

Development of a Social Sustainability Measurement Scale in Supply Chains

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Abstract

Sustainable development can be achieved by integrating three main core areas: Economy, Environment and Society. Although these three areas have the same importance both individually and as a whole, there has been a fairly strong development either in economic and environmental component and a slower development associated with social component. This paper discusses the importance of the social pillar in sustainable development, highlighting the need for a quantitative assessment of social sustainability at the same level of economic and environmental sustainability. The social sustainability assessment process should be applied throughout the supply chain allowing the evaluation of social sustainability related to different supply chains. This paper also presents a set of quantitative indicators that assess social sustainability in supply chains in order to be able to create a scale that can measuring social sustainability in supply chains. The methodology used to develop this study began with a review of existing literature related to indicators of social sustainability then, it was necessary adapting a set of indicators allocated to different categories of social impact in order to evaluate social sustainability in supply chains. An inquiry administered to different organizations enable the study of the proposed set of indicators. The results suggest that social sustainability indicators are considered important by organizations although its importance varies according to the level in which organizations operate in the supply chain.

Keywords: Social Sustainability; Social Sustainability Indicators; Social Sustainability in Supply Chains; Sustainability

1. Introduction

Sustainability focuses on economic development, environmental protection and social acceptance using the available resources of the present without compromising future generations (Egilmez et al., 2015). The concept of sustainable development introduces a new vision of how to develop the economy, environment and society at the same time. The importance of sustainability lies in the integrated development of the economy, environment and society. However, areas such as economy and environment continues to be the most debated in organizations, society and scientific community (Hutchins and Sutherland, 2008).

Sustainable development is present in the different levels of stratification of a society, in families, companies, associations, countries, in the world in general. It is the focus on the supply chains that will allowing the verification of the presence of sustainable development associated to the organizations which are part of the supply chains (Meckenstock et al., 2014). Supply chains are dynamic and evolving structures composed of various stakeholders, that by applying their

business models, develop products and services desired for final customers (Foran et al., 2006).

Supply chains accompanied the evolution of society due to the end user requirements, but also because the concern of society about issues related to economic and environmental sustainability. Traditional supply chain evolved into reverse supply chain where it becomes necessary to reverse the traditional flow, ensuring that the recycling of products or materials happens (Beamon, 1998).

The evaluation of the overall performance of supply chains is an evolving process. In the present, some existing performance evaluation methodologies are very focused on the individuality of organizations. Each organization uses the methodology of evaluation that considers more appropriate for their business model in the absence of methodologies that enable the assessment of the supply chains performance. One of the challenges for the development of this study is the integration social sustainability assessment in the supply chains structures.

This paper intends to highlight the study on social sustainability in supply chains by identifying and explaining a set of indicators that can be used to

evaluate and measure social sustainability This paper also will demonstrate the importance of the assessment of social sustainability in supply chains, where the interactions between products and organizations, material and information flows happen. During this paper, it is proposed a set of quantitative indicators, validated through a inquiry that was administered to organizations of different supply chains.

The remaining paper is organised as follows: section 2 refers the key points about social sustainability found in the review of the literature. Then, section 3 shows and explain all the steps of the methodology used in this study. Section 4 presents the 54 indicators of social sustainability and the results of the inquiry administered to a set of organizations in different supply chains. The paper ends in section 5 with some conclusions about this study as well as the importance of social sustainability in different levels of supply chains.

2. Literature Review

2.1. Social Sustainability

"The development that meets the needs of the present without compromising the ability of future generations to meet their own needs" It is the definition of sustainability that was presented in the Brundtland World Commission on Environment and Development (WCED), which presents itself as a lever for sustainable development. Egilmez et al. (2015) stated that "sustainable development was first initiated the environmentally friendly, economically feasible and socially acceptable" (Egilmez et al., 2015). After the definition of sustainability by the WCED, other authors have come up with new definitions trying to apply the concept of sustainability in organizations. Hutchins and Sutherland (2008) enhances that sustainability must be a path that leads to decision-making in organizations and proposes another definition of sustainability "[design and operation of] human and industrial systems to ensure that humankind's use of natural resources and cycles do not lead to diminished quality of life due either to losses in future economic opportunities or to adverse impacts on social conditions, human health and the environment" (Hutchins e Sutherland, 2008). The concept of sustainability uses three different areas that worked together lead organizations to sustainable development. The TBL (Triple Bottom Line) is seen as a methodology that indicates the evolution of business performance and the value creation in the three pillars of sustainability: Economic, Environment and Society (Gimenez et al, 2012).

