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Sustainability management in small and medium-sized enterprises of the food manufacturing sector

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Declaration of Originality

I declare that I have prepared the submitted thesis independently and without unauthorised third-party help and only with the help that I have indicated in the dissertation. All text passages that are quoted literally or analogously from other published papers, and all information that is based on verbal statements, are identified as such. In the research I conducted and mentioned in the dissertation, I complied with the principles of good scientific practice as laid down in the statutes of Justus-Liebig-University Giessen and Flensburg University of Applied sciences when carrying out the analyses of my research as detailed in this thesis.

Flensburg, November 2022 _____

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Summary

Multiple crises make the need for sustainable transformation more pressing than ever. Such a transformation concerns the environment, society and economy and other diverse stakeholders ranging from individual perspectives to enterprises, governments and global associations. Food is a crucial sector with a major impact on the environment and society, and plays an important role in that transformation. While some and increasing attention has been paid to the very first stage of the food supply chain, the agricultural stage, the next stage of food manufacturing has largely been neglected.

Although more than half of the turnover of the sector is made by multinational enterprises, the sector is dominated by the number of small and medium-sized companies. This group of small and medium-sized enterprises possesses individual and unique characteristics in comparison to larger firms. Little attention has been paid to that topic in research so far and there is evidence to suggest that food manufacturing SMEs need support in their sustainable development. The aim of this thesis is the investigation of sustainability management in food manufacturing SMEs. To this end, three successive research steps were carried out.

First, seven existing frameworks were analysed regarding their suitability for the food manufacturing stage. The explorative approach compares the frameworks' content as well as their supply chain connectivity, finding that none of the frameworks suits a food manufacturer perfectly. Either the content is too generic for food manufacturers and their supply chain, or a connection to the up- and downstream supply chain including evaluation and communication is only partly possible. A mix of research and practical implications is derived from that conclusion.

Furthermore, a Delphi study was conducted with experts from the food sector and/or from the field of sustainability management, exploring probabilities of scenarios of sustainability management (assessment, certification and communication) in food manufacturing SMEs. The parts of the Delphi study that specifically dealt with assessment and certification of sustainability in food manufacturing SMEs are included in this thesis. It does not only shed light on the expert's opinion on topics of sustainability assessment and certification for food manufacturing SMEs, but also on the principal challenges and probabilities of those processes for SMEs in general.

Finally, a sustainability management tool was developed and evaluated through expert interviews. This novel approach combines many of the important aspects from the preceding research. The outcome is a procedure including self-assessment of the enterprise, a minimum standard containing eight basic sustainability requirements, a supportive consultancy talk for the company's sustainable development, and a guided goal-setting process in order to find annual goals for the food manufacturing SMEs in the spirit of continuous improvement. This process aims at providing a first encounter with holistic sustainability management in food manufacturing SMEs, while meeting the special requirements by SMEs without adding to their administrative burden.

Overall, this research highlights important aspects of sustainability management, both for food manufacturing SMEs but also for SMEs in general. While food sector requirements

concern specific content, an holistic approach to sustainability, integration of both assessment and reporting elements and connectivity to the up- and downstream supply chain, SMEs' characteristics require transparency, a realistic framework regarding cost-benefit balance, simplicity and visible benefits. Furthermore, important aspects concerning the application of a sustainability management tool are personality/motivation of the owner-manager or person in charge, incentives, permeation/identification in the company, resources, management/documentation, support and communication.

The thesis demonstrates that a "one-size fit" sustainability management tool for all SMEs is hard or even impossible to develop. However, if the aspects mentioned above are taken into consideration in a balanced way, if further research on that topic is conducted, and if supportive policy is strengthened, the application of sustainability management in food manufacturing SMEs has the potential to improve sustainable development of single enterprises, and consequently the overall agri-food sector.

Zusammenfassung

Aufgrund vieler Krisen ist die Notwendigkeit einer nachhaltigen Transformation dringender denn je. Ein solcher Wandel betrifft die Umwelt, die Gesellschaft und die Wirtschaft und die unterschiedlichsten Interessengruppen, von der individuellen Perspektive bis hin zu Unternehmen, Regierungen und globalen Verbänden. Der Lebensmittelsektor spielt dabei als entscheidender Sektor mit großen Auswirkungen auf Umwelt und Gesellschaft eine wichtige Rolle. Während der ersten Stufe der Lebensmittelversorgungskette, der Landwirtschaft, bereits einige Aufmerksamkeit gewidmet wurde, ist die nächste Stufe der Lebensmittelherstellung bisher vernachlässigt worden.

Obwohl mehr als die Hälfte des Umsatzes dieses Sektors von multinationalen Unternehmen erzielt wird, wird der Sektor zahlenmäßig von kleinen und mittleren Unternehmen (KMU) dominiert. Diese Gruppe von kleinen und mittleren Unternehmen weist im Vergleich zu größeren Unternehmen eigene und einzigartige Merkmale auf. In der Forschung wurde diesem Thema bisher wenig Aufmerksamkeit geschenkt und es gibt Hinweise darauf, dass die KMU der Lebensmittelindustrie in ihrer nachhaltigen Entwicklung unterstützt werden müssen. Das Ziel der vorliegenden Arbeit ist daher die Untersuchung des Nachhaltigkeitsmanagements in KMU der Lebensmittelindustrie. Dazu wurden drei aufeinander folgende Forschungsschritte durchgeführt.

Zuerst wurden sieben existierende Rahmenwerke auf ihre Eignung für die Lebensmittelherstellung analysiert. Der explorative Ansatz vergleicht sowohl die Inhalte der Rahmenwerke als auch deren Anbindung an die Lieferkette und kommt zu dem Ergebnis, dass keines der Rahmenwerke perfekt für einen Lebensmittelhersteller geeignet ist. Entweder ist der Inhalt zu generisch für Lebensmittelhersteller und ihre Lieferkette oder eine Verbindung zur vor- und nachgelagerten Lieferkette einschließlich Bewertung und Kommunikation ist nur teilweise möglich. Aus dieser Schlussfolgerung wird eine Kombination von Forschungs- und Praxisimplikationen abgeleitet.

Darüber hinaus wurde eine Delphi-Studie mit Expert*innen der Lebensmittelbranche und/oder aus dem Bereich des Nachhaltigkeitsmanagements durchgeführt, in der die Wahrscheinlichkeiten von Szenarien des Nachhaltigkeitsmanagements (Bewertung, Zertifizierung und Kommunikation) in KMU der Lebensmittelindustrie untersucht wurden. Die Teile der Delphi-Studie, die sich speziell mit der Bewertung und Zertifizierung von Nachhaltigkeit in KMU der Lebensmittelbranche befassen, wurden in die Arbeit aufgenommen. Dieser Teil beleuchtet nicht nur die Expertenmeinung zu Themen der Nachhaltigkeitsbewertung und -zertifizierung für KMU der Lebensmittelindustrie, sondern auch die wichtigsten Herausforderungen und Wahrscheinlichkeiten dieser Prozesse für KMU im Allgemeinen.

Als dritter Teil der Thesis wurde ein Nachhaltigkeitsmanagement-Tool entwickelt und durch Experteninterviews evaluiert. Dieser neuartige Ansatz versucht, viele der wichtigen Aspekte aus der vorangegangenen Forschung zu kombinieren. Das Ergebnis ist ein Verfahren, das eine Selbstbewertung des Unternehmens, einen kleinen Mindeststandard von acht grundlegenden Nachhaltigkeitsanforderungen, ein unterstützendes und beratendes

Nachhaltigkeitsgespräch und einen angeleiteten Zielsetzungsprozess umfasst, um im Sinne einer kontinuierlichen Verbesserung jährliche Ziele für die KMU der Lebensmittelindustrie zu finden. Dieser Prozess zielt darauf ab, eine erste Begegnung mit einem ganzheitlichen Nachhaltigkeitsmanagement in KMU der Lebensmittelherstellung zu ermöglichen und dabei den besonderen Anforderungen der KMU gerecht zu werden, statt sie zu überfordern.

Aus den oben beschriebenen Untersuchungen werden sowohl allgemeine, Lebensmittelsektor-spezifische als auch KMU-spezifische, wichtige Aspekte des Nachhaltigkeitsmanagements in lebensmittelherstellenden KMU abgeleitet. Während die Anforderungen der Lebensmittelbranche spezifische Inhalte, einen ganzheitlichen Nachhaltigkeitsansatz, die Integration von Bewertungs- und Berichtselementen sowie die Anbindung an die vor- und nachgelagerte Lieferkette betreffen, sind für KMUs Transparenz, ein realistischer Rahmen hinsichtlich des Kosten-Nutzen Verhältnisses, Einfachheit und sichtbarer Nutzen wichtig. Wichtige Aspekte bei der Anwendung eines Nachhaltigkeitsmanagement-Tools sind darüber hinaus die Persönlichkeit/Motivation des Geschäftsführers oder der Verantwortlichen, Anreize, Durchdringung/Identifikation im Unternehmen, Ressourcen, Management/Dokumentation, Unterstützung und Kommunikation.

Diese Dissertation zeigt, dass ein für alle KMU passendes Nachhaltigkeitsmanagement-Instrument sich nur schwer oder gar nicht entwickeln lässt. Wenn jedoch die oben genannten Aspekte berücksichtigt und ausbalanciert werden und wenn weitere Forschung zu diesem Thema betrieben sowie Unterstützung durch politische Maßnahmen etabliert wird, hat das Nachhaltigkeitsmanagement in KMU der Lebensmittelherstellung das Potenzial, die nachhaltige Entwicklung der einzelnen Unternehmen und folglich des Agrar- und Ernährungssektors zu verbessern.

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Preface

This dissertation was conducted in collaboration with the Interreg-programme "Positively Produced" which took place from 2019 – July 2022 at Flensburg University of Applied sciences, financed through the European Fund for Regional Development. The output of the project was a novel sustainability management tool, named Positively Produced Compass, that can be explored in German and Danish via the following website: www.check.positivelyproduced.com.

This thesis is anchored in the research field of sustainability and entrepreneurial management in the thematic context of the agri-food sector.

The title of the thesis is "Sustainability management in small and medium-sized enterprises of the food manufacturing sector" and it is based on three publications (see below). The first two publications were published in Scopus-listed journals and are listed in Web of Science, the third publication has been submitted. In the publications, direct references to the project and tool were removed for reasons of anonymisation.

