An E-platform for Supporting Sustainability Developments with Special Reference to Latin America

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Abstract

Due to raising pressures from civil society, consumers, businesses and public institutions, appropriate methodological, technological and organizational innovations acquired a central role for the establishment of global sustainable food supply chains. This paper presents an-line software able to support the implementation of sustainable policies for two highly traded products between Latina America and Europe that still raise environmental, social and economic concerns, namely soymeal and beef. The E-Platform propose itself as a synthesis of both scientific and management requirements, therefore combining complex analysis methods as life cycle analysis in the back-end and implementation and monitoring modules in the front-end. The system, currently in its test phase in Brazil, Argentina and Mexico, has its primary objectives in facilitating the implementation of new sustainable production policies, in opening access to new markets and in complying with stringent requirements minimizing the certification costs and time investments for the actors of the supply chain.

Keywords: *sustainability management, implementation, life cycle analysis, audit, information organization*

1 Introduction

The production of two highly traded products between Latina America and Europe, beef and soymeal, raised and still raises several concerns due to social and environmental negative externalities in both Latin America and European countries (Gerber, 2013) (Elbehri A., 2013) (FAO, 2006). Due to mass media communication, the broader audience attention remains on themes as global warming, deforestation, effects of GMOs use and labour rights. However, according to Bergman and Heindel (2012), new research knowledge advances and methodological research assumptions reveal other impacts of major importance caused by the production of food and feed items. These unknown side effects, the need of reliable information and the subsequent international coordination of food markets, prompted the European Commission in financing, by means of the seventh research framework program, the SALSA research project. SALSA stands for “knowledge based Sustainable vAlue-added food chains: innovative tooLs for monitoring ethical, environmental and Socio-economic impActs and implementing Eu-Latin America shared strategies”. The project aims at preventing future adverse impacts of soymeal and beef production systems, at establishing innovative supply chain coordination processes and fostering shared sustainability strategies based on a common scientifically sounded methodology. In this work we present one of the main project outcomes. We frame first the main difficulties when considering, from a practice-oriented perspective, measures directed towards sustainability and second we present a scientifically grounded on-line toolset to support food system actors in implementing measures of prevention and mitigation of potential harmful impacts of beef and soymeal supply chains between Latin America and Europe.

2 Sustainability practice of food systems: criticisms and challenges

The way toward sustainable supply chains has been traced over several decades through a multitude of methodological approaches. The flourishing of many assessment methods can be lead back to the broad spectrum of impact categories directly implied in the objective of achieving a system's sustainability and the specificity and difficulty to address evaluation of complex phenomena (Bell & Morse, 1999). The establishment of sustainability discipline had been followed by the first technical and organizational market institutions' innovations. While public institutions prepared the regulatory ground for sustainable schemes, food producers, processors and retailers tried to embed the advantages of a new niche market through the creation of voluntary standards aimed at implementing new processes and communicate trustworthy efforts to consumers; hence reinforcing reputation and gaining competitive advantage (SustAinability, 2011), (BISS2012 - Summer School on Responsible Business, 2012). However, this whole chain transformation process has not achieved its final state yet; many problems remain unresolved and require specific interventions or solutions. Below I report some of the main issues retrieved from literature:

- Lack of knowledge on the dynamic and interactions of complex environmental and social phenomena and related information costs (Kaya J. J., 1999) (Bell & Morse, 1999) (Mazzocchi M., 2009) (Goedkoop Mark, 2001).
- Administrative burdens related to regulatory and standards compliance (European Commission, 2012) (Watson M., 2004) (Coldiretti, 2012).
- Appropriateness of standard scheme choice in respect of the particular targeted market and geographical location (SustAinability, 2011) (International Trade Center, 2014) (GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit, 2014).
- Effective implementation of measures directed toward negative impacts mitigation (Watson M., 2004) (McCown, 2002).
- Coordination and management of the supply chain (Dao V., 2011).
- Certification costs (Watson M., 2004).

Considering the scope of the SALSA research project and the economic dimension of a particular group of involved stakeholders, namely small and medium enterprises of soy and beef supply chains, all above mentioned issues could gain even major relevance in hindering the shift toward a sustainable production paradigm. The specific challenge of the project can be summarized by means of figure 2.1, where problems usually approached through the rigorous and analytical scientific perspective of the academic world have to be combined with the pragmatic working reality and management issues of food supply chain operators.

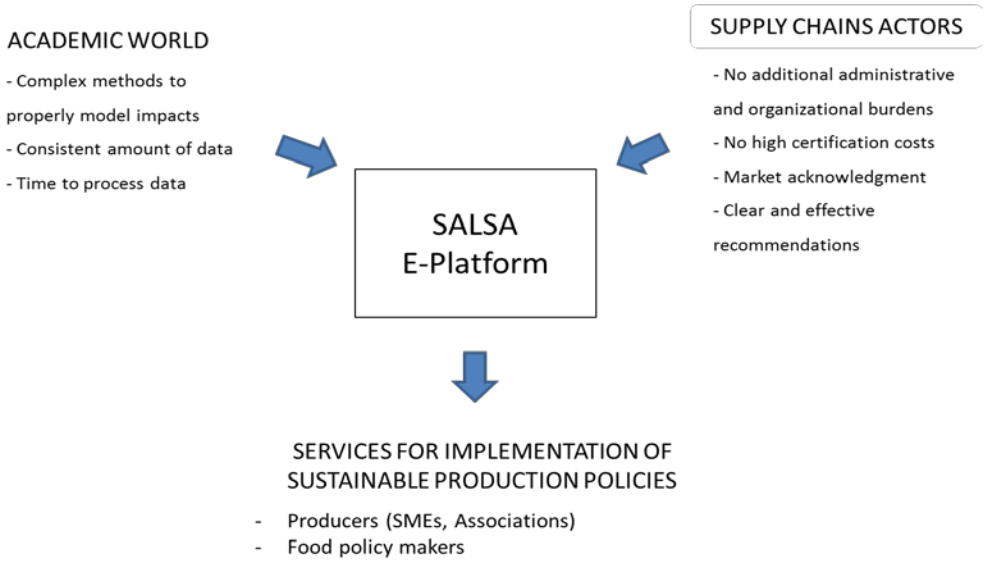

Figure 2.1. Constraints on adoption of sustainable food policies from the perspective of academics and supply chain practitioners and role of the SALSA E-Platform.