The literature shows that within the three pillars that make up the TBL, social sustainability is the dimension that is less developed and less studied and should therefore, become a major focus within an organization's policies. Many authors and researchers have been finding different definitions and frameworks for social sustainability, applying into the organizations, concepts related with community, social equity, education, employment, health, human capital,

justice, social development and others (Mani and Agrawal, 2014). The application of social sustainability in supply chains is seen as a new paradigm and should be studied and evolved nowadays.

2.2. Social Sustainability in Supply Chains

Supply chains refers to the set of all activities that are associated with the development of a product from extraction of raw materials to the final consumer, integrating all processes and economic flows, and communication materials that circulate in the chain (Seuring & Müller, 2008). Since supply chains are complex structures it is necessary an integrated management of all flows in order to optimize processes and ensure sustainable benefits.

Social sustainability in supply chains comes with the attempting of trying to integrate into supply chains, the social and human aspects, their needs, impacts and opportunities (Mani and Agrawal, 2014).

For many authors, social sustainability combined with corporate social responsibility can have results that must be evaluated in supply chains. These two concepts aligned encourage the participation of all stakeholders, focusing the attention of organizations in the social impacts that they generate the same stakeholders. This creates a cycle which improve social aspects between organizations and stakeholders, resulting in the development of social sustainability along the supply chain.

2.3. Social Impact Categories

Related to the development of this study it was necessary to review the concepts underlying the social impact categories developed by Simões et al (2014) in order to allocate in each category, different indicators capable of the evaluation of social sustainability aspects associated with each category. The following statement summarizes the social impact categories.

Employment Scope: Benefits and Characteristics

- Assessment of the basic job characteristics, existing contractual and compensation policies of the company as well as the benefits provided to the employees.

Employment Practices and Relations

- Evaluation of the internal disciplinary practices and the existing codes of conduct in a company, disclosing the labour rights' strength and the current relations between the workforce, the unions and the company.

Health and Safety Practices and Incidents

- Assessment of the organisation's duty of care towards its workforce, being its ultimate point to evaluate the success of the implementation of a responsible H&S culture in all business units.

Training: Education and Personal Skills

- Assessment of the level of commitment from the company to improve the human capital's skills.

Diversity and Equal Opportunities - Evaluation of all kinds of measures encouraging human capital diversity, equal opportunities and inclusion within the organisations.

Employee Welfare - Measurement of key essential aspects related to employee morale, employee satisfaction, employee wellbeing with the job.

Innovation and Competitiveness - Understand the organisation engagement in more innovative technological solutions, emphasizing on existing incentives that strengthen the innovation ability and optimise Research and Development (R&D).

Human Rights implementation and Integration - Provides evidence about the capacity and effectiveness of the policies aiming at preventing internally and externally (with suppliers) human rights violations.

Basic Human Rights Practices - Evaluation on management practices related to issues of non-discrimination and human rights.

Community Funding and Support - Measurement of direct and indirect financial support as well as material resources that the impacted communities are benefiting.

Business Impacts: Community Involvement and Welfare - Evaluation on the positive and negative externalities created by the business that impact on the society social performance, the communities and the delivered social value.

Corruption in Business - Evaluate what kind of good business practices the organisation has implemented in order to reduce its exposure to corruption practices both internally (own employees) and externally (business partners).

Fair Business Operations - Addresses the issues of fair competition, lobbying and compliance with legal requirements by the reporting organisation, thus providing a means of measuring accurately the integrity of practices and the potential impacts on stakeholders, especially the employees, the shareholders and the government.

Stakeholder Participation - Gauges the stakeholder involvement, influence and empowerment in the organisational business initiatives.

Consumer Health and Safety - Assessment on the consumer H&S threats, product quality as well as the pathways of the product social and environmental impacts across its life cycle.

Product Management and Consumer Satisfaction - Evaluation of the interactions between the consumers, the product and the company through the assessment of the issues related to product

commercialisation, brand awareness and legal consumer services.