Küchler, R., & Herzig, C. (2021). Connectivity is key: holistic sustainability assessment and reporting from the perspective of food manufacturers. *British Food Journal*, *123*(9), 3154–3171. https://doi.org/10.1108/BFJ-03-2021-0317
(Chapter 2)

Küchler, R., Nicolai, B. M., & Herzig, C. (2022). Towards a sustainability management tool for food manufacturing small and medium-sized enterprises—Insights from a Delphi study. *Corporate Social Responsibility and Environmental Management.* Advance online publication. https://doi.org/10.1002/csr.2376
(Chapter 3)

Küchler, R., Nicolai, B. M., & Herzig, C. (under review). A multiperspective evaluation of a novel sustainability management tool for small and medium-sized food manufacturers. *Management revue,* initial date submitted: 31 August 2022
(Chapter 4)

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Abbreviations

BIA	B Impact Assessment
CSR	Corporate social responsibility
DSC	Driving Sustainable Change
ECG	Economy for the Common Good
FAO	Food and Agriculture Organization
GRI	Global Reporting Initiative
MNE	Multinational enterprise
SAFA	Sustainability Assessment of Food and Agriculture systems
SC	Sustainability Code
SDG	Sustainable Development Goals
SM	Sustainability management
SMART	Sustainability Monitoring and Assessment RouTine
SME	Small and medium-sized enterprise

Chapter 1 General Introduction

1.1 Problem statement

As this thesis is being written, a most alarming report discloses the gap between global climate goals and reality: temperature increase caused by the G7 countries is heading towards 2.7 degrees instead of 1.5 degrees as demanded by the Paris Agreement (Carbon Disclosure Project & OliverWyman, 2022). This is only one serious example for the urgently needed shift to more global sustainability in general. An essential role for the planet's and society's survival is played by the agri-food sector which has an inbuilt conflict: it is needed to feed a growing population on the one hand while causing major environmental and societal damage on the other hand, affecting numerous Sustainable Development Goals (Chaudhary et al., 2018; Filho et al., 2022; Rajic et al., 2022). Sustainable transformation of our food systems is not optional but mandatory (Dixson-Declève et al., 2022).

Although there are multinational enterprises (MNE) in the agri-food sector, it is dominated by small and medium-sized enterprises (FoodDrink Europe, 2021). A large enterprise such as an MNE is likely to have a bigger impact than an SME – both positively and negatively – however, the sheer number of SMEs and their collective impact (Morsing & Perrini, 2009) necessitates investigation of this part of the sector. Yet, 'this part' is still divisible into different supply chain fragments: agricultural production, processing, wholesaling and retailing are supply chain stages shaped by enterprises. While the agricultural stage has gained substantial attention due to its dominating impact on environment and society (Filho et al., 2022), downstream stages have been neglected (Desiderio et al., 2022). This overlooks the leverage downstream actors have on their upstream supply chain in addition to their own direct impact (Chae et al., 2017) and the need for collective supply chain action in order to obtain a sustainable food system (Desiderio et al., 2022). Scholars have expressed the need for investigation of sustainability food manufacturing SMEs (Adams et al., 2021), and the need for research towards sustainability management tools for SMEs (Johnson & Schaltegger, 2016). As a contribution to addressing this gap, this thesis aims to investigate and support sustainability management in food manufacturing SMEs.

1.2 Background

The following part gives an overview of the background topics on which the thesis is based in order to introduce and illustrate the scope of research and derive the thesis' motivation. Some of the topics and concepts are introduced in more detail in the publications which form the main part of the thesis. Therefore, the introduction is kept at a minimum, motivated by "quantum satis" with references to the respective publication chapters to prevent repetition.

1.2.1 Sustainability and its management components

The first milestone of sustainability was Hans Carl von Carlowitz's plea for sustainable forest management, in 1732. It should secure the existence of the forest by taking only as much wood as is needed, so that enough was left to grow and recover. For a long time, sustainability was not considered a defined concept, until the unsustainable way of our living – taking more from nature and society than it can bear - made it a necessity. Milestones such as the Limits of Growth by the Club of Rome (Meadows et al., 1972), the Brundlandt-Report (World Commission on Environment and Devleopment, 1987), Agenda 21 (United Nations, 1992), Millenium Development Goals (United Nations, 2000) and the Agenda 2030, also known as the sustainable development goals (United Nations, 2015), are well-known attempts to move the world in the direction of a more sustainable future.

Although sustainability is a well-known term, sometimes even a buzzword, its definition varies. An oft-cited definition was given by the World Commission on Environment and Devleopment (1987, p. 15): "Sustainable development […] meets the needs of the present without compromising the ability of future generations to meet their own needs". The U.S. National Research Council (1999) declares that nature, life support and community are intertwined with people, economy and society and demands to take all aspects into account when dealing with sustainable development. This is reflected in most concepts explaining or depicting sustainability by integrating an environmental, an economic and a social dimension. Yet, the respective importance of each dimension varies within different concepts.

In their work, Giddings et al. (2002) introduce different models. The first is the well-known model of three interconnected rings, each of the rings representing one sustainability dimension. This model implies that all dimensions are separate from each other with only small overlaps. While this perspective fosters structured analysis, it neglects possible interplay of the dimensions. The second model describes the political reality in which the economy dominates environment and society and treats them "as a resource to be exploited, both natural and human" (p. 191). This model is similar to so-called "weak sustainability" which prioritises the economic dimension and which allows environmental and societal quality to be replaced by economic gain (Andes et al., 2019; Bell & Morse, 2008). In the third model mentioned by Giddings et al. (2002) economy is nested within society which is nested in the environment, meaning that society depends on the state of the environment and economy depends on the state of society and the environment. This model promotes a more integrative and holistic approach and is similar to the concept of "strong sustainability" which puts the environmental dimension first and excludes an exchange between natural and tangible capital (Andes et al., 2019; Bell & Morse, 2008). The fourth model suggests to remove the economic dimension because it is not separable from human activity. A social dimension is nested in the environmental dimension because society depends on the environment whereas the environment does not depend on society. However, the boundary between both dimensions is fuzzy due to constant flow of materials and energy as well as interaction between the two dimensions. As a compromise between weak and strong sustainability, "critical sustainability" allows short-term substitution of nature and tangible capital as long as it does not affect the environment in a negative way (Andes et al., 2019).

Rose & Cachelin (2018) describe critical sustainabilities as aiming to offer alternative systems rather than simply to change existing ones as in traditional concepts. The authors also include a critique of concentrating on the management of environmental restoration and amelioration while neglecting social aspects such as inequality and injustice. This overemphasis on the environmental dimensions has been reported when talking about and working on sustainability, and it is often reflected in the set-up of frameworks to measure, evaluate and communicate sustainability (Klewitz & Hansen, 2014; Lozano & Barreiro-Gen, 2022; Moldavska & Welo, 2015). The focus on the environmental dimension is often not derived from a concept of strong sustainability. However, it results from an anticipated separation of the sustainability dimensions (as in the concept of the three interconnected rings) and neglects the other dimensions.

The different models and concepts of sustainability influence and shape the actions concerning sustainable development as well as corresponding measures and tools. Therefore, when working on sustainable development, the understanding of sustainability needs to be discussed with involved stakeholders.

As mentioned above, frameworks have been developed by researchers and practitioners in order to facilitate sustainable development. Being possible components of such frameworks, the concepts of sustainability assessment, reporting and certification (see 3.2.1) are described in the following.

SUSTAINABILITY ASSESSMENT

Sustainability assessment is employed to measure and compare sustainability performance in order to derive measures and recommended actions for sustainable development. Moldavska and Welo (2015) enumerate the following requirements for manufacturing enterprises regarding sustainability assessment: "(1) to provide reliable information; (2) to address a manufacturing company's context; (3) to point out problem areas; (4) to point out solutions; (5) conducted within limited time and resources. (p.623)".

In order to operationalise sustainability assessment and to know whether a certain goal has been reached, indicators are used (Bell & Morse, 2008). The number of indicators varies according to the framework's scope and reaches from single-indicator to multi-indicator frameworks covering different sustainability dimensions (Tennhardt et al., 2022). Qualitative indicators are "softer" indicators, represented by ratings of words or descriptions, and are harder to compare. They are gathered through interviews or questionnaires (Moldavska & Welo, 2015). Quantitative indicators are represented by numbers and/or units. For data-driven comparison and development, quantitative indicators provide more value because they can depict a status-quo and can lead to concrete goals (Pintér et al., 2012). Yet, there is also the risk of using wrong, insufficient or imprecise data. Moreover, comparing indicators calculated from different scopes can be misleading sustainable development. Furthermore, balance between meaningful assessment and simplification needs to be established, finding the right level of complexity (Bell & Morse, 2008). Moldavska and Welo (2015) advise the use of both quantitative and qualitative indicators and to balance the number of indicators and the resources available.

If sustainability performance is to be compared to previous performance of the same

enterprise and benchmarked against target values, indicator sets and the measuring process need to be as standardised and harmonised as possible. Thus, results can be easily compared to the measurement of an initial baseline to determine progress (Pintér et al., 2012). In the end, measurement and output depend on the tool or framework used, because "different tools produce different assessments" (Alrøe & Noe, 2016). The scope of a sustainability framework can range from global, national, organisational through to production and product (Schader et al., 2014). Depending on its respective scope, a framework will address and support different aims. Product-related frameworks aid product development whereas an organisational scope supports managerial decisions, while national/global scope can be helpful for policy decisions and development (Chaudhary et al., 2018). With regard to geography, regional differences can also influence the scope of assessment and the importance of certain topics. One possibility to adapt a sustainability tool to a particular scope is to weight the indicators (Becker et al., 2017; Schader et al., 2019). This means, that the indicators do not contribute to an aggregated result in the same way. Schader et al. (2019) conducted a Delphi study with experts in order to develop tailored assessment by determining weighting.

After measuring multiple indicators, these can be aggregated in overarching topics to show results on a more general level (Becker et al., 2017; Rowley et al., 2012). This can be used "to form a comprehensive judgement on the sustainability performance of decision alternatives" (Rowley et al., 2012, p. 32). Hák et al. (2016) call these aggregated indicators "headline indicators" (p.571). According to the authors, this aggregated level is especially important to convey information towards the general public.

SUSTAINABILITY REPORTING

Conveying information leads towards the next aspect of sustainability management: sustainability reporting. What can be drawn from every sustainability framework is the possibility to report the outcome of the framework's application towards interested stakeholders. For external reporting, as mentioned above, aggregated information is needed whereas internal reporting requires more detail (Moldavska & Welo, 2015).

