POLITECNICO
MILANO 1863

SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE

EXECUTIVE SUMMARY OF THE THESIS

Sustainability performance measurement in food supply chains in Italy: deep diving into social sustainability

TESI MAGISTRALE IN FOOD ENGINEERING – INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE

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ACADEMIC YEAR: 2021-2022

1. Introduction

Sustainability can be defined as "***meeting the needs of the present without compromising the ability of future generations to meet their own needs***" (Brundtland, 1987). The last 40 years have seen its progressive rise towards the definition of a more balanced system promoting a shift in how business in the food and beverage industry (and not only) is approached. The need to push for sustainability practices is rising and the assessment of the performances represents an instrument to constantly track the behaviour and have the awareness of where to intervene. (Yakovleva, Sarkis, & Sloan, 2010)

The preliminary goal of this work is to map the state of the art of sustainable multi-tier supply chain performance measurement systems in the food and beverage industry, identifying enablers and challenges to the implementation of an assessment. After that, the purpose is to create a semi-quantitative decision tool that can be used to evaluate how social sustainability is handled both from a self-evaluation or supplier-centric perspective. The pathway will follow a mixture of qualitative and quantitative approaches while building a multiple case study framework comprehensive of a set of key performance indicators and interviews.

2. Literature review

The first phase of the study consisted of a broad work of literature review carried out in two steps. First, an initial set of articles was analyzed, this helped in having an overview of the current situation concerning sustainability management approaches in the agri-food supply chain, their assessment, the drivers and the barriers both for implementing and assessing the performances of different sustainability practices. This first step allowed to identify the main goals of the work.

Secondly, an analysis of 57 articles collected surfing through different search engines such as Scopus and Google Scholar was carried out. These articles were found by using different combinations of the keywords identified during the previous step.

All the articles gathered rely on the idea that sustainability is strongly correlated with the Triple Bottom Line approach (Elkington, 1997).

According to this theory, indeed, sustainability is made of three different dimensions, namely environmental, economic, and social, that are strongly correlated. A first, general insight, is that

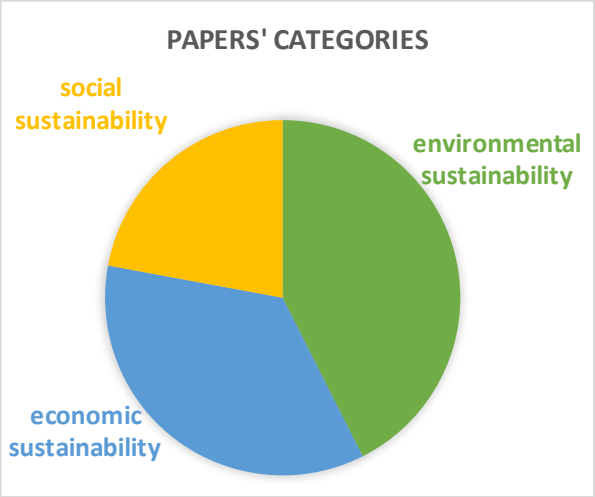

Figure 1: Graph showing the % of papers dealing with social, environmental and economic sustanability (Created with Microsoft Excel)

not all the sustainability aspects are addressed in the literature with the same commitment, as reported in *Figure 1*.

In particular, the literature review showed that only 165 documents (of which 43 were in the last two years) had been published about food supply chains' performance measurement or assessment regarding social topics. On the other hand, 353 documents were published all time (of which 79 were in the last two years) regarding environmental aspects. These data also show that the focus on sustainability themes are exponentially increasing in recent years.

2.1. Multi-tier Supply Chain Management

Nowadays supply chains are expanding both vertically (increasing the number of tiers) and horizontally (increasing the number of actors per tier) (Sauer & Seuring, 2018). Thus, for a firm becomes important to consider the processes of all the other stakeholders of its supply chain, especially the lower tiers ones, when claiming its products as sustainable (Sauer & Seuring, 2018). It is in this context that the concept of a Multi-tier sustainable supply chain (MTSSC) becomes important since it *"aims to reach deeper into the supply chain"* (Sauer & Seuring, 2018) extending its influence not only to the first-tier suppliers but also to *"any lower-tier supplier"* (Tachizawa & Wong, 2014). But this is not easy to achieve as many factors may hinder sub-suppliers management, as stated by (Grimm, Hofsetter, & Sarkis, Critical factors for sub-supplier management: A sustainable food supply chains perspective, 2014) and (Tachizawa & Wong, 2014).