3. Methodology

For the Development of this study was necessary to follow a methodology with all the important steps to obtain relevant conclusions about social sustainability in supply chains. It was defined the following main steps:

- Identification of the indicators related to social sustainability;
- Allocation of the indicators in the 16 categories of social impact;
- Aggregation and definition of the indicators considering the focus on supply chains;
- Validation of the indicators using an inquiry;

Identification of the indicators related to social sustainability

It was conducted a literature review to be possible to identify and remove from the scientific papers, all the indicators that were related to social sustainability. 249 indicators were selected and placed in a database that collected all the indicators identified.

Allocation of the indicators in the 16 categories of social impact

The next step was related with the distribution of all the indicators gathered in the database created in the first step. It was necessary to allocate all the 249 indicators in the correct social impact category. Simões et al, (2014) defined 16 social impact categories, each of them related to different aspects of social sustainability that need to be evaluated and monitored by different indicators. All the 249 indicators were allocated to one social impact category.

Aggregation and definition of quantitative indicators considering the focus on supply chains

After the allocation of the 249 indicators in the 16 social impact categories, it was necessary to verify which indicators were similar and which indicators were measuring the same social sustainability aspect. It was carried out a revision of the indicators in order to aggregate those who were closely related and identifying those who assessed quantitative parameters. After the aggregation of the set of indicators, it was required to establish a definition of each indicator as well as a mathematical formula that provides quantitative results, in a way that could be possible the assessment of social sustainability in different supply chains.

Validation of the indicators using an inquiry

The validation of the indicators studied was possible through a social sustainability inquiry applied to different organizations in order to obtain some information about the importance, the allocation to the 16 social impact categories and the utilization of the 54 indicators by the organizations of different supply chains. The main objective of the inquiry was to gather information

of the mentioned organizations in order to verify the possibility that the 54 social sustainability indicators were suitable to evaluate the social sustainability in supply chains.

4. Results and Discussion

In the literature that was reviewed was impossible to find a set of indicators able to assess social sustainability in supply chains. This study focused on the goal of stipulating a set of indicators to assess social sustainability and allow the comparison between the performance of different supply chains.

4.1. Social sustainability indicators

The methodology used to establish a set of indicators began with the definition of a database that contained indicators capable to assess aspects of sustainability, more specifically aspects related to the social pillar. Were gathered in the database, 249 indicators that were within the above-mentioned conditions. These indicators evaluate parameters applied to organizations, not always this evaluation was quantitative and wasn't applicable in supply chains. This work aggregated the 249 indicators in 54 quantitative indicators allocated in each of the 16 social impact categories mentioned above. This set of indicators focuses is evaluation in all organizations of the supply chain and introduces a new way of measure social sustainability in supply chains. It is shown below the set of indicators proposed in this study segmented by the 16 social impact categories.

Indicators related to Employment Scope: Benefits and Characteristics

Employee turnover

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{R_i + RD_i}{N_{t_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

R- Number of resigned employees

RD- Number of redundant employees

N_{t_i} - Total number of employees in the supply chain

Employee layoffs

$$\frac{L_{off}}{N_{tot}} \times 100$$

L_{off} – Number of layoffs in the supply chain

N_{tot} - Total number of employees in the supply chain

Working hours

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{WH_{avg_i}}{WH_{avg_l_i}} \right)$$

n- Number of organizations that are part of the supply chain

WH_{avg} - Average number of working hours

WH_{avg_l} - Average number of working hours regulated by law

Full- and part-time employees

$$FT = \frac{N_{full}}{N_{tot}} \times 100 \quad PT = 100 - FT$$

FT – Percentage of full-time employees in the supply chain

PT - Percentage of part-time employees in the supply chain

N_{full} – Total number of full time employees in the supply chain

N_{tot} – Total number of employees in the supply chain

Years of service

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{\sum_{y=1}^Y YS_y}{\sum_{y=1}^Y WY_y} \right)$$

n- Number of organizations that are part of the supply chain

Y- Number of organization workers

YS – Average years of service in the organization

WY- Average years of work of all organization's employees

Indicators related to Employment Practices and Relations

Promotion rate

$$\frac{N_{pe}}{N_{tot}} \times 100$$

N_{pe} - Number of promoted employees in the supply chain

N_{tot} – Total number of employees in the supply chain

Unionized employees

$$\frac{N_{ue}}{N_{tot}} \times 100$$

N_{ue} – Number of unionized employees in the supply chain

N_{tot} – Total number of employees in the supply chain

Indicators related to Health and Safety Practices and Incidents

Time lost

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{DL_{in_i}}{WD_{tot_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