Internal reporting is used to convey sustainability performance towards decision-makers in order to derive informed measures (Genç, 2017) and is categorised as an inside-out approach by Burritt & Schaltegger (2010). It focuses on informed decision-making and internal improvement and is driven by managerial interest. In that way it supports the sustainable development of an enterprise and can have positive external effects such as a stronger position in the market.

External reporting contributes to the image of an enterprise (Jones & Mucha, 2014) and legitimates actions in front of stakeholders (Shnayder et al., 2015) by disclosing information on sustainability. Burritt and Schaltegger (2010) call this an outside-in approach. It is driven by stakeholder expectations. An enterprise needs to know those expectations in order to react accordingly. It can help to improve the enterprise's sustainability performance but can also lead to selective reporting.

By disclosing information in the form of communication, transparency is created regarding sustainability efforts of an enterprise (Amundsen & Osmundsen, 2020). Transparency in turn

"plays a critical role in building consumers' trust and positive attitude toward the corporation and in turn developing their intentions to purchase from the corporation […]" (Kang & Hustvedt, 2014, p. 262).

Genç (2017) distinguishes between different communication scenarios regarding sustainability. Communication and sustainability describes the importance of communicating sustainability issues both internally for internal sustainable development and externally to maintain sales. Communication about sustainability discloses information that can be exchanged and discussed; it serves a discourse. Communication of sustainability is "instrumental or managerial" (p. 515) and serves to educate individuals. Communication for sustainability means conveying information in order to contribute to societal change and to reach normative goals. The more of the different communication scenarios are covered within a framework of sustainability management, the more an enterprise's sustainability efforts contribute to transformation - even beyond enterprise boarders (Schaltegger et al., 2022).

For this, sustainability efforts need to be communicated outwards. Sustainability communication in the form of reporting is often facilitated via internet (Gill et al., 2008; Herzig & Godemann, 2010) where not only distribution of information but also stakeholder dialogue can take place that in turn can create and support a positive business reputation (Gill et al., 2008). However, evidence for stakeholder dialogue through internet-based sustainability reporting has been missed by Herzig and Godemann (2010). This however could be beneficial as stakeholder engagement is one key enabler for successfully implementing sustainability as identified by Caldera et al. (2019). Da Giau et al. (2016) discuss four types of web-based sustainability communication practices in enterprises. Firstly, the low commitment category characterises enterprises with poor sustainability performance and consequently insufficient web-based communication. Secondly, high commitment enterprises show both good sustainability performance and online communication. Thirdly, low disclosure enterprises perform well regarding sustainability but they do not communicate that. Fourthly, high marketing enterprises do not engage in sustainability practices to a large extent but report the small amount of sustainability practices in an extensive way. Regarding sustainability communication towards costumers, it is not easy to find the right extent of communication because it is particularly challenging due to the complex nature of sustainability. Therefore, Schader et al. (2019) recommend outward communication based on only few indicators. However, this could be interpreted as a low disclosure approach (Da Giau et al., 2016). This problem illustrates the often contradictory aspects of sustainability management that complicate convention.

Consequently, critical voices note lacking harmonisation of reporting practices (Conca et al., 2021) and possible "camouflaging" by reporting and communicating only strong results. This draws off attention from weaker areas (Moneva et al., 2006) and lacking change (Gray & Milne, 2007). A reason for incomplete reporting is the large effort behind it. Executed comprehensively, it is "tied to accurate measurement and management […]" (Gill et al., 2008, p. 256) and causes enterprises to be hesitant applying assessment and reporting - at least in

more challenging cases. Preventing selective assessment and reporting, the control of an enterprise's sustainability management performance can create reassurance for stakeholders.

Sustainability certification

If a framework's outcome is checked by a verified and independent party, it can lead to a third component of sustainability management: sustainability certification. A certification includes a set standard that, if fulfilled, distinguishes an enterprise from poorer performing enterprises (Blackman & Rivera, 2011).

Certification can be undertaken by second or third party, however, due to higher independence, third party certification is advised (Blackman & Rivera, 2011; Tanner, 2000). Third party means that the party conducting the certification is neither associated with the enterprise to be certified nor with the entity providing the certification scheme but is an independent certification body.

Certification creates a financial incentive for the certified enterprise (Blackman & Rivera, 2011) by creating visibility and enhanced reputation (Gallego-Álvarez & Pucheta-Martínez, 2021). Through detailed documentation higher transparency is achieved (Amundsen & Osmundsen, 2020) and the customer can be informed (Harris, 2007). Furthermore, it can have enhancing effects on sustainability practices in the supply chain (Chkanikova & Sroufe, 2021) and on an enterprise's sustainability performance (Gallego-Álvarez & Pucheta-Martínez, 2021). This includes the sensitisation of novel topics through certification that leads to changes such as mitigation plans and measures (Amundsen & Osmundsen, 2020). Also in SMEs, scholars have observed sustainability certification influencing and inspiring company culture and sustainability performance (Carvalho et al., 2021). An example for a widely applied sustainability certification is B Corp certification or B-Impact Assessment. It starts with a self-assessment questionnaire and if an enterprise collects at least 80 out of 200 points, it may be certified. Then, documentation is checked and the information given by the company is verified by B Lab. If an enterprise acquires certification, it must recertify after three years (B-Lab, 2020a; Carvalho et al., 2021).

As demand for certification is increasing it can also be a trade barrier (Amundsen & Osmundsen, 2020). Moreover, certification is reported to be mainly attractive for enterprises which already display high performance (Amundsen & Osmundsen, 2020; Blackman & Rivera, 2011). Consequently, internal improvement triggered solely by certification is to be doubted.

Sustainability management

Sustainability management can comprise assessment, reporting and certification introduced above. These components and their tools are defined as "administrative technologies to manage sustainability issues by structuring, organizing, measuring and/or communicating sustainability information and/or developing and defining processes and structures" (Windolph, Schaltegger, & Herzig, 2014, p. 380). Scholars have demanded integration of all components: Maas et al. (2016) present a framework combining performance assessment, management accounting, management control, and reporting in order to combine internal and external benefits. This is in line with Burritt and Schaltegger (2010) who have identified

the twin-track approach next to the inside-out and outside-in approach to sustainability assessment and reporting. It combines the managerial inside-out and the stakeholder oriented outside-in perspective. The twin-track approach thus centralises advantages of sustainability assessment and reporting by providing both informed decision-making and satisfaction of stakeholder requirements. Different approaches towards sustainability assessment and reporting are supported by findings of Windolph, Harms, & Schaltegger (2014) that describe three types of motivation for corporate sustainability management: obtaining legitimacy, achieving market success and improving internal performance. Depending on a certain motivation, the focus of an enterprise is either more on a detailed assessment and the internal utilisation of results or on reporting the results for external purposes. While Windolph, Harms, and Schaltegger (2014) report legitimacy to be the foremost motivation, in the enterprise sample of Stubbs et al. (2013) legitimacy does not play an important role. This leads the authors to the conclusion that legitimacy might be only motivating very large enterprises to report their sustainability performance.

Consequently, in accordance with the demands by Maas et al. (2016), with an integrated sustainability management approach multiple business goals and motivations are covered and thus a twin-track approach can be recommended. Despite the mentioned advantages of sustainability management frameworks and tools, their application is associated with high resource requirements making them more applicable for larger enterprises (Kutzschbach et al., 2021; Steinhöfel et al., 2019), causing underrepresentation in SMEs (Gray & Milne, 2007; Perez-Sanchez et al., 2003).

Until here, sustainability and its management has been introduced generally. In the following, it is described in the context of the agri-food sector.

1.2.2 Sustainability in the agri-food sector

The agri-food sector reaches from selling unprocessed agricultural goods for food, feed or energy consumption regionally to producing highly processed products in a complex and global supply chain. The sector's supply chain comprises many actors, such as agricultural production, processing/manufacturing, wholesaling and retailing enterprises. With regard to sustainability, this causes complexity and overlapping of topics and dimensions (Filho et al., 2022).

Since 1970, despite a growing world population, the amount of people starving has been reduced due to enormous increases of efficiency in the agri-food sector (Dixson-Declève et al., 2022). However, while feeding the world, the agri-food sector affects five of the planetary boundaries: land, water, biodiversity, nutrient loading and climate change (Rockström et al., 2020). It causes about 26 % of anthropogenic greenhouse gas emissions (Poore & Nemecek, 2018), of which the manufacturing stage accounts for 11 % (FoodDrink Europe, 2021). It depletes natural resources such as water and land (Biodiversity International, 2017), for example, it contributes to soil degradation (Lal, 2015).

Moreover, despite securing a living for many employees, the sector also has negative impact on society. Therefore, "labour conditions, life quality and the impact of agricultural production on society will be 'core' bricks of social sustainability in agriculture" (Janker

& Mann, 2020, p. 1689). Precarious working conditions and working violations such as underpayment, job insecurity and lacking social protection (Kissi & Herzig, 2020) including child labour (Janker & Mann, 2020) and disempowerment (Mabhaudhi et al., 2019) are hindering the implementation of decent work; negative impact on human diet and health (Dwivedi et al., 2017) such as malnutrition and nutrition insecurity caused by lacking dietary diversity (Mabhaudhi et al., 2019), are negatively contributing to societal challenges.

Therefore, the transformation of the agri-food sector plays an important role in the necessary global transformation towards sustainability. The authors of the new report to the Club of Rome mention five necessary turning points for a sustainable transformation in general: termination of poverty, elimination of inequality, empowerment of women, establishment of a save and healthy food system and the transition towards renewable energies. For the transformation of the food system they describe three main paths for successful transformation: Firstly, the way food and agricultural raw material is produced needs to be reformed in a quick and comprehensive way. This includes reduction of harmful chemicals, no more expansion of cultivated area and the regeneration of already cultivated but depleted land. Secondly, change is needed towards more healthy and environmental-friendly diets as well as more nutritious diets for malnourished people. Thirdly, food waste along the food supply chain must be decreased (Dixson-Declève et al., 2022). Focussing on mitigation strategies against climate change, Filho et al. (2022) call for optimised production. This includes use of natural resources and use of climate friendly packaging, chemicals and refrigerants at the food processing stage of the food supply chain. Regarding the social dimension, Kissi and Herzig (2020) mention four main areas that contribute to decent work in the agri-food sector: (1) fundamental principles of rights at work such as elimination of child and forced labour, of discrimination and the right to assemble and bargain collectively, (2) employment issues such as wages, working hours and security, (3) skills development and training and (4) occupational safety and health (Kissi & Herzig, 2020).