2.2. Performances measurement and sustainability

In the context of MTSCM and MTSSCM, it is reported that the performance of every firm increasingly depends on the performance of other stakeholders along the supply chain (Maestrini, Luzzini, Maccarone, & Caniato, 2017). Thus, supply chain performance measurement systems (SCPMS) are becoming fundamental. Therefore, SCPMSs must be made of different components to consider all the different stakeholders. Maestrini et al. (2017) divide these components into *internal* (about monitoring and controlling the processes that take place within the firm's boundaries) *and external* (focusing on controlling inter-firm processes) *SCPMSs* (Maestrini, Luzzini, Maccarone, & Caniato, 2017). These can be further divided into *customer* and *supplier SCPMSs* which are defined as a set of metrics measuring the efficiency and effectiveness of the actions and the goodness of the relationships respectively with customers and suppliers (Maestrini, Luzzini, Maccarone, & Caniato, 2017). Also, as stated by (León-Bravo, Caniato, & Caridi, 2018) every supply chain stage has its own needs and objectives, and every company may measure differently their practices. Thus, every stage of the supply chain and every company's performance should be assessed through a specific set of KPIs.

The concept of PM was already well established in the field of economic performance, while the introduction of the sustainability concept requires the introduction of new and updated KPIs (Beske-Janssen, Johnson, & Schaltegger, 2015). As for the articles' distribution among the different topics, also for PMSs most of the tools are designed to deal with only one of the three dimensions of sustainability, especially the environmental one. Indeed, this dimension offers many metrics that can be measured and quantified, while performances in the social dimension of sustainability are harder to be measured since they are more qualitative and prone to subjectivity (Beske-Janssen, Johnson, & Schaltegger, 2015).

2.3. Buyer-supplier relationship

As stated in the previous section, in the context of SCPMSs it is important to take into account how different stakeholders relate to each other. Most of the articles analyzed only focus on the buyer-supplier relationship between two consecutive tiers of the supply chain. When it comes to long supply chains this is not enough, almost no papers address this topic. Different factors hindering the implementation of practices and their performance assessment along the whole supply chain are reported by (Grimm, Hofstetter, & Sarkis, 2014), (Tachizawa & Wong, 2014) and (Govindan, Shaw, & Majumdar, 2020) such as the lack of influence on stakeholders that are located in far tiers along the supply chain, the lack of contractual relationship between the focal firm and its sub-suppliers or the lack of willingness by sub-suppliers to comply with the focal-firm requirements. The relationships between buyers and their sub-suppliers are also often characterized by many tensions, the most important is the request of the buyers to keep costs as low as possible while at the same time complying with sustainability standards (Govindan, Shaw, & Majumdar, 2020). Sub-suppliers' sustainability approach can be influenced by how the buyer establishes its relationship with them. There are two opposite approaches: agency theory and stakeholder theory (Aßländer, Roloff, & Nayir, 2016). The former implies the use of the first-tier supplier as an agent to manage sub-suppliers (lack of direct control and visibility) while the latter sub-suppliers are directly followed and supported by suppliers relying on long-term relationships.

3. Research gaps and questions

A research gap (RG) can be defined during academic research as a topic that hasn't been approached yet by any other scientist or the presence of obsolete data on a specific topic that has the urge to be updated with new contexts. (Elsevier, 2022)

The preliminary literature review led to considering some interesting observations on the articles analysed, authors, focus on issues and barriers to sustainability matters without taking into consideration enablers or solutions. After a more structured categorization, the two gaps identified were:

1) **Quantitative findings/conclusions** with eventual modelling support (or similar) miss in most of the articles. While qualitative methods have already been studied a lot, the challenge might be to develop appropriate methods or tools to map sustainable supply chain management by mixing quantitative and qualitative considerations.
2) Few **social sustainability-based articles** (in MT-SSCM), it is a very recent matter especially in the food sector, how it connects with the other dimensions and why it is not so stressed by the companies.

From a multi-tier supply chain perspective, these fit particularly well: long supply chains are prone to issues related to trust in the suppliers and their practices that sometimes might be beyond the focal firm's control leading to scandals.

Before stepping ahead, a precise definition of the concepts expressed in the RGs is needed.