The tool further presented suggests a synthesis of these two different stakeholders groups' views, hence keeping a solid impact evaluation method in the back-end of the system and showing a simplified, essential (in its functionalities) and user-friendly interface in the front-end.

3 Sustainability, from theory to practice: the Salsa e-platform

In order to achieve the multiple objectives related to the creation of sustainable soy and beef supply chains between Latina America and Europe, it is necessary to set a tool flexible enough to capture and support the single needs of all involved stakeholders. We decided therefore to develop server-based software accessible through the internet from several locations and through the request of user's log in credentials. By means of personalized users' log-in, it is possible to characterize every profile with functionalities fitting that specific category of stakeholders. Moreover, the use of the on-line program does not require any additional proprietary software and therefore free access is granted to those actors unable to afford any consistent initial investments. All functionalities provided through the software have a clear operational intent and they voluntary lack long descriptions and explanations. To balance this information gap the initial page of the e-platform (figure 3.1) allows entering a secondary website, named Public Access Area (hereafter PuAA) with highly descriptive sections.

Figure 3.1. Initial page of the SALSA E-Platform.

This part makes use of a Content Management System and it has the objective to explain and invite users in exploring the e-platform and its functionalities. Here the user can also visualize and download informative material

as factsheets on existing sustainability standard schemes, webinars on impacts calculation methods and presentations reporting the outcomes of research projects concerning sustainable food production (figure 3.2).

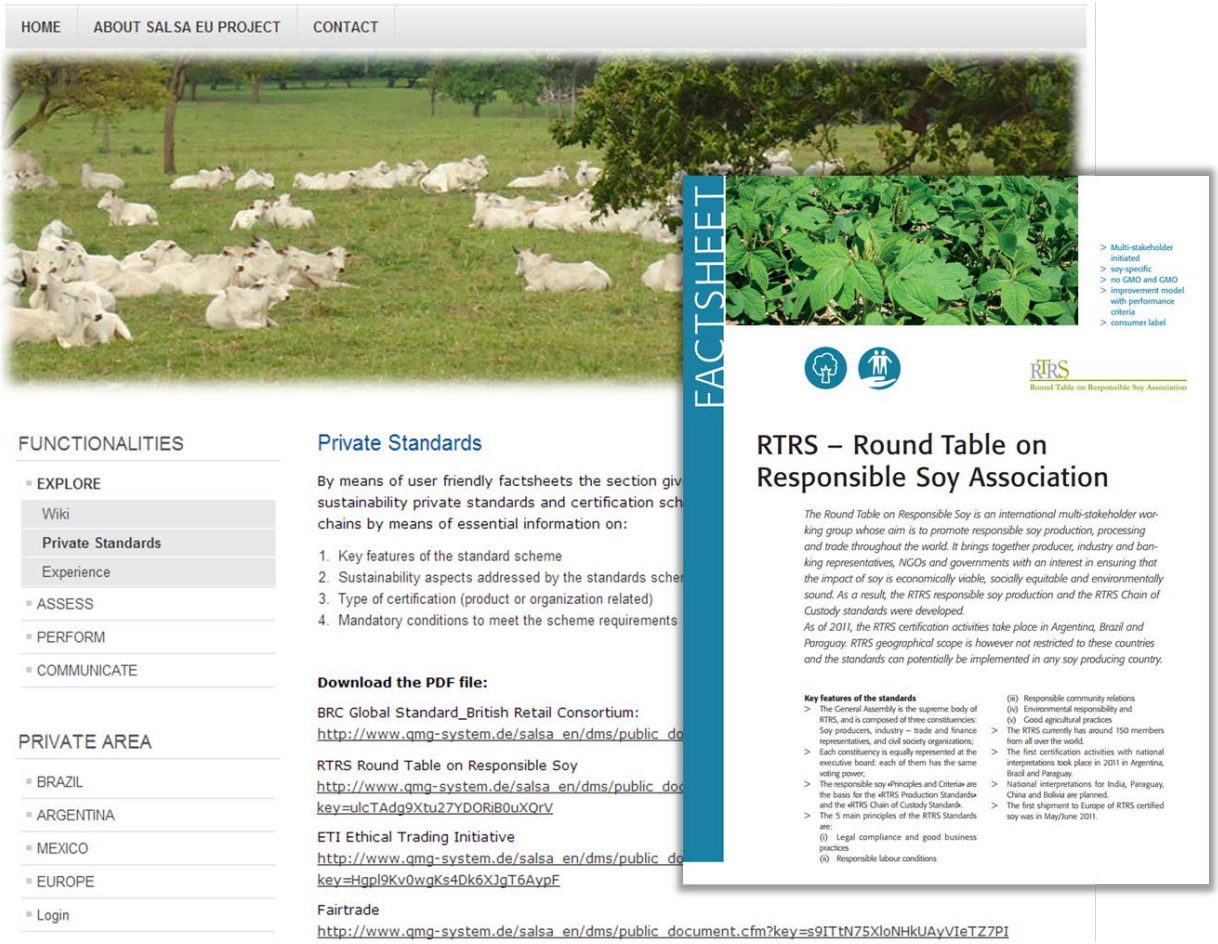

Figure 3.2. Public Access Area of the SALSA E-Platform.

Differently the log in section, also termed Private Access Area (hereafter PrAA), of the initial page leads to the system's functionalities and therefore the visualization of the operational structure of the software.