In summary, the general and the food-sector specific areas demonstrate the need for holistic action in the agri-food sector, transforming environmental, societal and economic structures. The outcome of this transformation is agreed on. Uncertainty exists, however, about measures and the complex way towards it. Many initiatives and frameworks have been founded and developed to foster sustainable development in the agri-food sector. Among them are frameworks and tools to measure, report on and certify sustainability (see 2.2.2), so that sustainable development can be observed and corrected in order to contribute to the transformation needed. These frameworks and tools are far from being harmonised and coherent though. Some frameworks and researchers consider an holistic approach (Häni et al., 2003; Tennhardt et al., 2022), while other work focuses on single dimensions (Broccardo & Zicari, 2020; Desiderio et al., 2022; Michalke et al., 2022; Rajic et al., 2022; Sartor et al., 2016). Some approaches integrate a company perspective (Häni et al., 2003; Schader et al., 2016), others take a product-based view, e.g. life-cycle analysis (Notarnicola et al., 2017) or true-cost accounting (Michalke et al., 2022). The difficulty of harmonised assessment and action is illustrated by the findings of Olde et al. (2017). Their study shows that even experts do not agree on which indicators are most important for assessing sustainability in

agriculture. Therefore, comparability between outcomes of sustainability assessment in the agri-food sector is lacking (Schader et al., 2014).

Not only the lacking harmonisation of sustainable development in the agri-food sector but also its scope poses challenges. Many frameworks and calculations are dedicated to the agricultural stage of the food supply chain (Desiderio et al., 2022; Filho et al., 2022; Schader et al., 2014; Slätmo et al., 2017). An important framework in the food context are the SAFA guidelines (Sustainability Assessment of Food and Agriculture systems), developed by the Food and Agriculture Organization (FAO). They comprise four sustainability dimensions (Good Governance, Environmental Integrity, Economic Resilience and Social Well-Being), that include 21 themes and 58 subthemes (FAO, 2014). Derived from that, a tool has been developed for facilitated application of the guidelines. The SMART (Sustainability Monitoring and Assessment RouTine) tool is closely connected to the SAFA guidelines' content and has been applied on over 5000 farms (Schader et al., 2016; Tennhardt et al., 2022). Apart from trials to work with the whole food supply chain, it has only covered the farm-level until now. However, a sustainability online check has been derived from the SMART tool in order to offer a quick self-assessment to businesses operating in the food sector, including businesses at the manufacturing level of the food supply chain (Sustainable Food Systems GmbH, 2022). The online check consists of a questionnaire with "yes and no" questions and "percentage" questions, ranging from 0 % to 100 % in six steps (0, 20, 40, 60, 80, 100 %). The online check has been used and adapted in the corresponding project of this dissertation and plays a role in the developed sustainability compass (see 4.2.3).

As the example of the SAFA guidelines and the SMART tool demonstrate, most sustainability frameworks developed specifically for the agri-food sector concentrate on the agricultural stage of the supply chain. Although sustainability frameworks for the processing and manufacturing stage of the supply chain exist and have been applied (Colley et al., 2020), frameworks and tools for the agricultural stage dominate. Therefore, scholars have demanded more and novel frameworks for the manufacturing stage (Adams et al., 2021) as well as for the whole supply chain (Filho et al., 2022; León-Bravo et al., 2021). While establishing new approaches is necessary, it is also important to investigate and understand the reasons why actors along the agri-food supply chain have not engaged in sustainability management to their full potential until now (Becker & Ellis, 2017).

1.2.3 Small and medium sized enterprises

When exploring sustainability management from a business perspective, it is crucial to acknowledge varying implementation of sustainability management according to business size. As this thesis investigates sustainability management in SMEs, the following paragraph introduces the special characteristics of SMEs. These characteristics have been critical for many scholars to research sustainability and its management approaches separated from application in MNEs (Arena & Azzone, 2012; Arzoumanidis et al., 2013; Carvalho et al., 2021; Chen et al., 2014; Colley et al., 2020; Dasanayaka et al., 2022; Grimstad et al., 2020; Hörisch et al., 2015; Ortiz-Martínez & Marín-Hernández, 2022; Shields & Shelleman, 2017; Steinhöfel et al., 2019; Stubblefield Loucks et al., 2010; Takacs et al., 2022; Topleva

& Prokopov, 2020).

SMEs are characterised by a staff headcount of maximum 250 employees and a maximum annual turnover of 50 million Euros (European Commission, 2022b). In more detail: Micro enterprises consist of less than 10, small enterprises of less than 50 and medium-sized enterprises of less than 250 employees. SMEs are titled as "the backbone of Europe's economy" (European Commission, 2022a), accounting for 99 % of all enterprises. This is also reflected in the food sector, where nearly 290,000 SMEs comprise 99 % of the European food and drink companies, accounting for more than 40 % of the turnover in this industry. In half of the EU member states, the food and drink industry is the largest manufacturing employer, with SMEs accounting for employing more than 58 % of people in the sector (FoodDrink Europe, 2021).

SMEs differ in character and structure (see Table 9, Chapter 4) from large enterprises. The smaller size often coincides (amongst a variety of aspects) with tighter resources (finances, time, labour), less (management) structure, a double role of the owner also being the manager, agility and flexibility. This dependence on size continues even within the group of SMEs. Findings by Cassells & Lewis (2011) indicate that there are differences regarding the size of an SME and its activity concerning environmental management: Medium-sized enterprises are more likely to integrate corresponding measures than micro enterprises. This might be due to higher capabilities to integrate sustainability strategically (Cassells & Lewis, 2011). In addition, medium-sized enterprises are probably more likely to benefit from reputation concerning CSR engagement than smaller enterprises (Graafland, 2018). Therefore, researchers call for differentiated treatment for the different sizes of SMEs (Bourlakis et al., 2014).

In general, SMEs lag behind with regard to sustainability management and the application of sustainability frameworks and tools (Gray & Milne, 2007; Kutzschbach et al., 2021; Ortiz-Martínez & Marín-Hernández, 2022; Perez-Sanchez et al., 2003). This is compounded by the lack of suitable tools (Arena & Azzone, 2012; Chen et al., 2014; Steinhöfel et al., 2019), lack of knowledge within SMEs which is central to the implementation of sustainability management (Hörisch et al., 2015; Talbot et al., 2021) and the tendency for research to focus on larger enterprises (Rekik & Bergeron, 2017).

However, this does not mean that SMEs are not involved in sustainability activities or do not care about sustainable development. Different incentives exist for SMEs to take part in sustainability activities, for example, (supply chain) pressure exerted by stakeholders (Morsing & Perrini, 2009), e.g. by large customers (Shields & Shelleman, 2020) or the intrinsic motivation by the owner and managers (Oelze & Habisch, 2018). SMEs' engagement in sustainability is mandatory (Corazza et al., 2021) and can have positive effects beyond the company borders. For example, DiBella et al. (2022) found that SMEs can contribute not only to organisational but also societal resilience on a broad scale. With regard to sustainability management, Ortiz-Martínez and Marín-Hernández (2022) are optimistic about more SMEs engaging in the disclosure of non-financial information in the future. Since stricter reporting directives for larger enterprises are under way, they anticipate a trickle-down effect on SMEs. However, SMEs need low-threshold and supportive measures in

order to increase their engagement (DiBella et al., 2022; Hörisch et al., 2015; Shields & Shelleman, 2015). Consequently, SMEs can be considered as under-utilised potential regarding sustainable development. Realising this potential will forge the way to sustainable transformation.

1.3 Research aims and thesis structure

Against this background, this thesis aims to investigate and support sustainability management in SMEs of the food manufacturing sector in order to contribute to filling the research gap in that context and to enable and improve sustainability management in food manufacturing SMEs. The main research question is:

RQ: What are the essential aspects for a sustainability management tool applicable by food manufacturing SMEs that fulfils both the unique requirements of SMEs and the specific demands of the food sector?

The more explorative part consists of an analysis of existing sustainability frameworks and a Delphi study among experts whereas the last part suggests a novel tool for sustainability management in food manufacturing SMEs and presents its evaluation. The overarching research question is split up into sub-questions concerning the respective parts of this dissertation. These sub-questions are presented in the following. The analysis of existing frameworks demonstrates the status quo of sustainability frameworks suitable for food manufacturing enterprises, integrating a supply chain perspective (Paper I, Chapter 2).

- Which frameworks exist to assess, report and certify sustainability applicable for a food manufacturing enterprise?
    - What is the difference between generic and specific frameworks?
    - How well is the (upstream) supply chain integrated?
    - How important is the holistic approach for SMEs?

Following on from this, and complementing the findings from the first analysis, a Delphi study was conducted to collect expert opinions on crucial aspects of sustainability management for food manufacturing SMEs (Paper II, Chapter 3).

- Which aspects should be considered for a sustainability management tool applicable for food manufacturing SMEs?

Finally, with the insights gathered, a novel sustainability management tool for food manufacturing SMEs was developed and an evaluated by conducting qualitative expert interviews to find further aspects vital for sustainability management in food manufacturing SMEs (Paper III, Chapter 4).

- Which aspects can be derived from the tool development and improved in future development?

The thesis is structured as follows: the next three chapters contain the three papers submitted to peer-reviewed and Scopus-listed journals. Paper I and II have been already published, Paper III has been submitted. A general discussion follows, summarising the research conducted and presenting the results into a unified and critical perspective, and ending with a conclusion which highlights limitations of the thesis and suggests future research possibilities.

Chapter 2 Connectivity is key: Holistic sustainability assessment and reporting from the perspective of food manufacturers

2.1 Introduction

Our food chain has a prominent role in transforming our world towards a sustainable future and in operating within planetary boundaries (Rockström et al., 2020). Powerful leverages become apparent in the connection between our food systems and the prevailing environmental problems: a third of anthropogenic greenhouse gas emissions stem from food systems (Crippa et al., 2021); moreover, terrestrial acidification, eutrophication, consumption of land and freshwater resources (Poore & Nemecek, 2018) and biodiversity (Crist et al., 2017) are dominated negatively by food production. However, a sustainable (food) future is not exclusively driven by obvious environmental effects but also by socio-economic conditions (Vermeulen et al., 2012). Social shortcomings are reflected in the 108 million children working in the agricultural sector, mostly in less developed countries (International Labour Organization, 2017), as well as in the precarious employment conditions of many workers throughout the European agri-food sector (European Federation of Food, Agriculture and Tourism Trade Unions, 2014). Therefore, changing our food systems can contribute to not only environmental but also to societal health (Dwivedi et al., 2017), wealth and economic development (Kanter et al., 2016).