DL_{in} – Days lost due to injury in the organization

WD_{tot} – Total number of working days in a month in the organization

Accidents

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{RA_i}{WH_{tot_i}} \right)$$

n- Number of organizations that are part of the supply chain

RA – Number of recordable accidents in the organization

WH_{tot} – Total site working hours in the organization

Risk assessment

$$\frac{VR}{n} \times 100$$

VR – Number of organizations with risk assessment in the supply chain

n- Number of organizations that are part of the supply chain

Healthcare security coverage

$$\frac{N_{hc}}{N_{tot}} \times 100$$

N_{hc} – Number of employees covered by healthcare given by the organization in the supply chain

N_{tot}- Total number of employees in the supply chain

Implementation of risk control

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{N_{ei_i}}{N_{tots_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

N_{ei} – Number of employees informed about risk control in the organization acerca de controlo dos riscos na organização

N_{tots} – Total number of employees in the organization

Indicators related to Training: Education and Personal Skills

Training

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{TH_i}{NT_{tot_i}} \right)$$

n- Number of organizations that are part of the supply chain

TH – total number of hours of training in the organization

NT_{tot} – total number of employees in training

Education level

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{N_{le_i}}{N_{tot_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

N_{le} – Number of employees with level of education corresponding to the allocated function in the organization

N_{tot} – Total number of employees allocated to a function in the organization

Indicators related to Diversity and Equal Opportunities

Ratio of female/male workers

$$\frac{FE}{ME}$$

FE – Number of female employees in the supply chain

ME- Number of male employees in the supply chain

Wage level female/male workers

$$\frac{FE_{aw}}{ME_{aw}}$$

FE_{aw} – Average female wage in the supply chain

ME_{aw}– Average male wage in the supply chain

Disabled employees

$$\frac{DE}{N_{tot}} \times 100$$

N_{tot} – Total number of employees in the supply chain

DE- Number of disabled employees in the supply chain

Income distribution

$$\frac{\sum_{i=1}^n IT_i}{n}$$

IT – Income of top 10% highest paid employees in the organization

IB– Income of 10% of the lowest paid employees in the organization

n- Number of organizations that are part of the supply chain

Indicators related to Employee Welfare

Vacations

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{VD_{use_i}}{VD_{tot_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

VD_{use}- Number of days used for vacation in the organization

VD_{tot} – Total number of available vacation days in the organization

Work satisfaction

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{SD_{avg_i}}{SD_{nat_i}} \right)$$

n- Number of organizations that are part of the supply chain

SD_{avg} -Average number of sick days per employee in the organization

SD_{nat} - National average sick days per employee

Indicators related to Innovation and Competitiveness

Innovations

$$\frac{IN_{ss}}{INN_{tot}} \times 100$$

IN_{ss} – Number of initiatives for improving social sustainability in the supply chain

INN_{tot} - Total number of innovations in the supply chain

New products

$$\frac{NP}{IN_{ss}}$$

NP - Number of new products in the supply chain

IN_{ss} – Number of initiatives for improving social sustainability in the supply chain

Ratio of investment in R&D

$$\frac{RD_{inv}}{INV_{tot}}$$

RD_{inv} – Investments for R&D in the supply chain

INV_{tot} - Total investment in the supply chain

Scientific publications

$$\frac{Pub_{ss}}{Pub_{tot}} \times 100$$

Pub_{ss} - Number of publications of social sustainability in the supply chain

Pub_{tot} – Total number of publications in the supply chain

Patents

$$\frac{PAT_{ss}}{INN_{tot}}$$

PAT_{ss} - Number of patents related to social sustainability in the supply chain

INN_{tot} - Total number of innovations in the supply chain

Indicators related to Human Rights implementation and Integration

Personnel training in aspects on Human Rights

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{T_{hr_i}}{N_{t_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

T_{hr} - Number of employees trained in aspect of human rights in the organization