A socially sustainable SC should make a profit without harming society protecting all the stakeholders, both within and beyond the SC boundaries. It must be a critical part of any business because it affects the quality of a business' relationships with stakeholders since it is a proactive way of managing and identifying business impacts on employees, workers in the value chain, customers, and local communities.

Measure sustainability is fundamental to truly embedding this concept into the decision-making process and the management system, crucial aspects of its operationalization are stakeholder engagement and contextualization. The evaluation can be done through a set of indicators, qualitative or quantitative; no matter what type of sustainability metric is used, its role will be anyhow to help decision-makers to evaluate company sustainability performance and consequently provide information to plan future strategic actions.

A research question (RQ) instead, is the core of the investigation that seeks to respond to a certain inquiry and at the same time helps to draw the path in the research process. (Vaus, 2001)

In this study, based on the previously stated research gaps and the preliminary literature, the best solution considered was to use a combination of qualitative and quantitative questions in order not to exclude any of the two approaches.

Defined the two main topics related to the gaps identified, Social Sustainability and Sustainability Performance Measurement System, a set of Research Questions was then defined:

RQ1: How is social sustainability assessment approached in food companies?

RQ1.1: What type of social sustainability practices does a company apply?

RQ1.2: Are these social practices assessed? If not, why? If yes, how?

RQ2: How do the following contingent elements influence the implementation of social sustainability assessment? Stakeholder, supply chain stage, geographical area, size of the company, type of product.

RQ3: What are the criteria for designing a Social Sustainability Performance Measurement System?

The proposed RQs find their location in a mixed-method study: for the quantitative category, their answer is not only "YES/NO" but gives space to descriptive explanations, while on the qualitative side, the best category that fits into the set of questions is the exploratory one since the main logical purpose of the study (and the connected gaps identified) is to provide additional data on unexplored topics.

4. Methodology

Defining a methodology means first identifying the unit of analysis, and then selecting the case (or cases) to include in the process. (Eisenhardt, 1989) A case study, in general, is "*the most flexible of all research designs, allowing the researcher to retain the holistic characteristics of real-life events while investigating empirical events*" (Schell, 1992). Considering the kind of gaps and questions identified, the best option is the usage of a mixture of qualitative and quantitative methodology, leading to selecting the multiple case study approach as the best possible. This choice presents both advantages and challenges.

The possibility to perform more than one analysis allows for keeping a wider variety in the choice of the type of analysis itself. In general, as stated by J. Gustafsson, "*the writer is able to analyse the data within each situation and across different situations. The writer studies multiple cases to understand the similarities and differences between the cases and therefore can provide the literature with important influences from its differences and similarities*" (Gustafsson, 2017). It is possible, in this case, to perform a comparison in the same step of the supply chain through the different cases (horizontal integration) or instead compare the whole chains among them (vertical integration). Taking into consideration many cases can improve the precision of the output, the study's set of cases will be composed of 8, a too small number to be considered a statistical proof but enough to provide a sufficiently complete framework. The aim is not to map the entire supply chain PM scenario (in this case only the Italian scenario) but instead to have one (or a couple of) samples on each step of a supply chain. Other benefits are that the evidence generated from a multiple case study is strong and reliable and the writer can clarify if the findings from the results are valuable or not. To cite again J. Gustafsson, "*An all-embracing fact is that the evidence created from a multiple case study is measured strong and reliable*" (Gustafsson, 2017)

The main limitations though can be: (Gustafsson, 2017)

- It might increase the complexity of the analysis and the amount of time and information needed; for our case, there's no financial issue because this is a quite small-scale analysis without involving big actors and databases, but often this approach is very expensive.
- There must be paid attention to the possibility of "outliers" cases that may be hidden in a multiple case study choice. A single case study approach may give a better output because of the high focus on a single one that can be replaced.