But where should one start? Comprising of agricultural producers (farmers), manufacturers, wholesalers, retailers, food service providers and consumers (M. A. Bourlakis & Weightman, 2004), the food supply chain embraces different actors and levels. Regarding its direct impact, agriculture's role is evident: over three quarters of the global greenhouse gas emissions from food production are caused at the primary production stage (Vermeulen et al., 2012) whereas less than 10 % are generated at the manufacturing level (Poore & Nemecek, 2018). Additionally, in 2018, the number of people working and earning their livelihood in European food manufacturing (4.5 million) was half that of European agriculture (9.3 million) (Eurostat, 2021).

However, according to the definition of sustainable supply chain management, every actor in the supply chain bears responsibility for sustainability. Hence, a sustainable supply chain is only possible through the collaboration of every actor (Chae et al., 2017; Seuring & Müller, 2008). Their responsibilities as well as actions need to be defined and prioritised. Sustainability assessment and management tools are used as instruments to achieve this (Sala et al., 2015). Much research has already been conducted on the different principles and frameworks for sustainability assessment (Faulkner & Badurdeen, 2014; Moldavska & Welo, 2015; Pintér et al., 2012; Sala et al., 2015) as well as on the categorisation of sustainability assessment tools (Ness et al., 2007; Singh et al., 2009). The need for research on industry-specific sustainability management tools has been determined (Hörisch et al., 2015), and in the context of food production, frameworks for sustainability assessment and reporting have

already been analysed (Coteur et al., 2020; Olde et al., 2016; Schader et al., 2014; Slätmo et al., 2017) However, although the food supply chain has been investigated, the perspective of food manufacturers has not yet been discussed despite their important role in the supply chain. Thus, this study aims to explore the existing frameworks' suitability for the food supply chain from a food manufacturer's perspective as well as their connectivity with the up- and downstream supply chain by comparing the sustainability frameworks applicable to food manufacturing.

The paper is structured as follows: first, the methodological considerations' background is explored briefly, followed by the selection criteria and introduction of the investigated frameworks. The first part of the findings and discussion section analyses the frameworks' content concerning the needs of a (upstream) food supply chain and the second part asks how evaluation and communication of the frameworks can support the sustainability assessment of a food manufacturer and contribute to (downstream) supply chain sustainability before arriving at a conclusion.

2.2 Background and conceptual framework

2.2.1 Sustainability assessment and reporting

According to Ness et al. (2007, p. 499) "the purpose of sustainability assessment is to provide decision-makers with an evaluation of global to local integrated nature–society systems in short and long term perspectives in order to assist them to determine which actions should or should not be taken in an attempt to make society sustainable." Furthermore, as Kanter et al. (2016, p. 72) put it:"[…] backcasting articulates what might be a pathway to a desirable future." Thus, in order to take aim-oriented actions for the future, the evaluation of the past until the present situation and the assessment of the status quo provide a base for the next steps.

Communication of sustainability (e.g. sustainability reporting) functions as an instrument to transfer information to decision makers or the public and to legitimise a certain behaviour (Genç, 2017, p. 515; Shnayder et al., 2015). In the agri-food sector, sustainability reporting practices are very limited (Becker & Ellis, 2017). The ones that do exist lack harmonisation, and thus, various sustainability reports in the agri-food sector disclose different aspects ((Conca et al., 2021; Shnayder et al., 2015).

For a company, Burritt and Schaltegger (2010) divide the tasks of sustainability accounting and reporting using an inside-out approach, assessing the internal performance for alignment with management, and an outside-in approach, aiming to justify their choices to stakeholders. Consequently, in the context of an entity, sustainability assessment and reporting can lead to positive internal change (e.g. cost reduction and management improvement) and improved external appearance due to the emphasis on perhaps formerly hidden but now exposed values (Jones & Mucha, 2014, p. 1472). This is also reflected by the motivations for sustainability assessment that Windolph, Harms, and Schaltegger (2014) stated to determine the following: legitimisation (external), market success (external) and internal improvement (internal) (see Figure 1).

2.2.2 Holistic and company-based sustainability approaches

The usefulness of sustainability assessment and reporting depends on various factors. The U.S. National Research Council (1999) has demonstrated the interlinkage between what is to be sustained and what is to be developed. Nature, life support and community are deeply interwoven with people, economy and society and need to be taken into account when dealing with sustainable development (s. Figure 1). Sustainability assessment thus includes all three dimensions of sustainability, their interactions and their relation to governance (Morrison-Saunders & Pope, 2013; Ness et al., 2007; Pintér et al., 2012). The importance of holistic sustainability assessment for agriculture, and thus for food-related sustainability, is emphasised by Talukder et al. (2020). Besides the conceptual derivation, global sustainability strategies and policies are other crucial determinants of sustainability assessments. At the company level, this is shown by Kasim et al. (2021), who investigate the micro-level activities of a medium-sized food business for integrating sustainability into its corporate strategy, highlighting the needs for sustainability accounting and communication with consumers to enhance transparency. At a macro level, when orientating sustainability assessment towards the global, overarching concept of the sustainable development goals (Kanter et al., 2016) all three dimensions (environmental, social and economic) of sustainability are to be considered to fulfil the goals set by the UN (United Nations, 2020).

Traditional product-based assessment, such as life cycle assessment, cannot provide comprehensive account (Moldavska & Welo, 2019; Sala et al., 2013) and assesses merely the environmental dimension (Schader et al., 2014). Meanwhile, this one-dimensional approach has been amended e.g. by life cycle sustainability assessment including life cycle assessment, life cycle costing and social life cycle assessment, in order to aim for a more holistic and multidimensional approach (Gbededo & Liyanage, 2020; Guinée, 2016) However, the dimensions are approached from a product perspective, leaving out non-product-related aspects at the corporate level (Fritz et al., 2017; Moldavska & Welo, 2015, p. 625). From that standpoint, the sustainability assessment of a product can be interpreted as an important component of a company's sustainable development but to work towards overall sustainability goals, a broader approach is favourable.

2.2.3 Sustainable supply chain management

Although agriculture's dominant impact on the sustainability of our food supply chains is evident, sustainable supply chain management concerns every actor in the entire supply chain (Chae et al., 2017; Seuring & Müller, 2008). One mechanism to improve sustainability in a supply chain is the sustainability-driven selection of suppliers by buyers and integrating sustainability into the evolving buyer-supplier relationship (Chae et al., 2017). Manufacturers of food products (buyers) consequently have an impact on agricultural producers' (suppliers') sustainability by having the power of choice and by engaging in this important relationship, thus playing an important part in food supply chain sustainability (see Figure 1). Such relationships among the stakeholders of the food sector can be equally important to increase sustainability in the food supply chain by facilitating knowledge sharing between stakeholders (Cortese & Murdock, 2020). Another mechanism for sustainable supply chain management

is certification to enhance credibility and trust towards other actors, especially at the downstream end of the supply chain. Retail-driven certification is an example of how sustainability can be communicated efficiently from one actor of the supply chain to another (Chkanikova & Sroufe, 2021).
All internal and external drivers were put forward by Windolph, Harms, and Schaltegger (2014) and Windolph, Schaltegger, and Herzig (2014), while the food supply chain-related aspects mentioned above were also investigated by Beske et al. (2014) in a study on sustainable supply chain management practices in the food industry, with relationship management and enhanced communication appearing as two very highly relevant aspects.

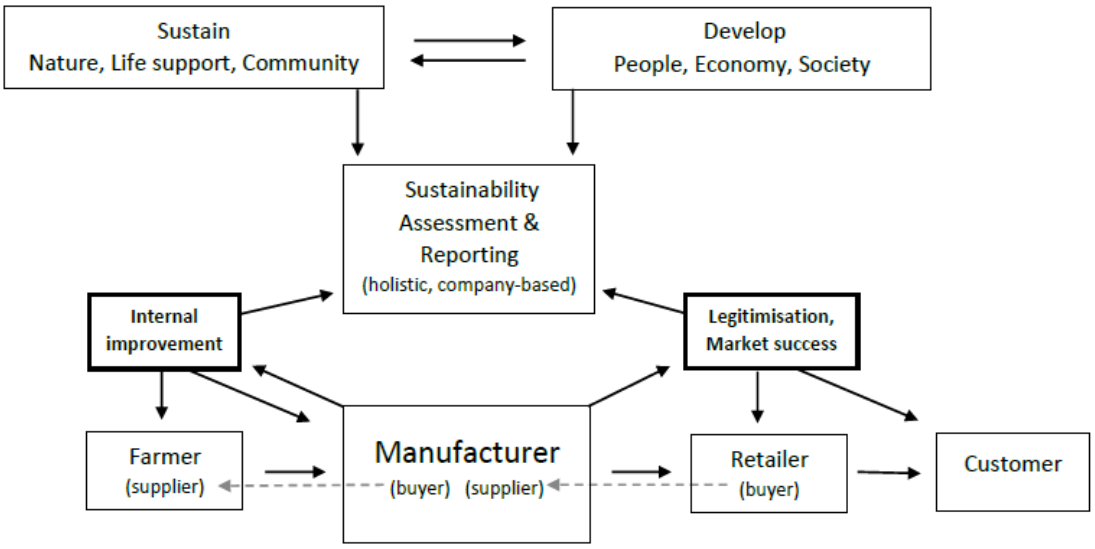

Figure 1: The motivation of food manufacturing sustainability assessment and its relation to the food supply chain

As seen above, by engaging in different buyer-supplier relationships (e.g. partner/supplier selection, certification or knowledge sharing), a food manufacturer plays a key role in food supply chain sustainability. Different motives affecting different parts of the food supply chain drive a food manufacturer to conduct holistic sustainability assessment and reporting (s. Figure 1) and seek connectivity between their and another actor's sustainability. Hence, the study's aim is to investigate frameworks for the holistic sustainability assessment and reporting of food manufacturers and for the connectivity with the supply chain.

2.3 Method

2.3.1 Boundary considerations

The following exploration is based on a comparison of seven - mostly globally applicable - sustainability frameworks (see Table 1), of which four are employed only in German-speaking countries effectively for now. As this study aims for a general description and exploration of the frameworks' applicability for food manufacturers, the completeness of the included frameworks is subordinated.

Recapitulating the need for an holistic and corporate sustainability assessment method mentioned in the introduction, only frameworks or tools that have a multi-dimensional perspective on a food manufacturer's corporate sustainability are investigated. Frameworks applicable to agriculture only are excluded. Furthermore, research approaches that are yet to be applied or not applied anymore are not within the scope of this paper, nor are tools applicable to only a part of the sector, such as the Dairy Sustainability Framework (Dairy Sustainability Framework, 2020).
The analysis in this paper focuses on the following research questions:

- In comparison to food sector-specific frameworks, are generic frameworks lacking topics important for the assessment of food manufacturers?
- How and how well is the sustainability assessment and reporting of a food producer linked to the other stages of the food supply chain?