The PrAA comprises five general modules represented as parent items of the menu on the left side of the screenshot of figure 3.3.

Figure 3.3. Private Access Area of the SALSA E-Platform and main functionalities

Each module describes a step of the procedure necessary to implement, from anew, a set of sustainability measures. Below I report the list of modules and a short description of their functions:

a) Docu System: repository of private or shared documents (standards' schemes, successful cases, etc.) and search engine (SalsaWiki) for project related themes (sustainability of productive systems in LA and EU) and definitions.
b) Analysis: online tool for environmental, economic and social assessment of a beef or soy productive system (supporting regulatory compliance, marketing and establishment of a CSR policy).
c) Control: online audit system for the creation of evaluation categories, assignment of categories' weights and the inputting of performance results. The module provides the user with a ready to use pool of checklists of recommendations/best practices that can be further personalized (supporting self-assessment, on-going and ex-post evaluation, on-time results' visualization).
d) Communication: through this sub-section it is possible to write articles, post links or videos (based on external video sharing websites) within the frame of a CMS (Content Management System). The web system allows assigning rights to protect confidential information and edit it.
e) Management: the last section of the navigation menu allows a user to create its own contacts and users structure. By clicking on Management the user can add new subsidiaries and sub-users and personalize the depth of the access to the functionalities that he already owns.

The combined use of these five modules is supportive for the overall objective of creating a sustainable productive system and it allows an organization to achieve the following operational results:

- Access privileged information (e.g. simplified introduction to sustainability related subjects, checklists for the compliance with several standards' requirements, template of CSR report following GRI guidelines, etc.) and select the appropriate funding opportunities and certification schemes.
- Protect sensitive internal documentation (e.g. audit reports, LCA results and inputs datasets), manage access rights to specific folders and set a control system on documents prior to their disclosures to third parties.
- Analyze impacts of beef and soy/ soymeal productions and monitor improvements along the time in the whole supply chain.
- Perform audit on highly decentralized multi-level governance system and monitor targets' achievement from a centralized digital base system.
- Communicate the good available practices necessary to reduce impacts and/ or comply with standards to the internal personnel structure by means of multi-media documentation as external feeds and embedded videos. Communicate improvements to an audience external in respect of an organization environment.

4 Modules functioning and benefits of E-Platform use

An integrated use of all functionalities available in the E-Platform is possible thanks to the module "Management", the last item of the menu of the PrAA. This module allows the creation of new users and new sub-sets of users or subsidiaries, where for subsidiary we intend a set of users excluding another set from the access of specific folders, functions and documentation (e.g. checklists of standards schemes' requirements). Therefore the general structure of the users' system and the assignment and access to functionalities follows a hierarchical order. Nevertheless, the top-down approach does not exclude the possibility of creating a users' structure of one single equal level. In this way the e-platform use can be adapted to the several type of chain governance (figure 4.1).

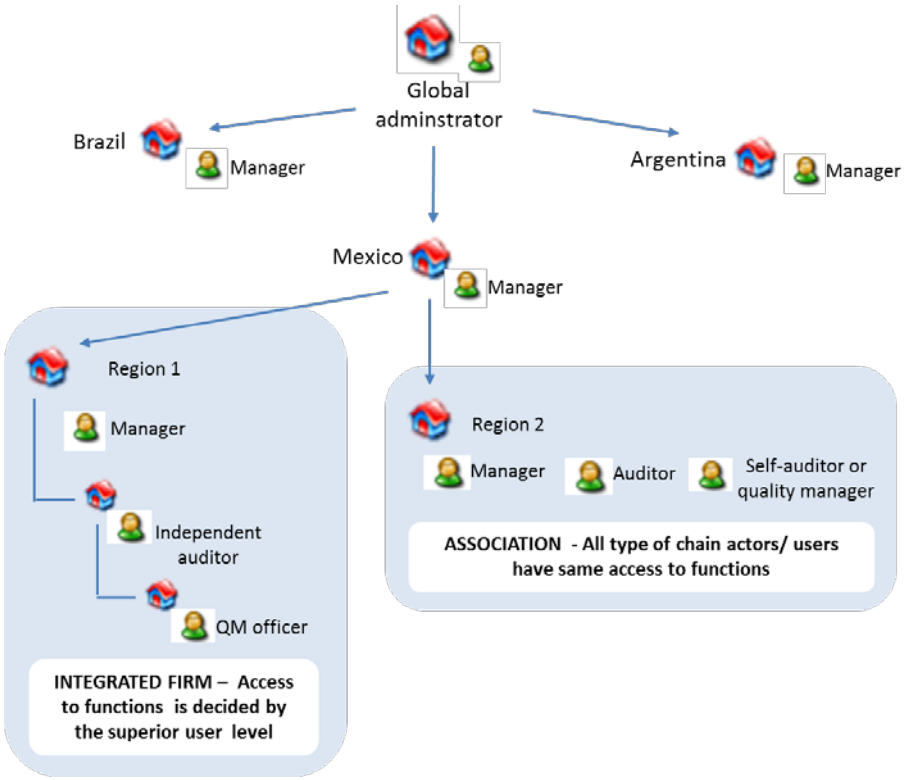

Figure 4.1. Type of chain governance and related e-platform users' structure

The flexible assignment of functionalities has the two main advantages of simplifying implementation processes and protecting the privacy of an organization. As an example we can imagine that an association of producers intends to comply with a set of requirements to improve its performances. The situation requires the establishment of different roles: a program manager, two field officers and 20 self-auditors in 20 different farms spread on five

regions. The program manager would have the overall modules view. The field officers would have access only to modules a), b) and c), while the farms' self-auditor would have only a partial view of module c) (figure 4.2).