4.1. Operative steps

In the case study selection, several constraints will be followed:

1) Food company: operating directly or indirectly in the food sector
2) Multi-tier: must present multiple stages or act in some of them
3) Employees: the social-oriented focus implies the presence of employees or direct contact with them giving a more precise limitation to the agricultural-based products where the human role is central

4) Sustainability office: the interviewee must generally be part of the sustainability plan of the company which means being involved in practices/decisions/report drafting/…

The 8 companies selected, can provide useful information in the form of primary or secondary data, defined respectively as data gathered directly in the field or not directly obtained by a researcher himself. (Rabiansky, 2003)
Primary and secondary data for a single company form a case (under the form of interviews and sustainability reports), and the usage of both of them is crucial for internal validation since the two sources not only may complement each other but also ensure a double proof for a certain topic.
All the files will be kept in the original language (Italian) and format in order not to give space to interpretation and mistakes in the translation; this method is considered the most reliable since keeps the most objective possible data analysis. Specific software will be particularly helpful to perform the analysis in a structured way, NVivo can collect documents of any kind (pdf, audio, Word, …) and organize them. The main feature that this software displays is the text analytics function that will be performed in the original language too, taking the name of "Coding". To be more specific, each indicator connects with as many sentences as possible that can explain in Italian the real meaning of the indicators themselves. This manual coding will be done on 3 interviews and 1 report to give the software as many pieces of information as possible to be more precise in the autocoding phase, this strategy allows a solid internal validity and reliability of the final output.
After collecting all the possible data from the cases, the analysis phase foresees two kinds of methods. The analysis within the case will compare the documents to find patterns or trends and therefore validate them. Another addition will be the comparison between cases (i.e. Company #1 interview + report with Company #2 or #3 interview + report) that can highlight analogies or differences given a certain parameter (i.e. compare results based on #employees, net sales or step of competence). (Yin, 1981)

5. Framework development

What emerged from the previous chapters is not just that social sustainability is the least addressed sustainability dimension but there is also a lack of clear, and simple instruments that may allow us to objectively assess companies' social sustainability performances. Through a literature check, it was possible to identify the main areas of observation regarding social sustainability and the most common and relevant indicators that have been proposed by researchers. Different papers give a representation of the different categories that must be addressed when dealing with the social sphere. Some examples are the publications of (Morais & Barbieri, 2019), (León-Bravo, Caniato, & Caridi, 2020), and (León-Bravo, Moretto, & Caniato, 2021) where different categories are presented and given a proper definition. Therefore, relying on these papers, a list of macro-categories was drawn up, trying to address all the aspects of social sustainability both related to the internal and external community. Two categories, namely *Working conditions and well-being* and *Human rights*, are more related to addressing the internal one. And other two, namely *Product liability* and *involvement with the community and public affairs*, are more related to the external.
The *Working conditions and well-being* macro-category includes all the topics related to the contractual terms and conditions of the workers and the working environment they live in daily, how the workers' skills are exploited and valorised, and what the company offers to its employees (Morais & Barbieri, 2019) (León-Bravo, Moretto, & Caniato, 2021). Being this the broadest among the four macro-categories, it was split into four different sub-categories: *Working conditions* (contractual related), *Safety* (working environment-related), *Extra benefits* (beyond contractual terms), *communication and involvement* (building sense of affiliation and transparency).
The *Human rights* category concerns the companies' approach to equity and gender, inclusivity and respect for their workers as equal human beings (Morais & Barbieri, 2019) (León-Bravo, Moretto, & Caniato, 2021).
Product liability includes themes related to the product and its impact along the whole supply chain such as the integration of consumer's health, disposition of ethical guidelines, traceability, addressing the needs of specific categories of

people, develop innovative smart packaging solutions (Morais & Barbieri, 2019) (León-Bravo, Caniato, & Caridi, 2018).

Involvement with the community and public affairs is related to how companies approach external environments such as local communities or communities where they source their raw materials, how they try to educate people and whether they collaborate with charitable organisations, NGOs or with sustainability-driven start-ups (Morais & Barbieri, 2019) (León-Bravo, Caniato, & Caridi, 2018).

Figure 2: Chart to sum-up the indicators' categories (created with Draw.io)

For each of the above-mentioned categories, a specific set of indicators was defined starting from the papers of different authors that already tried to draw up lists of social practices that are implemented in companies or along supply chains or sets of indicators useful to assess social sustainability performance such as (León-Bravo, Caniato, & Caridi, 2018), (Yakovleva, Sarkis, & Sloan, 2010), (Ahi & Searcy, 2015) and (Govindan, Shaw, & Majumdar, 2020). This step led to the first draft of thirty-six indicators.

This set of indicators has been drafted without considering any case-specific factor that may affect each company or supply chain analysed. Indeed, as already mentioned, every actor in a food supply chain has its own needs and peculiarities and may apply different practices (León-Bravo, Caniato, &

Table 1: List of categories, sub-categories and indicators (Created with Microsoft Excel).