For the content analysis, the frameworks have been compared on a rather broad macro level (topic level) because a more detailed analysis of the frameworks' topics would require qualitative analysis at the micro level (indicator level) which is beyond the scope of this paper. In order to explore the connectivity with the upstream supply chain, the frameworks' applicability at the farm level and its connectivity with different farm-level frameworks is discussed. The connectivity with the downstream supply chain is derived from the discussion of the frameworks' evaluation and communication options.

2.3.2 Introduction of the investigated frameworks

The seven frameworks investigated are described briefly below, starting with the three non-sector-specific sustainability assessment frameworks. One of the more frequently used frameworks (see Table 1) is B Impact Assessment (BIA). It is an online method for holistic sustainability assessment, certification and reporting for companies and organisations (B-Lab, 2020a, 2020b).
The second generic framework has been established by the Economy for the Common Good (ECG). Its aim is to assess and report the level of common good, and its operational aspect is built upon a matrix between stakeholders and values. ECG offers a compact (for the first two assessments of smaller companies or the first assessment of bigger companies) and a full version (Blachfellner et al., 2017; Dolderer et al., 2021).
Having been developed from a sector-specific tool (ZNU Standard^{Food}) to a more generic tool, open for all sectors and sizes of businesses, the ZNU Standard - Driving Sustainable Change (DSC) offers a management standard option. Continuous improvement and an integrated management system are promoted by this standard (Zentrum für Nachhaltige Unternehmensführung, 2020).
The Sustainability Assessment of Food and Agriculture Systems (SAFA) framework is one of the two sector-specific frameworks included in this research. It has especially been designed for the holistic sustainability assessment of food and agriculture businesses and offers comprehensive guidelines, detailed information on indicators, evaluation instructions and a tool (FAO, 2014, 2021). Sustainability Monitoring and Assessment RouTine (SMART)

provides the assessment and certification of the SAFA indicators for agricultural and food companies, and it is the second sector-specific framework. It exists as a farm tool and an online self-assessment method accessible to food manufacturers. Only the self-assessment is subject to this comparison. (Forschungsinstitut für biologischen Landbau, 2020; Sustainable Food Systems GmbH, 2020).

In addition to the five assessment frameworks, two reporting frameworks are also explored in this study: the current version of the Global Reporting Initiative (GRI) reporting framework is a set of interrelated standards with two levels of reporting depth to choose from – core and comprehensive (Global Reporting Initiative, 2021). The Sustainability Code (SC) is a less complex reporting framework, partly compliant with the GRI. Although developed in Germany, the SC can be used internationally (Rat für Nachhaltige Entwicklung, 2020). A guideline for the food industry exists for the SC framework (Braun et al., 2015), which is the basis for this research.

Before comparing the chosen frameworks in terms of content and supply chain connectivity, an examination of the application numbers reveals GRI, SMART self-check and BIA being applied more often than SC, DSC, ECG and SAFA (see Table 1). The higher application numbers by GRI (958) and BIA (416) can be explained by global application. However, 291,000 food companies are reported to exist solely in Europe (FoodDrink Europe, 2020). Consequently, many European companies are currently not applying any of the investigated frameworks.

Table 1: Overview of investigated frameworks

	GRI	**SC**	**BIA**	**DSC**	**SAFA**	**SMART**	**ECG**
Last updated	2016	2017	2019	2018	2014	n.a.	2017
Possible/Actual sphere of action	Global/ Global	Global/ Germany	Global/ Global	Europe/ D-A-CH	Global/ Global	D-A-CH/ D-A-CH	Global/ D-A-CH
Application in food manufacturing*	958**	25	416	38	n.a.	approx. 650	approx. 15
Complexity (indicators)	>120	20 criteria	200 questions	30 criteria with sub criteria	116	181 questions	20 topics (compact), 60 aspects (full)

GRI=Global Reporting Initiative
SC=Sustainability Code
BIA=B Impact Assessment
DSC=Driving Sustainable Change
SAFA=Sustainability Assessment for Food and Agriculture Systems
SMART=Sustainability Monitoring and Assessment RouTine
ECG=Economy of Common Good

*counted at available online-sources in Jan 2021, **until December 2020, n.a.: not available

2.4 Findings and discussion

In the following section, we first present and discuss the findings from analysing the content of the frameworks i.e. the sustainability topics addressed (4.1). This is followed by a presentation and reflection of framework connectivity with the upstream and downstream

supply chain (4.2). The description of the findings is directly linked to their discussion to facilitate reading.

2.4.1 Comparison of framework content

Although it is hard to compare the content of the frameworks in detail due to the different approaches in structure and definitions of sustainability dimensions, it can be stated that all the frameworks investigated not only consider aspects of each of the three traditional dimensions of sustainability (ecology, society, economy) but also include aspects of governance as a separate dimension. Governance represents "the process of making and implementing decisions" and is needed besides the 'traditional' dimensions as argued by the SAFA guidelines because "unless good governance is seriously considered, sustainability will remain a mirage" FAO (2014, p. 79). As expected, in the management dimension, no food sector specificities were found. In the following section, the frameworks' differences among their topics and the topics' importance with regard to food sector specificity are elaborated on.

ENVIRONMENTAL TOPICS

The environmental dimension is the dimension primarily associated with sustainability assessment (Ness et al., 2007; Schader et al., 2016; Seuring & Müller, 2008) and thus also the most clearly defined: greenhouse gases and air, water, energy, materials and waste are included in every framework. However, certain topics important to food systems are not universally included (see Table 2). The topic of soil and land is covered by SAFA, SMART and DSC. BIA includes aspects for a healthy soil but not with regard to agriculture. When discussing sustainability assessment for food production, soil is an indispensable topic because it is a determinant of agricultural production and its outputs, which are currently jeopardised by advancing soil degradation (Lal, 2015). According to Montanarella & Panagos (2021), sustainable soil management needs to be a crucial component of policy frameworks, such as the European Green Deal to secure the basis of food production and to create carbon sinks. Therefore, soil and land needs to be included in the sustainability assessment of food production. Biodiversity is a complete topic on its own in GRI, DSC, SAFA, SMART and BIA. In the SC guidelines for food industry (Braun et al., 2015), biodiversity is mentioned in the descriptions on what to report. ECG does not mention it explicitly. Due to food production's role in a landscape's future design (Krebs et al., 1999) and in improving diets and health (Kennedy et al., 2017), biodiversity is key to the sustainability assessment of food production. This applies to animal welfare, as well, which is inevitably connected to the rearing and treatment of animals at the agricultural level. This topic is both of general ethical concern and economic importance to producers (Wawrzyniak, 2019) but is only covered explicitly by DSC, SAFA and SMART and mentioned in passing by SC and ECG (see Table 2)

SOCIO-ECONOMIC TOPICS

In the social and economic dimensions, food sector specificity only raises a few special topics (see Table 2), e.g. customers and customer information are addressed differently. SAFA,

SMART, GRI and ECG cover customer needs indirectly by asking for product information. Labelling or product transparency, product quality or health and safety of products are topics in SAFA, SMART, DSC, GRI and ECG. BIA dedicates one entire assessment dimension to it. Information about regarding food, for example about its composition (Wyrwa & Barska, 2017), as well as information about its quality and safety (van Rijswijk & Frewer, 2008), is of enormous importance to consumers and thus a part of the upstream supply chain. Packaging information is a specific topic under the responsibility of food manufacturers. Regarding traceability, product information is essential to every stage of the supply chain as well as the health and safety of products (Dabbene et al., 2014).

SAFA, SMART and GRI include indigenous knowledge or rights of indigenous peoples which are not covered by any other framework explicitly, and SAFA and SMART also include food sovereignty, which is connected to owning patents. It can be an important topic if food ingredients are sourced from countries where indigenous rights are threatened (Hadiprayitno, 2015).

Undoubtedly, all the topics discussed above are of great relevance to the functioning and sustainability of food supply chains. However, apart from product information and safety, their impact at the agricultural stage is predominant. This also holds true for topics that are not specific to food production (e.g. greenhouse gases, water, child labour (B. Carter, 2017), living wages). Food manufacturers can only assess and impact the mentioned agricultural topics by using similar methods (similar topics and indicators) as agricultural producers to ensure connectivity and sound communication of results. Yet, there is still a lack of harmonised topics described in sustainability assessment (Olde et al., 2017; Schader et al., 2014; Schader et al., 2016) and sustainability reporting literature (Becker & Ellis, 2017; Conca et al., 2021; Shnayder et al., 2015) regarding the food supply chain. Furthermore, in order to legitimise and achieve market success, a link to the downstream supply chain is necessary. Therefore, in the next part of the paper the frameworks' connectivity with the supply chain of food manufacturers is investigated.

Table 2: Examples of topics relevant to the food sector and their inclusion into the investigated frameworks

	BIA	**ECG**	**DSC**	**SAFA**	**SMART**	**GRI**	**SC**
Soil and Land	(✓)	-	✓	✓	✓	-	-
Biodiversity	✓	-	✓	✓	✓	✓	(✓)
Animal Welfare	-	(✓)	✓	✓	✓	-	(✓)
Indigenous rights	-	-	-	✓	✓	✓	-
Product information & safety	✓	✓	✓	✓	✓	✓	-

GRI=Global Reporting Initiative
SC=Sustainability Code
BIA=B Impact Assessment
DSC=Driving Sustainable Change
SAFA=Sustainability Assessment for Food and Agriculture Systems
SMART=Sustainability Monitoring and Assessment RouTine
ECG=Economy of Common Good

✓: criterion/topic; (✓): mentioned in guidelines but no criterion; -: not mentioned

2.4.2 Connectivity with the supply chain

Although food manufacturers only have an indirect impact on agricultural topics, their position, power and responsibility within the food supply chain, as described in the introduction, can function as ignition, leverage and management. Different mechanisms integrate the matter of supply chain into sustainability assessment: it can be directly asked for (see 2.4.3) or it can be integrated indirectly (see 2.4.4 and 2.4.5).

