating cost and depreciation (Hillier et al., 2010). Operating costs were costs of feed, fertilizers, energy (fuel and electricity), medicine, veterinary, mortality, maintenance, certification and hired labour.

Due to lack of data for assessing operating profit of transportation and slaughterhouse we did not consider these parts in this study.

**SAFA:**  
Sustainability analysis of standards using the framework for Sustainability Assessments in Food and Agriculture Systems (SAFA) Promoted by FAO, SAFA guidelines define 20 sustainability categories in four sustainability dimensions 64 sub-categories developed for assessment of standards requirements

**Standard setting organizations:**  
A standards organization, standards body, standards developing organization (SDO), or standards setting organization (SSO) is any organization whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting, or otherwise producing technical standards that are intended to address the needs of some relatively wide base of affected adopters.

Most standards are voluntary in the sense that they are offered for adoption by people or industry without being mandated in law. E.g. RTRS
### SAN

Some standards become mandatory when they are adopted by regulators as legal requirements in particular domains (e.g. organic).

| Stakeholders: | Stakeholders are groups or individuals who can affect or be affected by the achievements of a business. E.g: Typical stakeholders that define most businesses are customers, employees, suppliers, communities, and shareholders or other financiers. For some purposes, some companies also consider a broader group that includes governments, media, competitors, non-governmental organisations (NGOs) and others.  
*Source: Financial Time Lexicon*

| Supply chain scenario: | A SC scenario is an internally consistent view of a possible instance of the following elements, i.e. the chain configuration, chain control structure, chain information systems and chain organization and governance structure.

| Sustainability: | Sustainability is the "long-term, cultural, economic and environmental health and vitality" with emphasis on long-term, "together with the importance of linking our social, financial, and environmental well-being"

| Sustainability Standard: | Refer to a voluntary, usually third party-assessed, norms and standards relating to environmental, social, ethical and food safety issues, adopted by companies to demonstrate the performance of their organizations or products in specific areas. There are perhaps up to 500 such standards and the pace of introduction has increased in the last decade.

| Third party certification: | Provided by certification bodies unrelated to the certified client, officially appointed and monitored by accreditation bodies.  
- for certification bodies see: [http://www.certificationalliance.org/ver1/cbs.html](http://www.certificationalliance.org/ver1/cbs.html)  
- for accreditation bodies see: [http://www.european-accreditation.org/mission](http://www.european-accreditation.org/mission)

| Water consumption: | This section assesses the impacts of consumptive freshwater (CW) use on water scarcity (IWS) along the whole GM, non-GM and organic soybean production chains of soybean meal. The consumptive water used in this paper refers to blue water. The blue water is a type of consumptive water originating from water resources such as surface and ground water (Jefferies et al., 2012). The impact of CW on IWS was calculated by summing up of the impacts of each phase (IWSp) of the soybean meal production chain According to de Boer (2012) all water sources used (from a lake, river, well or unspecified sources) were assumed to be consumptive. Since plant production occurs during the rainy season (from October to March, sometimes until February), no CW is used for irrigation in soybean plantation (farm phase) in Brazil. The only CW applied in the farm phase is water for production of artificial fertilizers and fossil fuels, for which we used the Eco-invent data (Ecoinvent, 2007). All water sources used (from a lake, river, well or unspecified sources) were assumed to be consumptive.

| Working Conditions: | It the level of workers’ civil rights (freedom to join a trade union, legal working contract), safety (protective gear, training on safety management) hygiene (presence of toilets and drinking water) fair economic
<table>
<thead>
<tr>
<th>Working conditions (labour rights, working hours):</th>
<th>Working conditions refer to the working environment and aspects of an employee’s terms and conditions of employment, including wages, benefits and working hours.</th>
</tr>
</thead>
<tbody>
<tr>
<td>conditions (fair salary, documented working hours).</td>
<td></td>
</tr>
</tbody>
</table>
Focus on WP3 and WP4 Sustainability Monitoring and Improvement Options Impact Assessment tools

Calculation of the overall sustainability score

In order to come up with an overall sustainability score, the indicators need to be measured in an objective way. Since each indicator has a different measurement, it is not possible to add them up for obtaining an overall sustainability score. Therefore one needs a transition to a relative score. This made it easy to add up all indicator scores and obtain a relative score per dimension and an overall relative sustainability score for the whole chain or farm.

The second part of the tool involves the weighting and hence the preferences of the user of the tool. At first the tool allows to compare the users preferences compared to the objective scores from part 1 described above. This gives an answer to the question: how should one adapt the sustainability scores according to the preferences. Weights indicate relative importance of the various indicators, where higher weights indicate higher marginal impacts of improvement, so weights can differ across stakeholders. Thus, secondly, the user can compare his/her own situation with the preferences of another group of stakeholders (to be selected in the tool). This allows farmers of other people in the chain to compare their situation with the ones from others, and furthermore to adapt their sustainability score in order to comply e.g. with the demands from the retail sector.

Weighting of indicators according to stakeholders’ preferences

- Weights indicate relative importance of the various indicators
- Higher weights indicate higher marginal impacts of improvement
- Weights can differ across stakeholders
- Weights were assigned by dividing 100 points across the sustainability dimensions Economy Environment and Society on the base of their relative importance for sustainability along the soy and beef chain

Weighting preferences

- Allows adapting the sustainability scores according to the users’ preferences
- The user can compare his/her own situation with the preferences of another group of stakeholders (to be selected in the tool)
- Allows farmers or other agents in the chain to adapt their sustainability score in order to comply e.g. with the demands from the market (e.g. the feed industry for soy)
For measuring and calculating sustainability performance the user can decide whether to obtain the final results based on dimensional or non-dimensional values.