MACRO-CATEGORY	CATEGORY	INDICATOR
Working conditions & well-being	Working conditions	Assurance of decent wages
		Working hours per day
		Extra working hours per day
		Job security
		# of days off available per year
		Free association (labour unions)
	Safety	# of working accidents per year
		Degree of exposition to hazardous substances
		Maintenance activities
		Investments in new technologies and training courses
	Extra benefits	Minimum health care
		# of initiatives supporting the development of workers' skills
		Investments in subsidiary equipment for the working environment
		Corporate childcare
		Extra refunds
	Communication & involvement	Degree of information sharing towards workers about company activities
		Decision making involvement
		Initiatives to promote involvement
		Presence of anti-corruption practices and/or policies
Human rights	Human rights	Child workers along the supply chain
		Male vs female employment full time labour
		Average wages of female employees vs average wages of overall workers
		Inclusivity for disabled people
		Parenthood respect
		Non-discriminatory hiring about origin and disability
		General harassment
Product liability	Product liability	Disposition of space for ethical and health guidelines on the labels
		# of inquiries from customers (or retires from the market)
		Traceability width and depth
		Presence of certifications
		Investment in alternatives (such as surrogates, gluten-free, vegan options)
		Investment in Smart packaging or innovative solutions
Involvement with the community & public affair	Involvement with the community & public affair	Community fundings and support initiatives
		Fundings invested in social events or sustainable cooperatives/NGOs
		Collaboration with start-ups for food recovery
		Sustainability monitoring role
		Degree of information disclosure

Caridi, 2018) depending on different factors such as the supply chain stage, the type of product handled, the geographic location, the availability of the resources (Abbasi, 2017). Therefore, it may happen that not all the indicators may have the same importance for all the actors of the same supply chain or be relevant for the performance assessment of specific companies.

6. Case studies selection

The step before conducting the interviews was to come up with a list of possible companies to contact. The selection was narrowed down to prioritize companies that are present in the Italian food supply chain network and that rely on agriculture or agricultural raw material rather than breeding and livestock. Additionally, the purpose was to include as many supply chain steps as possible and consider both small, medium or big companies in order to have the most complete view possible and to understand how these contingent factors can affect which is the social sustainability focus, the practices implemented, and how they measure their performances. In the end, a list of fifty-seven companies distributed along the whole supply chain was gathered. In the table below, the final list of the companies interviewed is reported.

Particular attention must be given to B Corp, which is a certification that a company can gain by respecting high standards in all sustainability areas, 3 out of the 8 companies fit into this category.

The interviews were then carried out, not before conducting a pilot interview to test if the protocol was unbiased or not, meaning that it should've worked independently from the step of the supply chain considered, the type of product handled, the role of the interviewee or all the possible variables that in an interview arise.

For the data collection process, two different data sources were considered. The primary data sources consisted of the 8 interviews while the secondary data sources consisted of sustainability reports or impact reports of the companies interviewed, if available. The combination of these different types of data allowed to ensure data triangulation and to have a more complete overview of the themes and topics of this study.

The pilot interview result was also useful during the entire data collection process since it could be used as a sort of checklist to keep track of the topics faced during the interviews.

7. Findings & Discussion

After the data collection phase, an analysis of the eight interviews and the six reports gathered is needed. All the interviews had first to be transcribed in order to have all written documents to be coded.

The next step consisted in coding the documents collected relying on the N Vivo software which is also able to present data in graphs, flows or diagrams. Moreover, all the interviews were carried out in Italian and, to avoid possible

Table 2: List of the 8 companies selected with their main features.

N°	# Employees	SC step & product	Status	Role	Net sales (M€)
#1	4	Certifications -	s.r.l.	Food Technologist	/
#2	450	Logistics -	s.b.	Sales & Sust. manager	326 (2021)
#3	1473	Logistics-Distribution-Packaging (Fruits &Vegetables)	s.b.	Sustainability Office	1070 (2021)
#4	N.A.	Distribution-Processing-Foodservice	B Corp	Sustainability manager	6 (2020)
#5	N.A.	Distribution-Processing (Dried fruits)	B Corp	Sustainability manager	≈ 50 (2020)
#6	≅ 20 (+externals)	Distribution-Processing (Wine)	B Corp	CSR Manager	6,3 (2020)
#7	>25000	Mainly all SC steps (all kinds of products)	s.p.a.	Sustainability Office	8497 (2021)
#8	130	Processing (Coffee & derivates)	s.p.a.	Sustainability manager	10,5 (2020)

interpretation and biases due to translation, it has been decided to analyse them in the original language.