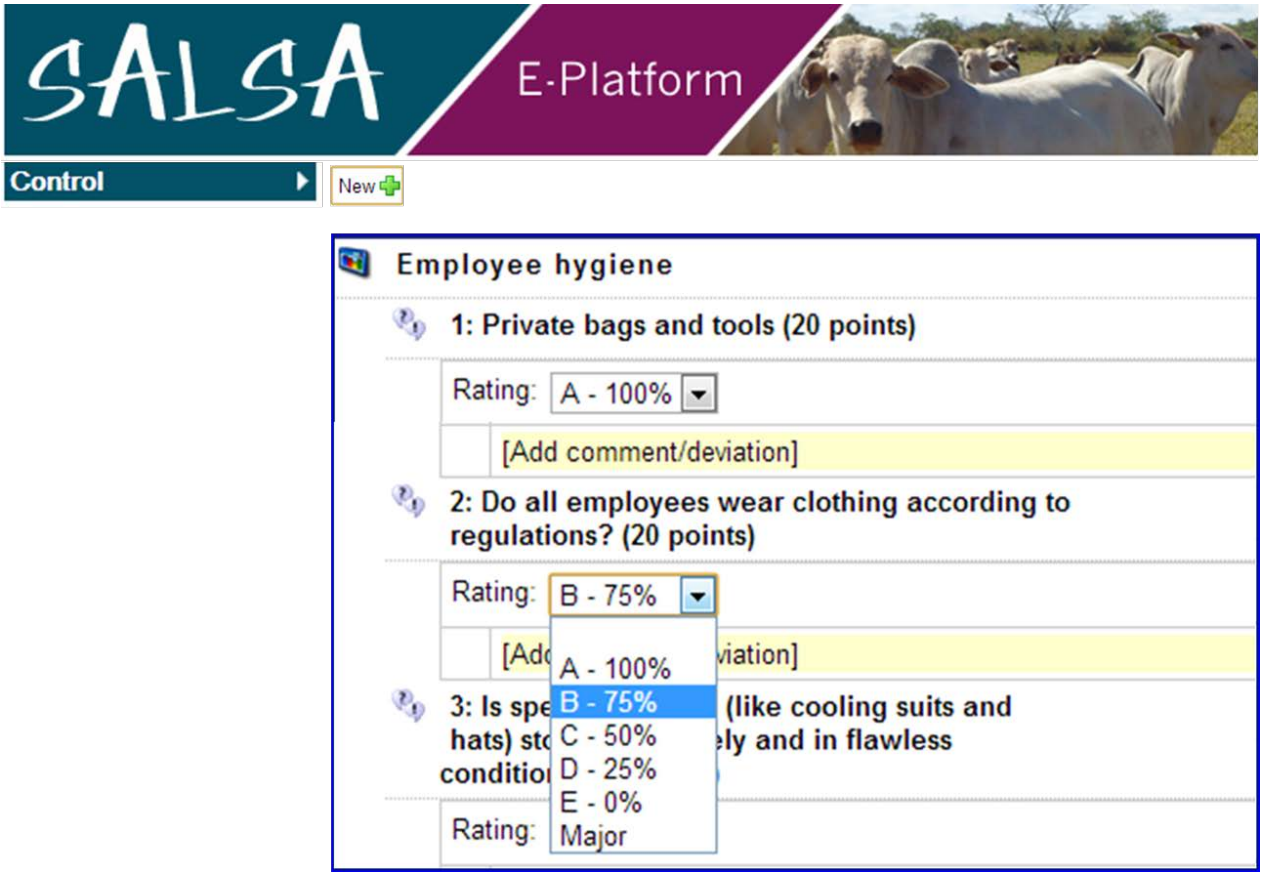

Figure 4.2. View of a user having access only to module c) for audit execution.

In this case the unique option left to self-auditors, due to its design, will require no additional training time and resources for the understanding of its functioning. The tool is set in a way that its comprehension is for every category of users as much self-explanatory as possible. In regard of documentation privacy, we could imagine that every field officer set-up a series of folders containing sensitive data for the activity of every single farm (e.g. key-accounts, suppliers, bills, pesticides applications register, checklist of requirements, etc.). Keeping in mind that farms remain market competitors even if in the same program, the use of the e-platform and its users' structure would not allow a field officer or a self-auditor of farm A to access audits' results or checklists of farm B.

After the creation of a users' structure mirroring the organization's structure by means of the management module, the user can profit from the other modules available and assigned to him. In order to clarify how the single module works and how it addresses the issues reported in paragraph two, we can imagine that a user received access to modules a), b), c) and d) . We go through their functioning by following the same order.

The module a) corresponds to a Document Management System (hereafter DMS) and it has two main documentation functions. The first is to generally inform, in all its theoretical and practical aspects and with particular regard to the situation of Brazil, Argentina, Mexico and Europe, about the overall theme of sustainability. Practically, documents (PDF files, web links, and webinars) are uploaded in the folder "Explore Knowledge on Sustainability" and every user having access to the DMS is enabled to read them. The second function is the management of the internal documentation of the company. Here the user is able to control, provide and/or deliver the relevant documentation necessary for the administrative evidences accompanying the production processes of the organization. The presence of a digitalized documentation system for a widely spread organization of producers allows to consistently lessen the administrative burdens related to the management of any policy directed towards improvements of the productive system. Specific documents can be recalled immediately from a

central control point at any time. Through feedbacks' signals linked to the folders, the user on top of the hierarchy is sure that documents are read by the responsible persons and are ready for submission by due time (e.g. prior to ware delivery).