N_t – Total number of employees in the organization

Child labour

$$\frac{CL}{N_{tot}} \times 100$$

N_{tot} – Total number of employees in the supply chain

CL – Number of cases of child labour in the supply chain

Bonded labour

$$\frac{BL}{N_{tot}} \times 100$$

N_{tot} – Total number of employees in the supply chain

BL - Number of cases of bonded labour in the supply chain

Collective bargaining agreements

$$\frac{N_{ca}}{N_{tot}} \times 100$$

N_{tot} – Total number of employees in the supply chain

N_{ca} - Number of employees covered by collective bargaining agreements in the supply chain

Indicators related to Basic Human Rights Practices

Discrimination

$$\frac{IN_{tot}}{N_{tot}}$$

IN_{tot} – Total number of incidents related with discrimination in the supply chain

N_{tot} – Total number of employees in the supply chain

Employee complains

$$\frac{C_{tot}}{N_{tot}}$$

C_{tot} - Total number of complaints from employees in the supply chain

N_{tot} – Total number of employees in the supply chain

Indicators related to Community Funding and Support

Share of distributed revenues

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{CC_i}{R_i} \times 100 \right)$$

n- Number of organizations that are part of the supply chain
 CC- Community monetary contributions made by the organization
 R- Revenue of the organization

Social projects

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{IN_{sp_i}}{S_{tot_i}} \right)$$

n- Number of organizations that are part of the supply chain
 IN_{sp}- Investment amount in social projects in the organization
 S_{tot}- Total amount of sales in the organization

Support for cultural preservation

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{MG_i}{B_{tot_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain
 MG – Money given for support purposes and cultural preservation by the organization
 B_{tot} – Total budget of the organization

Indicators related to Business Impacts: Community Involvement and Welfare

Community complains

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{C_{comp_i}}{R_i} \right)$$

n- Number of organizations that are part of the supply chain
 C_{comp} – Total number of community complains to the organization
 R- Revenue of the organization

Volunteering activities

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{V_{tot_i}}{N_{tot_i}} \right)$$

n- Number of organizations that are part of the supply chain
 V_{tot}- Total number of volunteer hours in the organization
 N_{tot}- Total number of employees in the supply chain

Indicators related to Corruption in Business

Risk of corruption

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{BU_{a_i}}{BU_{tot_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain

BU_a- Number of business units in an organization assessed about risk of corruption
 BU_{tot}- Total number of business units in the organization

Employees trained for anti-corruption

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{T_{ac_i}}{N_{t_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain
 T_{ac} – Number of employees trained for anti-corruption in the organization
 N_t- Total number of employees in the organization

Indicators related to Fair Business Operations

Support for political parties

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{FS_i}{B_{tot_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain
 FS – Amount of financial support provided by the organization to political parties
 B_{tot}- Total budget of the organization

Anti-competitive behaviour

$$\sum_{i=1}^n (AL_i)$$

n- Number of organizations that are part of the supply chain
 AL – Number of legal actions related to the anti-competitive behavior of the organization

Sanctions for non-compliance with law

$$\sum_{i=1}^n (M_i)$$

n- Number of organizations that are part of the supply chain
 M – Number of sanctions for non-compliance with the law to the organization.

Indicators related to Stakeholder Participation

Strategic cooperation

$$\sum_{i=1}^n (CE_i)$$

n- Number of organizations that are part of the supply chain
 CE – Number of strategic cooperations related with the organization

Community forums

$$\sum_{i=1}^n (CF_i)$$

n- Number of organizations that are part of the supply chain
CF – Number of community forums related with the organization

Complaint channels

$$\sum_{i=1}^n (CR_i)$$

n- Number of organizations that are part of the supply chain
CR – Number of complaints channels in the organization

Response to information request

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{\sum_d R_d}{R_{tot}} \right)_i$$

n- Number of organizations that are part of the supply chain
D – Information requests
R_d – Number of days needed for the organization respond to requests for information
R_{tot}- Total number of requests for information about the organization

Employment involvement in decision making

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{N_{dm_i}}{N_{t_i}} \times 100 \right)$$

n- Number of organizations that are part of the supply chain
N_{dm}- Number of employees involved in decision making in the organization
N_t- Total number of employees in the organization