Since N Vivo software doesn't support the Italian language a preliminary phase of manual coding was needed. This step was useful to build a codebook as complete as possible so that the software could then have the necessary instructions and guidelines to carry out the automatic coding on the remaining documents collected. In the manual coding, sentences were assigned to the connected code (or codes). In order to build the codebook, this part was carefully carried out, structuring three different levels. The first level comprised the macro-themes faced during the interviews (e.g. Supplier Relationship, Geographical context, …); the second level comprised all the sub-categories for social sustainability defined in the framework (e,g, human rights, product liability, ...); in the third level all the indicators were inserted (e.g. safety, maintenance activities, …).

Then, to conduct the autocoding on the remaining documents, the manually coded documents were selected as a template that the software had to follow.

At this point, all the data were ready to be analysed, and both within-case and cross-case methods were considered. The within-case consists in considering each case as a standalone entity (Eisenhardt K. M., 1989). As mentioned, a case is the combination of Sustainability Reports and the interview conducted, or, whenever the report was not available, the interview alone. The cross-case analysis consists of a comparison of different cases in order to enhance the probability of capturing novel findings which may exist and of improving the reliability of the finding itself (Eisenhardt K. M., 1989).

Starting with the within-case analysis different insights were highlighted:

- Cases without report (cases 1 and 2) do not have the same internal validity as the others but they are still considered in the analysis since they can provide additional useful information
- Sustainability reports and interviews complement each other leading to strong internal validity. Moreover, generally for all the cases, the report presents more codes than the interviews
- During the interviews, the interviewees prefer to focus on macro-themes (level-one codes) going beyond data giving also opinions and insights. Indeed, the highest frequency codes in interviews are level-one codes. On the contrary, Sustainability Reports usually go into detail for each of the sub-indicators (level-three codes)
- No specific data pattern is observed through the within case analysis

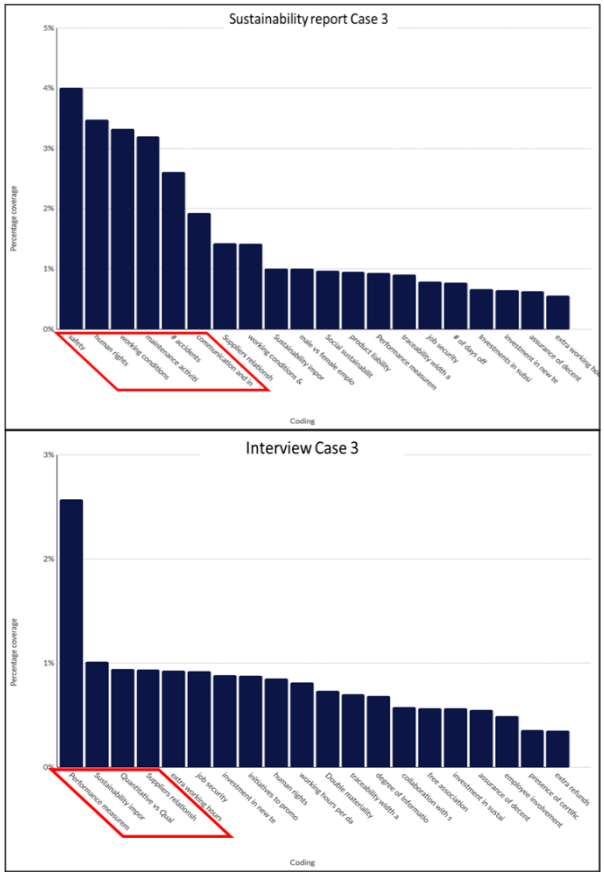

Figure 3: Histograms reporting the highest frequency % codes presence in Case 3 report and interview (Built from: N Vivo software)