The module b), denominated Analysis, allows a user to perform a Life Cycle Integrated Assessment for soymeal and beef supply chains. The module, in terms of environmental impacts calculation, bases mostly on current Life Cycle Analysis methodologies. Although several unresolved issues (Reap J., 2008), this methodology has been identified by project partners as the most appropriate approach to obtain impacts information related to beef and soy production systems (Meuwissen M., 2013). The assessment method has been then integrated by the addition of social, economic and governance impact categories, hence following the Sustainability Assessment of Food and Agriculture Systems guidelines issued by the Food and Agricultural Organization (FAO, 2012). The system boundaries of the model, on which the module has been drawn, includes the agricultural production, the processing stage and the transportations from farms to processing sites (mill or slaughterhouse) and from processing sites to Latin America harbors. The scope of the analysis is to link impacts of global warming, energy consumption, water consumption, biodiversity, operating profits, employability, working conditions, food safety and barriers to chain entry, to the two functional units kilo of soymeal and kilo of beef, in order to obtain the state of the art of a production system and monitor its sustainability improvements. Moreover, the calculation system allows benchmarking the user results with other type of production methods (e.g. genetically modified soy, non-genetically modified soy, organic) and additionally to calculate an overall sustainability assessment by means of a mono-dimensional indicator. The module requires the user to follow a two steps procedure. The first window asks for setting analysis parameters as follow: the country, the system boundary (chain stage), the category of impact and the way output results are displayed (figure 4.3).

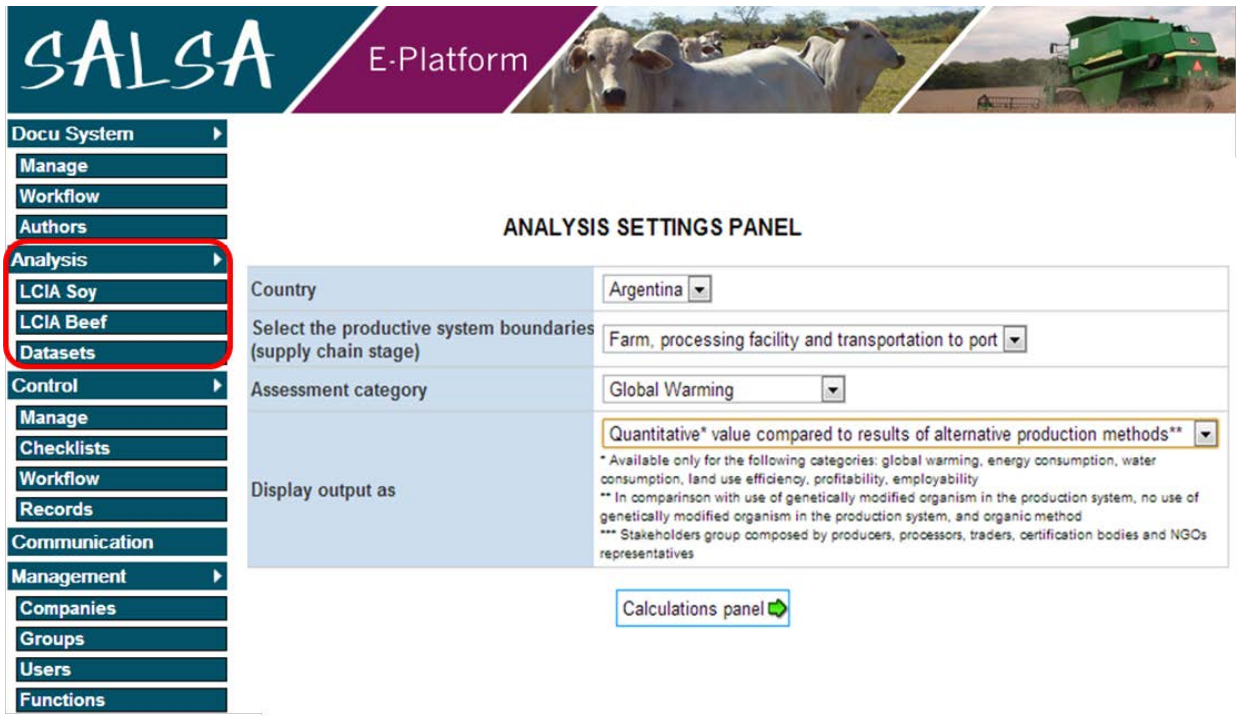

Figure 4.3. First window of the module Analysis

Once confirmed the analysis' parameters, the user accesses the second window; this one is divided in two sub-sections: the one of the left side requires, through a dialog box, to enter production's inputs information, the one of the right side shows the results in form of numerical value and graph (figure 4.4). The advantage of the module Analysis is that it conveys in a single tool a rigorous time-intensive analytical method with an extremely user-friendly interface. Going back to the example of an organization whose objective is the implementation of sustainability measures, we can say that its analysts would have a hard time requiring the many necessary data to model time by time the several production units' processes requested by current on market LCA software.