Indicators related to Consumer Health and Safety

Health complains

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{HC_i}{P_{tot_i}} \right)$$

n- Number of organizations that are part of the supply chain
HC- Total number of health complains related to the organization
P_{tot}- Total number of products of the organization

Indicators related to Product Management and Consumer Satisfaction

Supply chain cycle time

TCA – Total supply chain cycle time

Percentage of repeated customers

$$\frac{RC}{C_{tot}} \times 100$$

RC – Number of repeated customers in the supply chain
C_{tot}- Total number of customers in the supply chain

Average period of relationship

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{\sum_{b=1}^B RLC_b}{C_{tot}} \right)_i$$

n- Number of organizations that are part of the supply chain
B – Customers of the organization
RLC_y – Number of years of relation with customer in the organization
C_{tot}- Total number of customers of the organization

Inspection and quality audits

$$\frac{SC_{insp}}{SC_{tot}} \times 100$$

SC_{insp}- Number of suppliers and contractors that are subject to quality inspections in the supply chain
SC_{tot}- Total number of suppliers and contractors in the supply chain

Compliance with regulations

$$\sum_{i=1}^n (I_i)$$

n- Number of organizations that are part of the supply chain
I – Number of incidents with regulations and laws associated with the organization's marketing communication

Information Infringement

$$\sum_{i=1}^n (CRP_i)$$

n- Number of organizations that are part of the supply chain
CRP – Number of cases reported about violations related to the dissemination of information carried out by the organization

Customer privacy

$$\sum_{i=1}^n (CQ_i)$$

n- Number of organizations that are part of the supply chain
CQ- Number of complaints made by consumers of the organizations related to aspects concerning the privacy of consumers

4.2. Social sustainability inquiry

The development of the social sustainability inquiry represents an important stage in this study. It was necessary to develop an appropriate methodology with several steps (definition of the study sample; elaboration of a draft of the inquiry; inquiry testing and the launch of the survey for organizations) that culminated with the release of the inquiry to different organizations present on Portuguese supply chains. The inquiry got 26 participations that help to collect some data based on the views of organizations regarding the correct allocation of the indicators in the social impact categories, the importance of the indicators and the utilization of the proposed set of indicators by the organizations. The 26 answers obtained are a relatively low number for a robust statistical analysis. Factors such as the inquiry extension, the rules of participation in the inquiry and the subject of the study may have contributed to a low number of responses. In this study it was needed only one participation for each organization in order to assess the weight of social sustainability in organizational structure. Were contacted 182 organizations but only 26 participate in this work. It was used some statistical methodologies that helped the analysis of the data collected from the inquiry. These methods involve the analysis of the average values related to the responses of the organizations, principal components analysis and the Cronbach Alpha method.

4.3. Inquiry results analysis

The analysis of the data from the inquiry consists in the junction of the data related to the overall supply chain as well as the data related to each of the three levels of the chain. All the 54 indicators allowed the identification of the information relating to the importance, the allocation and the utilization of each indicator. Table 1 shows the indicators considered more important for the organizations (green) and the less important (red). Indicators related to the work conditions and health of the employees are important for the organizations. In the other hand, indicators related to the innovation of aspects associated to social sustainability are less important. Support for political parties as well as Collective bargaining agreements are the only two indicators below the midpoint of the scale used in the inquiry (1- slightly important...5- very importante)

Table 1 - Table that summarize the most and less important indicators

Indicators considered most important	Average	Indicators considered less important	Average
Accidents	4,85	Support for political parties	2,58
Employee layoffs	4,58	Collective bargaining agreements	2,62
Discrimination	4,54	Scientific publications	3,04
Time Lost	4,35	New Products	3,12
Community complains	4,35	Innovations	3,12

Table 2 highlights which indicators are considered more and less important in the three levels of the supply chain – upstream, midstream and downstream. It is possible to verify that the indicators related to working conditions are considered more important in the upstream and midstream level of the supply chain (industries and manufacturing). At the downstream level, organizations attribute a greater importance to social topics related to workforce training, human rights and discrimination and the relationship with the community where the organizations are installed.