The non-dimensional values
The different indicators values have been transformed in non-dimensional values that are values without a measurement unit. This will allow to “sum pears and apples”, in particular

- to compare the contribution of different sustainability indicators to the overall sustainability performance
- to compare the different sustainability performance between production systems

According to D3.2 the change from dimensional to non-dimensional values was obtained by defining as benchmark values the sustainability indicators performances of the mainstream production systems. The benchmark values are compared to the indicators coming from the users’ cases (my case) and those calculated for the other production systems within SALSA D3.2 were calculated according to this equation

\[ x = \frac{I_m}{I_b} \]

where:

- \( x \) = non-dimensional value
- \( I_m \) = my case indicator
- \( I_b \) = benchmarking indicator.
Calculation of improvements options impact on sustainability

During the tool development a number of improvements options were selected based on literature review, panel of expert and the results coming from the LCA analysis to design this tool.

The improvement options will have an impact on the improvements needs related to four soy and beef supply chains areas, which are:

- Technological area (LCA methodology)
- Logistics area (optimization model)
- Food quality/safety (panel of experts) evaluation)
- Supply chain governance (inferential statistics)

In order to put these impacts in a quantitative tool, the following rules have been used:

<table>
<thead>
<tr>
<th>Impact Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>No impact</td>
<td>0</td>
</tr>
<tr>
<td>Small improvement</td>
<td>+</td>
</tr>
<tr>
<td>Average improvement</td>
<td>++</td>
</tr>
<tr>
<td>High improvement</td>
<td>+++</td>
</tr>
<tr>
<td>Small worsening</td>
<td>-</td>
</tr>
<tr>
<td>Average worsening</td>
<td>--</td>
</tr>
<tr>
<td>High worsening</td>
<td>---</td>
</tr>
</tbody>
</table>

Putting these impacts in the improvement options tables for all four chain areas, we have a “database” as origin for the further evaluation (Figure 1.).

*Figure 1: Improvement options and their impacts in Quality Management*
The values for small, average and high impact can easily be changed by developers if needed in the tool after the testing period.

The impact of improvement actions were evaluated by developers following the four consecutive steps:

- **1 step:** select the improvement options according to the improvement need (*Figure 3*)
- **2 step:** select the values for small, average and high impact on the improvement needs (*Figure 4*), according to:
  - the outcomes of the literature
  - the expert point of view
  - the user’s opinion
- **3 step:** calculate, for each indicator (e.g. global warming), the related “impact” considering all the impacts coming from the selected improvement options
- **4 step:** calculate, for each indicator, the related “scenario” based on the related impact (*Figure 5*) and calculate for each dimension’s overall score (*Figure 6*)

*Figure 3: Selection of the improvement options according to the improvement need*
Figure 4: Selection of the values for small, average and high impact

Figure 5: Calculation for each indicator, the related “scenario”
<table>
<thead>
<tr>
<th>Scores</th>
<th>Weights per dimension</th>
<th>Weights</th>
<th>Benchmark</th>
<th>Current</th>
<th>Scenario impacts</th>
<th>Scenario A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global warming</td>
<td>0.25</td>
<td></td>
<td>4.00</td>
<td>2.40</td>
<td>+++</td>
<td>5.54</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>0.25</td>
<td></td>
<td>4.00</td>
<td>4.40</td>
<td></td>
<td>4.40</td>
</tr>
<tr>
<td>Water Consumption</td>
<td>0.25</td>
<td></td>
<td>4.00</td>
<td>4.20</td>
<td></td>
<td>4.20</td>
</tr>
<tr>
<td>Land use</td>
<td>0.25</td>
<td></td>
<td>6.00</td>
<td>6.90</td>
<td></td>
<td>6.30</td>
</tr>
<tr>
<td>Economic</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td>0.50</td>
<td></td>
<td>3.00</td>
<td>2.10</td>
<td>++</td>
<td>2.54</td>
</tr>
<tr>
<td>Barriers to entry</td>
<td>0.50</td>
<td></td>
<td>4.00</td>
<td>3.10</td>
<td></td>
<td>3.10</td>
</tr>
<tr>
<td>Working conditions</td>
<td>0.50</td>
<td></td>
<td>5.00</td>
<td>4.30</td>
<td></td>
<td>4.30</td>
</tr>
<tr>
<td>Food safety</td>
<td>0.50</td>
<td></td>
<td>4.00</td>
<td>3.50</td>
<td></td>
<td>3.50</td>
</tr>
<tr>
<td>Social</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of chain coordination</td>
<td>1.00</td>
<td></td>
<td>4.00</td>
<td>4.10</td>
<td></td>
<td>4.10</td>
</tr>
<tr>
<td>Institutional</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainability</td>
<td>0.25</td>
<td></td>
<td>4.19</td>
<td>3.75</td>
<td></td>
<td>3.91</td>
</tr>
</tbody>
</table>

Each dimension’s overall score is the sum of the weighted single scores.

*Figure 6: Calculation for each dimension’s overall score*