To better understand also how contingent factors can influence sustainable performance implementation and assessment along the supply chain, a cross-case analysis has been developed. To do this a matrix was built, where for each case and each code is reported the number of times that specific code has been assigned summing the interview and the report of the different cases analyzed. The level-one codes have been split into three categories of pressure: the high-pressure ones are *PM tools*, *Sustainability Importance*, *Suppliers Relationship*, *B Corp Certification*, and *Double*

materiality. The medium-pressure ones are *Qualitative vs Quantitative indicators*, *Policies and government incentives* and *Benefits from sustainability practices*. The only low-pressure category is the *Geographical context* (see *Figure 4*).
Also, considering all the codes it is also possible to note that:

- Cases 3 and 7 present high values for many indicators while cases 1 and 2 present low values in most of the indicators
- Some codes have opposite behaviour among different cases. For example, *Maintenance activities*, *Policies and government incentives*, and *child workers*
- The central part of the table is a cluster of codes with variable frequencies among different cases

Indeed, interviewees from larger companies are held by members of sustainability teams while in the smaller ones the person who deals with sustainability also has other tasks. Thus, among smaller companies, the ones that do assess their performances rely on third parties such as B Lab, an external entity that provides certification through an assessment.
Moreover, not only does the size of a company influence how the performance is assessed but the supply chain stage and the type of product handled too. This is confirmed by different codes. To make an example the code "*Child workers*" in case 7 is absent while it is present in cases 3 and 8. This is due to the fact that these last two companies operate closer to field workers.
Based on all the observations presented a tool with specific features is built. It displays some necessary

CASE	Performance measurement tools	Sustainability importance	Suppliers relationship	B-Corp certification	Double materiality	Quantitative vs Qualitative	Policies and government incentives	Benefits from sustainbility practices	Geographical context
Case 3	40	32	42	3	14	7	17	5	1
Case 7	25	7	14	5	22	15	0	9	5
Case 4	20	14	19	11	4	8	10	7	3
Case 5	27	21	0	24	13	4	2	4	0
Case 8	3	10	18	6	1	3	3	5	3
Case 6	4	5	4	1	2	0	2	1	0
Case 2	0	2	0	5	1	2	0	0	0
Case 1	0	7	2	1	4	1	0	1	0
		A					B		C

Figure 4: Matrix Coding Query for macro-codes (Extracted from N Vivo to Microsoft Excel)

7.1. Discussion of Findings

Interviews and Sustainability reports clearly post different information, the latter are generally used to claim the good performances reached by the companies in the sustainability field and must follow a standard format, while in the interviews the real core of the company's mission emerges since they are semi-structured and more flexible.
Another insight is that larger companies often use specific sets of KPIs for each project to assess their performance, this is unfeasible for smaller companies that can rely on fewer resources in terms of time, economical availability and people.

features such as being user-friendly, not resource-consuming, flexible and adaptable to different specific situations. Results should be easily readable and understandable. This tool is developed in an Excel file. Two are the main sheets to be filled: in the first sheet, which reports a table with all the categories and the indicators identified during this study, a "weight" should be assigned to each indicator and each category for each of the supply chain stages considered in this work. The weight represents the importance of the specific category/indicator: the higher the value with respect to others and the higher its importance. The