Table 2 – Table that summarize the most and less important indicators by level of the supply chain

Upstream	Midstream	Downstream
Accidents	Accidents	Training
Employee layoffs	Employee layoffs	Discrimination
Average period of relationship	Healthcare security coverage	Community complains
Healthcare security coverage	Scientific publications	Promotion Rate
Support for political parties	Innovations	Supply chain cycle time
Scientific publications	Collective bargaining agreements	

Related to the allocation of the indicators in the 16 different social impact categories, it is possible to verify only the indicator, Support for political parties have a average value below the midpoint (3) of the scale used in the inquiry (1- incorrectly allocated...5- correctly allocated). It is also possible to verify that indicators related to the employees accidents as well as employee training have a strong average value which indicates that both indicators are allocated to the correct category.

Table 3 – Table that summarize the best and worst indicators in terms of allocation in the social impact category

Indicators considered well allocated	Average	Indicators considered worst allocated	Average
Accidents	4,96	Support for political parties	2,81
Training	4,88	Supply chain cycle time	3,62
Discrimination	4,77	Collective bargaining agreements	3,62
Social Projects	4,73	Information Infringement	3,81
Community complains	4,65	Scientific publications	3,96

Table 4 reveals the best allocation (green) and the worst allocation (red) of the indicators and the social impact categories where they were allocated. It is possible to verify that the indicators related to the support for political parties, collective bargaining agreements and supply chain cycle time were considered less well allocated in more than one supply chain level. Once again, Support for political parties is considered less well allocated in all the three levels of the supply chain.

Table 4- Table that summarize the best and worst indicators in terms of allocation in the social impact category in the three levels of the supply chain

Upstream	Midstream	Downstream
Accidents	Accidents	Training
Implementation of risk control	Discrimination	Accidents
Community complains	Social Projects	Risk of corruption
Support for political parties	Collective bargaining agreements	Supply chain cycle time
Supply chain cycle time	Support for political parties	Support for political parties

Table 5 - Table that summarize the utilization of the indicators in the three levels of the supply chain.

Upstream	Midstream	Downstream
Accidents	Accidents	Employee Layoffs
Training	Employee layoffs	Share of distributed revenues
New Products	Community forums	Patents
Scientific publications	Complaint channels	Support for political parties
Patents	Percentage of Repeated customers	Employees trained for anti-corruption
Support for cultural preservation		
Community forums	Support for political parties	Scientific publications

Table 5 reflects the utilization of the indicators in each level of the supply chain. It is possible to verify that the indicators used by the organizations are related with aspects that are important in the organization structure (employees accidents, employee layoffs, employee training...) and not because are aspects related to social sustainability. It was expected that the results of the utilization of indicators were very low due to the fact that many of the indicators proposed in this study are innovative and attempt to measure social sustainability in supply chains with a focus on quantitative results.

5. Conclusions

The results of this paper are in line with the considerations that Meckenstock et al. (2014) states in its work, where the organizations located in the upstream level of the supply chain attribute greater importance to indicators that measure aspects of health and safety such as accidents and workers injuries. In contrast, give less importance to indicators related to ethics, culture, legislation and justice of business operations. Organizations located in the midstream level of the supply chain attaches special importance to aspects related with health and safety of their workers as well as the aspects related to accidents and injuries. Moreover, aspects related with innovation and development are considered the least important. Organizations located in the downstream level of the supply chain consider that the most important indicators are related to education and training as well as fundamental human rights. In contrast, health and consumer safety it is not considered a major social impact category.

The analysis of the inquiry data shows that five categories of social impact (Health and Safety Practices and Incidents, Diversity and Equal Opportunities; Human Rights Implementation and Integration; Fair Business Operations, Product

Management and Consumer Satisfaction) may contain indicators that are not fully and correctly allocated to the respective social impact category. The notion of correct allocation in the categories of social impact described in this paper must take into account the fact that all categories are quite broad and may include several subcategories of topics related internally. This indicates that the presented indicators may not statistically fit in the right category of social impact in which is allocated but looking at the definition it follows that its allocation makes sense.

The analysis of the utilization of the indicators shows that indicators related to accidents, health and safety of employees and the training of employees are already used on a regular basis by organizations. On the other hand, the indicators defined to measure innovation related to the development of social sustainability as well as the stakeholder's participation aren't used.

From a general perspective, the vast majority of the 54 indicators is considered important and fits in one of the social impact categories. This information indicates that the future steps for the development of social sustainability in supply chains should reside in the continuous development and study related with the applicability of this set of indicators in the three supply chain levels.

6. References

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