2.4.3 Supply chain as a topic

Integrating the supply chain as an explicit criterion or topic into an assessment framework is one possible mechanism for dealing with it. This mechanism is used by every framework: SAFA describes each indicator's "relevance to the enterprise type and supply chain level" FAO (2014, p. 59) and comprehensively explains the importance of assessment boundaries, which are often beyond the manufacturing gates. SMART as a tool committed to the SAFA guidelines integrates supply chain in its questions and so does BIA with some topics. SC has its own criterion for it (depth of supply chain), which mainly requests supply chain knowledge. Nearly every criterion of DSC includes the remark "along the supply chain". GRI includes the topic supply chain in its disclosure standard, it has a standard for supplier environmental assessment, and for some topics (e.g. child labour), it asks for the results of both operator and supplier. ECG integrates it especially in its full version. Thus, it can be stated that the importance of the supply chain is acknowledged by all frameworks. However, the way to actually assess the urgently needed supply chain aspects is often neglected. According to León-Bravo et al. (2021), frameworks still focus more on indicators for internal improvement than supply chain connectivity.

2.4.4 Connectivity with the upstream supply chain

A further possibility to integrate the upstream supply chain can be the use of generalised (secondary) data of the agricultural level. Here, no actual data from suppliers is needed; however, the use of proxies for environmental data, for instance, is to be questioned because even the outcomes of similar geographic regions vary widely (Poore & Nemecek, 2018). This mechanism can only be used for the estimation of certain conditions; it will not display a differentiated picture (Fritz et al., 2017).

Another mechanism is label-use, which can bring about the assurance of a certain standard. Environmental topics, such as soil management and land use or animal welfare, can be monitored by sustainable procurement, via label compliance or individual monitoring schemes (Bracke et al., 2005; Hamprecht et al., 2005). Partly, social and economic topics can be covered via social standards such as the SA8000 (Sartor et al., 2016). Additionally, there are more holistic labels such as Fairtrade, which integrate aspects from all sustainability dimensions.

Despite the assurance label compliance offers, we argue that, like sustainability assessment frameworks, the requirements for labels are very different (van Amstel et al., 2008). Moreover, a label does not provide data that can be further employed, and often labels cover only certain aspects of sustainability, e.g. a food manufacturer buys raw material with organic quality. This does not facilitate the manufacturer's assessment of greenhouse gases or water

footprint, nor it demonstrates whether the agricultural producer grants, for instance, co-determination to his employees. Consequently, more than one label is needed to prove sustainability in all dimensions.

Therefore, we make a case for an holistic assessment at the producer level, which can convey more detailed and accurate information and data than a label. If agricultural producers undertake holistic sustainability assessment themselves, manufacturers can use the compiled data to refine their assessment, thus contributing to valid assessment throughout the supply chain (Fritz et al., 2017). Various tools exist for agricultural assessment (Olde et al., 2016) with different levels of complexity and managerial implementation (Coteur et al., 2020); however, with the focus on holistic assessment, the number of possibilities decreases. The Response-Inducing Sustainability Evaluation (RISE) (Häni et al., 2003) or Farm Sustainability Assessment (FSA) (Sustainable Agriculture Initiative Platform, 2021) are examples of holistic sustainability frameworks for agriculture. Moreover, the Dairy Sustainability Framework (DSF) is an approach to assess sustainability throughout the food supply chain. However, with 11 indicators reported at the agricultural level and three at the processing level, it cannot be counted as an holistic framework for producers (Dairy Sustainability Framework, 2020). It lacks connectivity and is only applicable to the dairy industry.

In order to facilitate data use at the next level of the supply chain, a harmonised procedure using the same framework at both the agricultural and manufacturing stages is ideal. SAFA provides this possibility, but is difficult to implement because of its complexity. SMART, the tool designed to implement the SAFA guidelines, is only used for farm analysis and as an online check at present, lacking the detailed assessment at the manufacturing stage. DSC does not provide easy access to farmers since it is a management standard. However, it can be paired with an agricultural assessment. Similarly, GRI appears to be highly complex in its full extent and lacks important topics of soil and land as well as animal welfare. SC does not provide high connectivity and lacks many of the important aspects. At present, no tool for holistic, company-based sustainability assessment exists, connecting the agricultural and manufacturing levels of the food supply chain.

2.4.5 Connectivity with the downstream supply chain

After discussing the content and the framework's connectivity with the upstream supply chain, this last section is dedicated to the exploration of connectivity with the downstream supply chain. Here, food manufacturers' power and influence are limited; therefore, the important leverage entails conveying credible sustainability assessment results on which a retailer or customer interested in sustainable food products can base its buying decision. The results are identified by evaluation and conveyance is established by communication. In the following part, the frameworks' different evaluation types are discussed before their ways of communication are scrutinised.

Karapetrovic & Willborn (2001) describe two different types of evaluation: "While the audit objective is to verify compliance with the criteria, self-assessments are aimed at the examination of drivers for continuous improvement using the criteria as a framework." For

internal purposes, a thorough self-assessment hinting at areas of potential improvement is important. However, from the perspective of a food manufacturer regarding the supply chain it operates in, a mere sustainability assessment for internal improvement is not enough; external utilisation is needed as well. For external purposes, certification is of enormous importance for a food manufacturer to achieve market access (Blackman & Rivera, 2011, p. 1177). Hence, a company is advised to employ a framework that is validated by second- or third-party certification. Second-party certification can be conducted by a framework provider (e.g. BIA, ECG), whereas third-party certification is defined as an audit by an independent institution (GRI, DSC). Third-party certification is perceived as favourable because of its independence and objectivity (Golan et al., 2001; Hatanaka et al., 2005) and because second-party consultants' work is neither regulated nor independent (Tanner, 2000).

In summary, from a food manufacturers perspective, self-assessment with a result (ECG, SMART, SAFA and BIA) can be a successful tool for internal purposes, whereas second or particularly third-party certifications (BIA, ECG, DSC, GRI and SC) can be a verified method for external purposes (see Table 3). However, to meet the overarching aim of food systems transformation, a food manufacturer should not solely improve internally, but impart its sustainability assessment results further down the supply chain to achieve supply chain sustainability (León-Bravo et al., 2021). This suggests the application of a framework integrating both internal and external purposes (Maas et al., 2016).

Table 3: Assessment and audit type of the investigated frameworks

		DSC	ECG	BIA	SAFA	SMART	GRI	SC
Application without audit	Self-Assessment without score						✓	✓
	Self-Assessment with score		✓	✓	✓	✓		
Application with audit	External verification				✓			✓
	Certification	TPC	SPC	SPC			TPC	

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SC=Sustainability Code
BIA=B Impact Assessment
DSC=Driving Sustainable Change
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SMART=Sustainability Monitoring and Assessment RouTine
ECG=Economy of Common Good

SPC=Second party certification; TPC= Third party certification

Due to the multiplicity of products that a retailer, especially, or a customer buys, concise information instead of detailed assessment results are necessary at the downstream stage of the supply chain. For a retailer, a report may serve this purpose, but for a customer, even more compacted information is convenient. Thus, from a food manufacturer's perspective, it is important to choose a framework that is capable of enhancing communication as a

crucial part of the sustainable supply chain management (Beske et al., 2014).

All frameworks allow the communication of their application. However, the form of communication varies (see Table 4). GRI and SC are frameworks explicitly established for reporting, thus they concentrate on that form of communication. BIA and ECG provide standardised reports that summarise assessment scores and results. Reporting can be aligned to the SAFA topics, but the guidelines do not provide guidance on reporting, and the results are not suitable for business-to-customer communication. Claims about its application may be only of value to the communicating company if the recipient is familiar with the framework. The results of the SMART online check must not be communicated. DSC allows communication of the certificate; however, a report is not issued. On the contrary, it is an indicator of assessment. The lack of reporting possibilities and guidance in the food sector-specific frameworks does not demonstrate integrated action of assessment and reporting (Maas et al., 2016) and can explain the lack of harmonised, holistic reporting throughout the agri-food supply chain claimed by Conca et al. (2021), Becker and Ellis (2017) and Shnayder et al. (2015).

Besides a written report, there is visual communication via a signet or label. SC, BIA and DSC allow companies to use a signet with the framework emblem in corporate communication, including websites. A label to present the conduction of an assessment on a company's product is not provided by any of the frameworks except for BIA. Is the lack of a label disadvantageous for external purposes? "Food labelling is how food business operators and consumers communicate and interact" Moreira et al. (2019, p. 333). However, their research showed that excessive information diverts attention from the essential information of a label that a consumer is supposed to grasp quickly, recommending low complexity. Furthermore, Janßen & Langen (2017) discuss the poor understanding of consumer regarding the overall concept of sustainability. Both low complexity and poor understanding complicate the implementation of an holistic sustainability label. One could argue, that until the required public understanding of holistic sustainability has not been accomplished, the requirement for an holistic sustainability label is subordinated. Therefore, communication of sustainability via labels cannot be a determining factor for the choice of one of the investigated frameworks, which is supported by the findings that "sustainability labels currently do not play a major role in consumers' food choices" (Annunziata et al., 2019; Grunert et al., 2014, p. 177). Another option to inform the downstream supply chain is the communication of definite assessment results in points (BIA and ECG), making the assessment results more palpable and directly comparable to other companies, a factor that is possibly relevant to market success and legitimisation. Further examples of communication are internet-based solutions such as a map (ECG), a database (GRI – until 2020) or a register (BIA) where the company's participation and a report are presented (see Table 4). External presentation can create extra credibility because a company's work on sustainability is communicated by another party than the company itself. Moreover, for smaller companies, this can reduce the effort they would otherwise have to put in to create their own presentation.

In summary, although only BIA supplies a label, external communication of reports is

supported by GRI, SC and ECG. For DSC, only its application can be communicated, but since it is a certified standard, it provides credibility. SAFA and the SMART online check are only suitable for internal communication or communication with other experienced businesses.

Table 4: Communication of investigated frameworks

	DSC	ECG	BIA	SAFA	SMART	GRI	SC
Report		✓	✓	✓		✓	✓
Result		✓	✓	✓			
Standard	✓						
Label (L)			L				
Signet (S)	S		S				S
Other	Register	Map	Register			Database	

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2.5 Conclusion

By comparing the seven frameworks, this paper aimed to clarify sustainability assessment from a food manufacturer's perspective and its connection to the food supply chain. None of the frameworks displayed perfect characteristics. This does not remain a theoretical issue solely: only a small share of European food manufacturers applies any of the investigated frameworks at present. By considering the circumstances of the food supply chain some conclusions can be drawn.