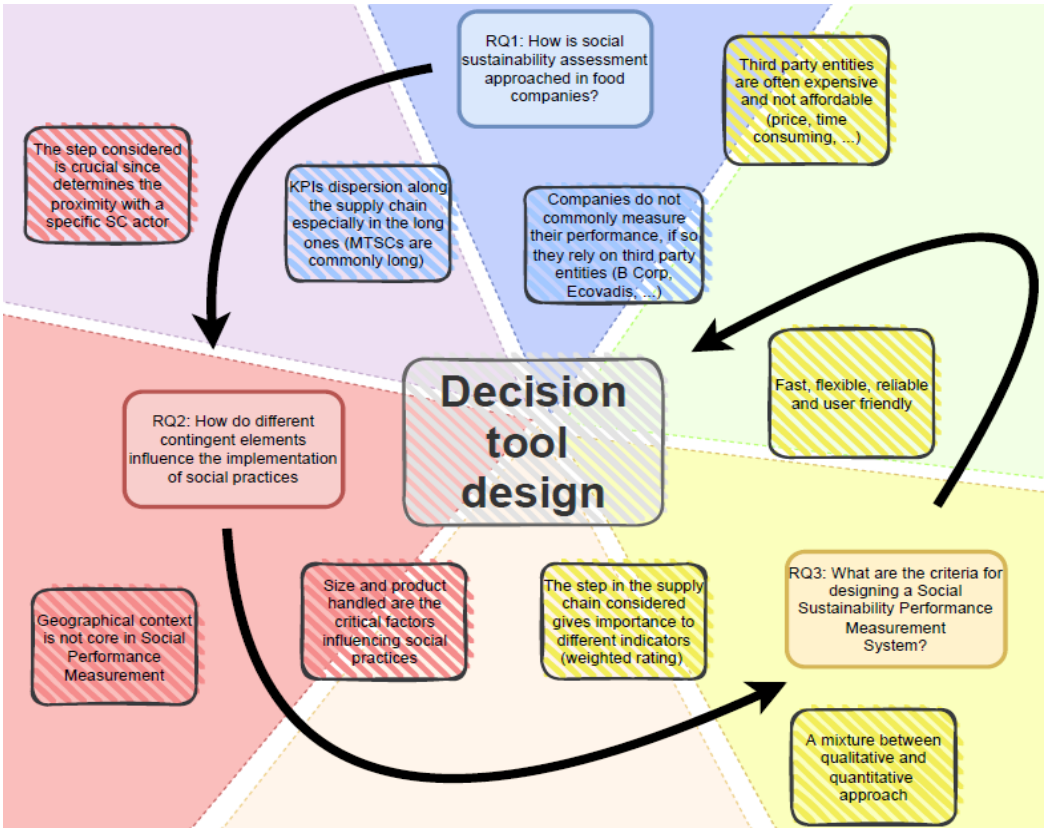

Figure 5: Final framework proposal scheme, the colours identify the 3 RQs of the study, and their intersections the main answers. (Created with Draw.io)

second sheet is the evaluation one. Here, the supply chain stage to which the analyzed company belongs must be selected. Thus, the file automatically fills the weight cells with the values assigned to that SC stage in the previous sheet. Now a certain number of points, ranging from 1 to 5, must be assigned to each indicator. Finally, the tool will show the overall results along with more detailed ones.

To summarize all the previous observations and how they contribute to answering the research questions the scheme reported in *Figure 5* has been developed.

8. Conclusions

This study has the main objective to map the state of the art of sustainable multi-tier supply chain performance measurement systems in the food and beverage industry while developing a complete framework with key performance indicators applied in a multiple case study approach, focused on social sustainability.

The multiple case study method led to semi-structured interviews along with sustainability reports allowing to gather data from 8 companies belonging to the Italian agri-food sector. The two kinds of sources were translated, through text analytics, into data that were further analysed following within-case and cross-case approaches. Therefore, the most relevant indicators for social sustainability assessment were identified, followed by insights and a discussion on the importance of contingent factors.

The main contribution of the theory is first, a mapping of the state of the art on sustainability performance measurement in multi-tier supply chains while building a preliminary conceptual framework comprising the literature background. Since social sustainability appears to be an unexplored area, the first zoom is on practices and their assessment along the supply chain around social matters. From this literature background, the need for a specific set of KPIs was fundamental to identifying critical factors in the analysis of a social-oriented PM system. These indicators not only complement the preliminary framework suggested but also may find a practical application when translated into an interview. Keeping an inductive and rigorous methodology along with a multiple case study approach, 8 interviews with food companies operating in the Italian scenario

were put in place. Finally, an additional contribution to the usage of a rigorous coding method is the approach given to text analytics: 4 out of the 14 documents were manually coded. All the cases were also strong in internal validity due to the presence of two types of documents in each. The contribution given to practitioners can be identified in the empirical steps of the study. First, the collection of primary and secondary data for 8 cases allows the building of a strong basis on which to develop a series of observations and a discussion. From the analysis of all the data gathered a strong focus of the companies on sustainability themes arose, underlining the importance of a structured approach to the assessment of the performance in this area. The indicators showed that this kind of assessment is not free from several specific contingent factors that highlight the importance of being flexible. Indeed, the position in the chain, the type of product handled, the size of the company, the stakeholder considered, and the geographical context were tackled in the discussions, leading to considering the first 3 in the contribution. As last, the need for a practical PM tool that might help the companies in assessing their social performances while at the same time not relying on big internal resources (in terms of time, employees, and money), led to the design of a decision tool. This can be easily used in a company by the ones who can concern with it and can give useful insights about not only their firm but eventually, the whole supply chain depending on the data availability and the purpose of the investigation.

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