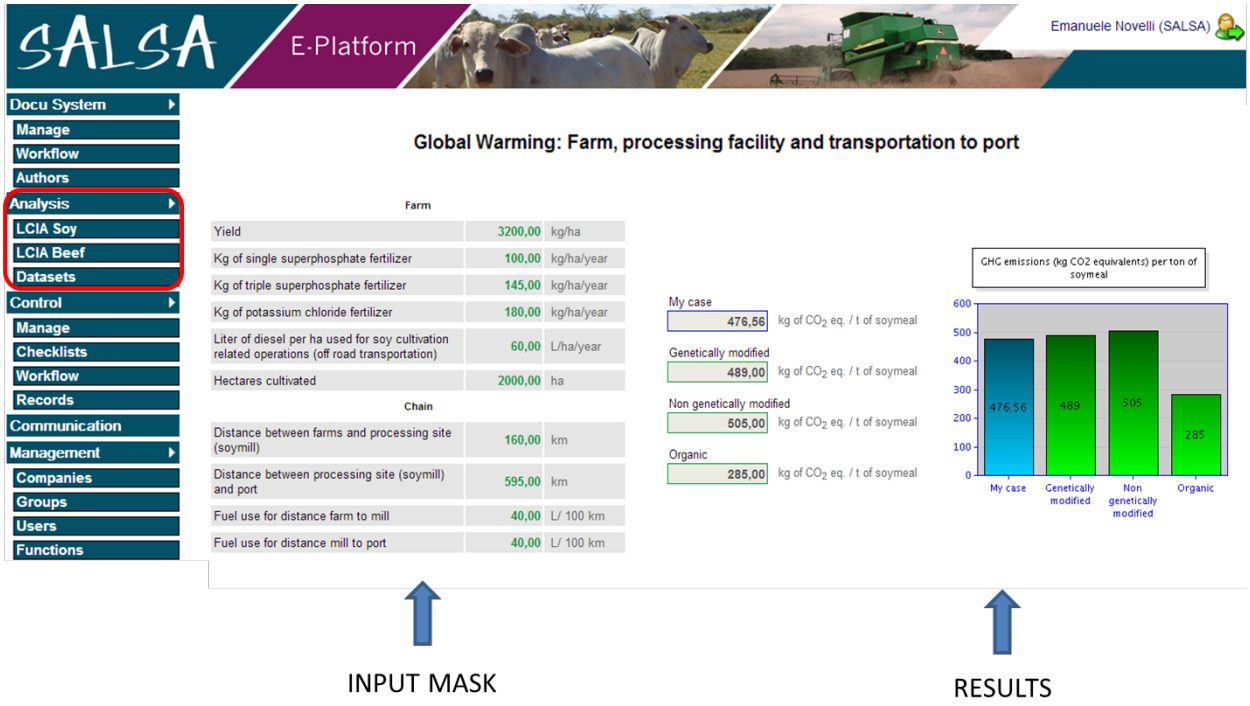

Figure 4.4. Second window of the module Analysis

Nevertheless this information is necessary to fully describe the potential impacts. Farmers or responsible employees would not be willing to provide detailed data, or if they would, doubts on data quality would be more than justified. In the module here presented we drastically reduced the inputs required for every impact category so that at least 95% of the final impact can be reported. Moreover, we parameterized, where possible, some similar variables across the types of productive system we aimed at supporting. Last, all input data provided are user related, therefore protected from third parties, and they can be saved and recalled by the user at any moment without any further time investment.

The module c) or Control allows the user to perform audits and has the primary objective to foster self-assessment in production units so that they can pass inspections from independent bodies at a first try, therefore avoiding to stumble a second time across certification costs. The module is divided in three operational parts: checklists creation, audit execution and audit records. By means of the first part the user is able to insert in the system sets and sub-sets of requirements as categories and sub-categories. For every inserted requirement is possible to assign a weight and to decide whether it has a non-conformity function, hence it can invalidate the whole checklist audit result (figure 4.5).

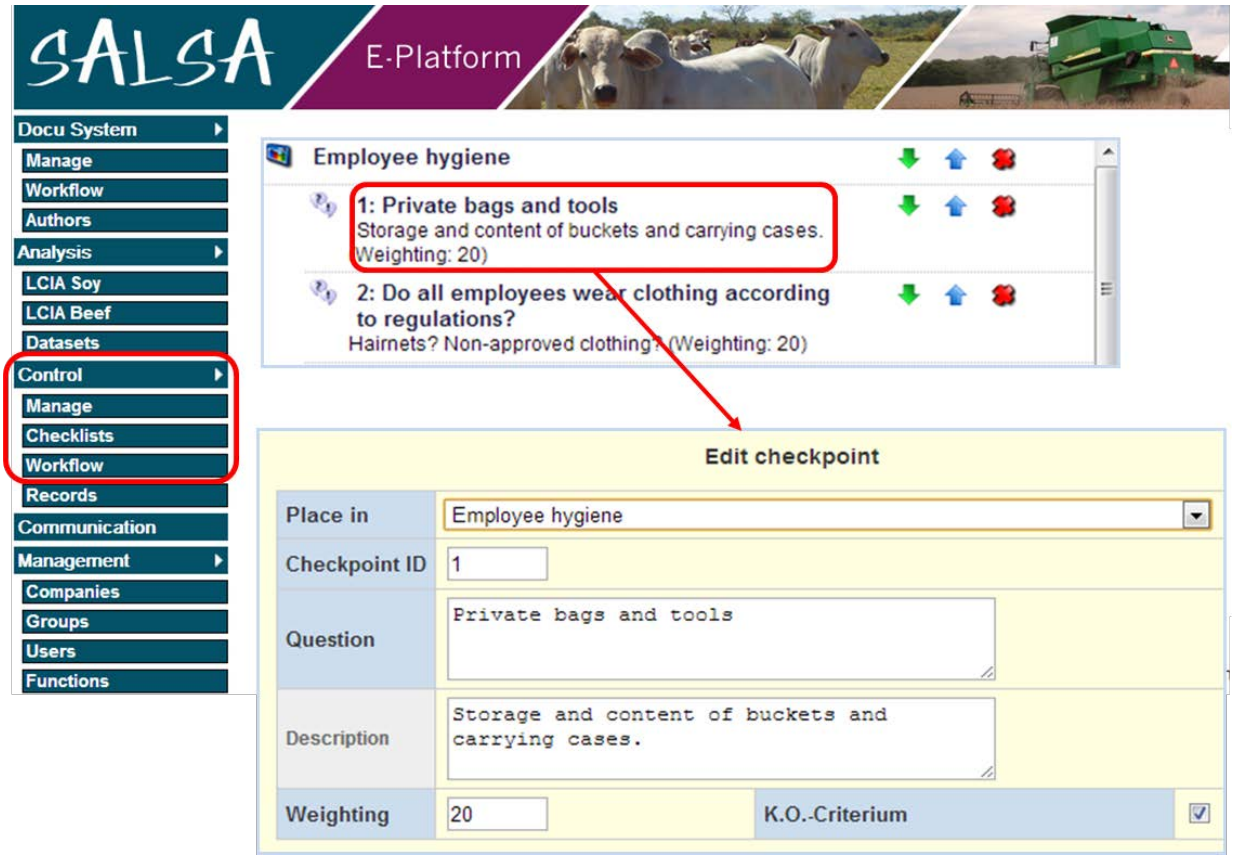

Figure 4.5. Checkpoint creation and requirements score

The second operational part of the module consists of the possibility to select one of the already created checklists and to assign a score to every requirement. The scoring system is analogous to the one suggested in the IFS Food Standard (Version 6) and therefore based on four classes of requirements' compliance expressed in percentage. The higher the percentage, the higher is the deviation from the optimum, namely the full compliance. Failing requirements, invalidating the complete checklist, are marked through majors and knock out scores. Once the audit has been performed it is possible to generate an audit report in a csm file format. The file contains a structured summary of the audits outcomes and indicators. The file can be simply copied and pasted in any office software suit to be further personalized and beautified for presentations or for counterfactual paper evidences. The last operational part of the module c) is the audit records. Here it is possible to keep track of all audits performed individually or by sub-users. This part allows the user to simply surf among thousands of data, to sort them by score, or by execution date and to recall reports of a specific auditor. Moreover, every recorded audit can be marked through an evident icon as "passed" or "not passed"; therefore the cause of failure can be rapidly traced back and addressed. The module Control is a natural subsequent step of the module Analysis. Once determined which impacts should be addressed it is necessary first to find suitable mitigation actions and secondly to implement them. Keeping in mind the perspective of supply chain actors, the measures to implement and therefore to include in the checklists, should be suitable in terms of impacts' reduction effectiveness as much as market recognition. Every measure to implement would require financial, human resources and time investments and no operator would simply commit himself to these expenses without a proper return. In most cases the first type of return concerns the reputation of the operator (Friedrich N., 2012), the possibility to overcome entry barriers to foreign markets and the compliance with their legislation (BS BIOS - ENERGIA RENOVÀVEL, 2014). In a second step, also organizational benefits such as higher production efficiency, strengthening of corporate culture and identity, better intra-chain communication (Rota C., 2011) and reduction of costs, could arise as long-term results of implemented measures (BISS2012 - Summer School on Responsible Business, 2012) .

In this respect the first operational part of the module offers the possibility for the user to select the most appropriate set of measures among a list of standards or funding schemes already established in the national and international markets: Round Table on Responsible Soy production standard, Round Table on Responsible Soy chain of custody standard, Soja Plus, Low Carbon Agriculture Program (ABC), Norma Regulamentadora 31, Global G.A.P. Combinable Crops, etc.

In addition to the implementation support of sustainability measures, the module Control in combination with the module Management can as well foster better coordination policies. For example a new set of legislation requirements can be translated into a checklists approved by the parties representatives of those institutions commanded to comply. The hierarchical users' structure of the system would allow then to satisfy the basic requirements of the checklist and to add other requirements needed to cope with the specific situation of the sub-system (figure 4.6).

The module d) or Communication corresponds to a website created through the Content Management System open-source software Joomla 2.5. The function of this module is twofold. On the one hand it allows communicating achieved results of many Salsa partners to the broader internet audience and therefore it serves as a marketing tool, on the other hand it permits, by means of a private log-in, to access further implementation support material under the form of news feeds from technical journals and magazines.

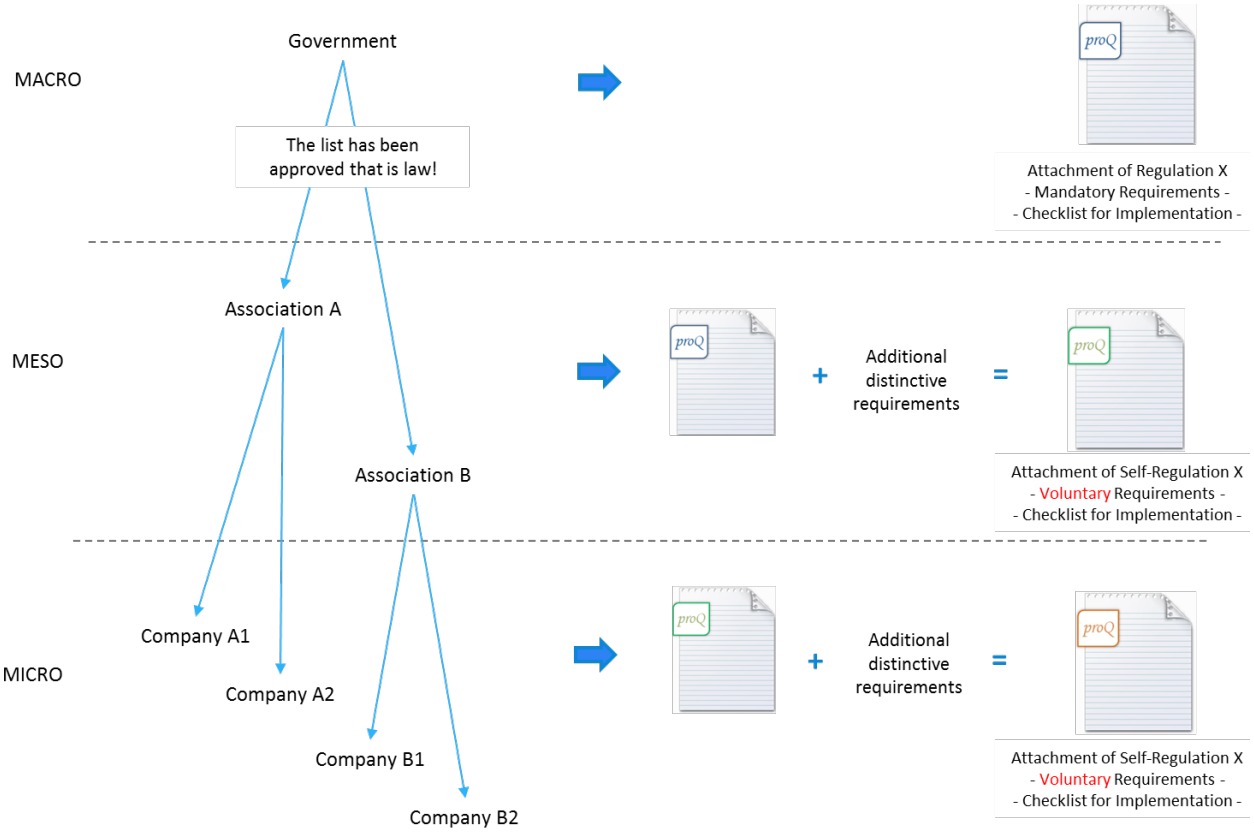

Figure 4.6. E-Platform use for coordination of the implementation of sustainability policies

Due to its suitability for deployment of information to farmers (Mbuvi, 2013), this part of the system makes as well use of videos to display and explain good practices. This module too allows creating a users' structure following a hierarchical order. As a consequence effectiveness of communication increases because every web material can be personalized and targeted to every specific final recipient.

In the table of figure 4.7 we report a summarizing view of how the E-Platform intends, through its features, to support the implementation of sustainable practices. Stakeholders are classified by country, product and chain stage.

Country	Product	Expressed needs for the implementation of sustainable practices by stakeholder type		E-Platform features supporting the supply chain stakeholder
Mexico	Beef	Association of producers/ Consultants	• No higher certification costs. • No additional documentation to achieve certification. • Data confidentiality of single farms.	• Hierarchical audit system • Digital and centralized documentation system. • Document Management System.
		Processers	• Monitoring and implementation systems to grant high quality standard of the supply and to support training of suppliers.	• Hierarchical audit system • Content Management System (videos on best available agricultural practices)
Brazil	Soymeal	Association of producers/ Consultants	• No higher certification costs. • No additional documentation to achieve certification. • Simple impact calculation methodologies and data collection. • Self-assessment/ pre-audit.	• Hierarchical audit system • Digital and centralized documentation system. • Life Cycle Integrated Assessment module with simplified inputs mask.
			• Standards scheme recognized by European market/ price premium. • Clear and simple method for GHGs emissions accounting in order to access European biofuel and feed market (RED Regulation).	• Checklists of current available standards schemes in the module Control • Life Cycle Integrated Assessment module with simplified inputs mask.
	Beef	Association of producers/ Consultants	• No higher certification costs. • No additional documentation to achieve certification. • Access to European market. • Self-assessment/ pre-audit.	• Hierarchical audit system • Digital and centralized documentation system. • Checklists of current available standards schemes in the module Control
		Processers	• Monitoring and implementation systems to grant standard of production and to support training for suppliers.	• Hierarchical audit system • Content Management System (videos on best available agricultural practices)
Argentina	Soymeal	Association of producers/ Consultants	• No higher certification costs. • No additional documentation to achieve certification.	• Hierarchical audit system • Digital and centralized documentation system.
EU	Soymeal	Processers/ retailers associations	• Traceability and physical separation of no GMO soymeal. • Certification: no use of forest areas for soy production	• Hierarchical audit system • Digital and centralized documentation system. • Document Management System.

Figure 4.7. Summary of e-platform features addressing stakeholders' implementation needs

5 Current use and future developments

The Salsa E-Platform is currently in a testing phase in Mexico, Argentina and Brazil. Mexican partners are currently in charge of testing the LCIA module for what concerns beef production. The two main methods of Mexican animal production will serve as test cases: feedlot-finishing system and cow calf line rearing system. Differently, in Brazil the E-Platform as a whole is already in use as a pilot for the implementation of a sustainability program concerning the soy production sector. The program is called Soja Plus and its main objectives are to improve conservation of natural resources, governance of productive activities, and social welfare of workers, farmers and local communities. The pilot will involve several farmers associations and soymeal producers of the state Mato Grosso Do Sul (e.g. Aprosoja-MS, Sapé Agropastoril Ltda, BSBIOS Energia Renovável, Grupo Palhano SA) and will operationally support land use regulation, fulfillment of labor rights, health care measures in the field, prevention of accidents/ contamination and better workplace safety conditions. The E-Platform is currently in use in Argentina as well for both soy and beef producers. Main responsible for the use of the tool is the Fundacion Solidaridad Latinoamericana an ONG currently in charge of sustainability programs as Soy Fast Track Funds and Sustainable Livestock.
The feedbacks deriving from the above mentioned use-experiences will be later considered for an updated version of the E-Platform. Currently many efforts are under development for the improvement of the PPAA and the communication of good available practices through the module d) of the E-platform.

6 Conclusions

In view of future global food system challenges, we presented here a management on-line tool for the support of sustainable programs/ measures implementation. The system architecture has been thought to overcome some of the main problems that can be recalled from literature and it has been shaped on the specific food chains of beef and soymeal between Europe and Latin America. The software tries to address by means of a modular structure, the many issues highlighted from both practitioners and researchers of the sustainability discipline. The system, currently on fields-test, presents as strengths the possibility to mirror an organization structure in a users' structure, the simplified impacts analysis method, the combination of analytical tools with implementation tools and the inter-exchange of information across the many modules. All these features reflects the supply chain actors' needs for tools able to grant confidentiality of the information provided, control of existing or new processes, access to knowledge on market acceptance of sustainability standards and easiness of use. Currently the E-Platform is used in Brazil, Argentina and Mexico for support to several programs concerning the sustainable production of soymeal and beef. Feedback from these experiences, together with parallel running improvements of the module for internal communication, will help to improve the overall usability of the system, its future viability and the understanding of management innovation drivers of global sustainable food production systems.

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