The food sector-specific content includes important aspects that are only partly included in non-specific frameworks. As demonstrated above, food sector-specific topics such as soil and land use, biodiversity and animal welfare, product transparency, product safety and indigenous rights belong to our food systems. Despite lack of direct impact at food manufacturing level but due to the responsibility for sustainability throughout a supply chain they should be included in the sustainability assessment for food manufacturers.

In order to include fundamental topics from the upstream end as well as to cultivate relationship management at the downstream end, a food manufacturer should be able to connect its sustainability assessment and reporting to both ends of its supply chain. At the upstream end, harmonised assessment between farmers and manufacturers is needed. The agricultural level can provide food manufacturers with relevant information about their sourcing of raw materials; the assessment of the food manufacturing stage thus combines the analysis of agricultural data with assessment at its own stage. Apart from harmonisation, this can reduce cost and labour for both parties: farmers can concentrate on compiling data

whereas food manufacturers can focus on its analysis and interpretation. Through this mechanism and the importance of influential buyer-supplier relationships, manufacturers can directly increase their sustainability and indirectly challenge suppliers to improve, as well.
At the downstream end, by engaging in framework certification, a manufacturer can legitimise itself for retail with verified criteria and moreover can further communicate sustainability credibly to achieve market success through increases in customer numbers. A framework solely for internal improvement can be valuable to a company itself; however, discussing the value of a manufacturer's assessment to the whole supply chain, is too short-sighted. In terms of communication, a label is the standard way to attract customers' attention. In the context of sustainability in the food sector, whether and how far a complex topic such as holistic sustainability can be conveyed via labelling is not yet clear. Until now, communication has depended largely on the self-initiative of the customer, making use of reports, scores, maps and databases.
If we are to change our food systems profoundly, there is no way around holistic (Vermeulen et al., 2012), integrative (Maas et al., 2016), harmonised (Schader et al., 2014) and sector-specific (Hörisch et al., 2015) assessment throughout the entire food supply chain. The discussed frameworks all have their own potential and can lead to thorough, corporate engagement with holistic sustainability. However, summarising our work we can conclude that where content is comprehensive and tailored to food sector needs (SAFA, SMART), evaluation and communication is lacking, thus neglecting the downstream supply chain. Where evaluation and communication are strong (ECG, BIA and GRI) or a management system is established (DSC), concrete integration of the upstream supply chain and food sector-specific content is missing. A thematically tailored framework, applicable to a food manufacturer yet catering to the needs of the whole food supply chain, has yet to be developed or rather created from the existing frameworks with potential. Promising projects are underway: currently, a sector-specific GRI standard for agriculture, aquaculture and fishing is being developed, and it will be interesting to see how well this standard connects to the downstream supply chain.

2.5.1 Research implications

Further research should focus on the connection between agricultural and manufacturing assessment and how retail can integrate the assessment of food manufacturers to improve sustainability at the downstream end of the supply chain. Case studies such as that from León-Bravo et al. (2021), studies scrutinising the appropriate content for feasible data and result exchange between different supply chain levels such as the study of Fritz et al. (2017) or integrated supply chain modelling studies (Taghikhah et al., 2021) can help find more connected ways to assess and report sustainability throughout the (food) supply chain. This research is currently receiving impetus in the area of determining the true cost of food production along the food value chain. Walkiewicz et al. (2021) used a multiple case study with four SMEs from the food sector to show how a multidimensional management and accounting system can be built up in a participatory process that includes relevant sustainability indicators across the food chain.

In order to agree on the appropriate content, more content analysis at the indicator level of the existing frameworks should be carried out. Here lies a limitation of this study, which only described content at the topic level. Moreover, to not ignore the development of holistic, product-based assessment such as life cycle sustainability assessment, experts from the product-based and company-based approaches and from all levels of supply chain should collaborate, pondering the connectivity of both approaches. For the very end of the food supply chain, further research in customer behaviour and education is needed to arrive at the best possible solution for customer information regarding sustainability in the food supply chain.

2.5.2 Practical implications

This study provides a preliminary overview of sustainability assessment and reporting frameworks with a specific view on their applicability for the manufacturing stage of the food supply chain. Therefore, it can help managers of food manufacturing companies to make an informed decision about which framework to apply and can thus contribute to the application of sustainability assessment and reporting in the food sector. The findings imply, that because there is no wholly integrated approach combining assessment and reporting as well as including all sector-specific topics, a framework for sustainability assessment and/or sustainability reporting should be chosen according to the motivation of the company to engage in sustainability performance measurement and communication. This may also result in the use of more than one standard to meet the information demands of internal decision-makers and external stakeholders.

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Chapter 3 Towards a sustainability management tool for food manufacturing small and medium-sized enterprises—Insights from a Delphi study

3.1 Introduction

Small and medium-sized enterprises (SMEs) are titled as "the backbone of European economy" (European Commission, 2022). Zooming in on the European food industry, 99 % of the companies are SMEs, accounting for 43 % of the turnover in this industry (FoodDrink Europe, 2020). This makes SMEs a central part of European food production with an important role in European economy.

As food manufacturing SMEs are part of a more decentralised food production, connected to local and regional values and practices (Cohen et al., 2017), contributing to regional development, while also depending on their home region (Tödtling & Kaufmann, 2001), they are vital actors in transferring global demands into regional action for sustainable development. For this task local tools and expertise are needed (Kanter et al., 2016).

In contrast to SMEs, many big enterprises already pursue aim-oriented and strategic sustainability management. Tools for that include sustainability assessment, reporting and certification (Amundsen & Osmundsen, 2020; Burritt & Schaltegger, 2010; Sala et al., 2015). In SMEs those practices have not been implemented widely yet (Jansson et al., 2017; Rekik & Bergeron, 2017; Steinhöfel et al., 2019). This is partly due to SMEs' special characteristics (Grothe, 2012), leaving SMEs between the pressure to develop sustainably and the lack of tailored tools and support (Arena & Azzone, 2012). Acknowledging the importance of food manufacturing SMEs' participation in sustainable development, the question occurs how a tool of sustainability management can be used and implemented by food manufacturing SMEs in a beneficial way and whether tool requirements for a food manufacturing SME differ from tool requirements for SMEs in general.

With an extract from a Delphi study this paper collects expert insights on the potential use and application of sustainability management tools for food manufacturing SMEs and derives practical implications for future tool development. The paper is structured as follows: First, basic characteristics of SMEs and their relationship with sustainability management as well as a description of sustainability management components such as sustainability assessment, reporting and certification are briefly summarized with reference to existing literature, followed by the methodological description. The part about results and discussion displays both quantitative and qualitative results including their discussion for each study question before conclusions are drawn.

3.2 SMEs and sustainability

3.2.1 Components and content of sustainability management

Different concepts for evaluation and communication of sustainability performance can be applied to support sustainability management. Three possible sustainability management tool components dealt within this paper are briefly described in the following (see Figure 2) to illustrate their differences and requirements:

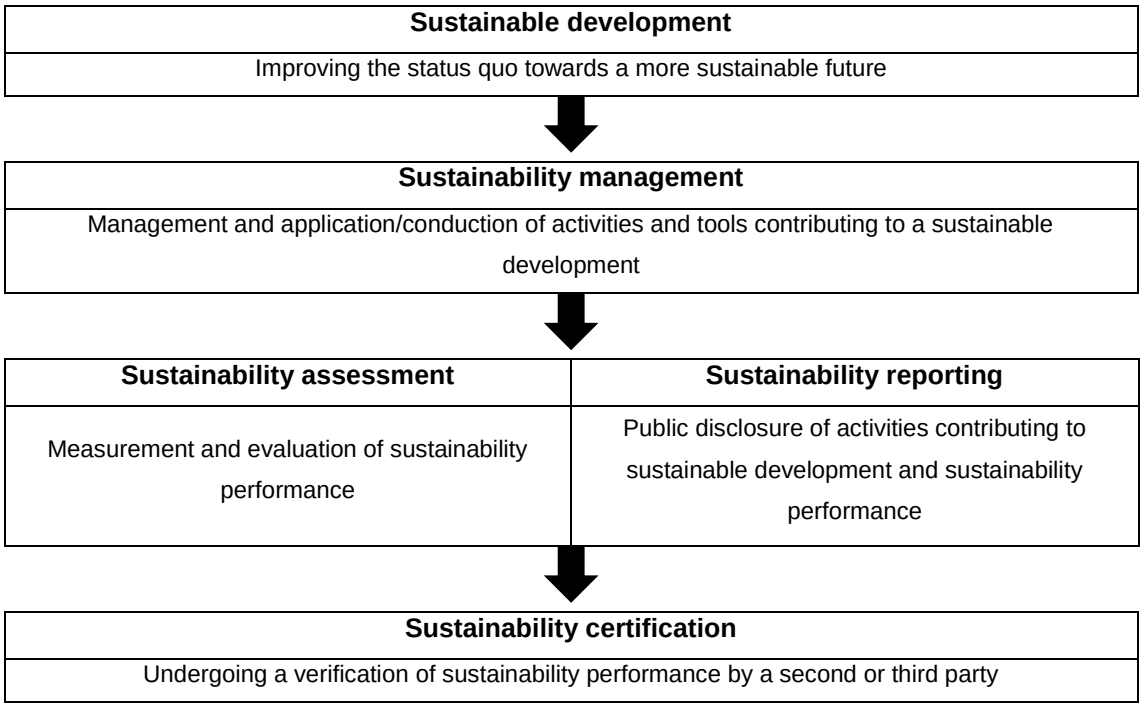

Figure 2: Definition of terms used in the paper

According to Sala et al. (2013, p. 1663) sustainability assessment can "bridge the knowledge to action gap providing efficient and reliable methodologies to measure progress towards sustainability and to assess sustainable development objectives and goals". Thus, *sustainability assessment* can help decision-makers with the complex task of sustainability management (Ness et al., 2007). Despite being a supportive tool, sustainability assessment is not one fixed method as "there are usually many competing objectives to consider" (Morrison-Saunders & Pope, 2013, p. 55). Therefore, criteria or indicators for measuring sustainability need to be chosen carefully, because what is measured determines the outcome (Moldavska & Welo, 2015). Sala et al. (2015, p. 323) also express three requirements for sustainability assessment: It "has to fulfil at least three main features of sustainability science: inter-disciplinarity; its foundation on an holistic perception of reality; and collaboration in scientific research […].". When the current sustainability performance has been measured, it can be advantageous to communicate the results internally and externally.

Sustainability reporting is one way to communicate activities for sustainable development and sustainability performance towards stakeholders as well as to legitimise behaviour (Genç, 2017; Shnayder et al., 2015). The findings of Gallego-Álvarez and Pucheta-Martínez (2021, p. 12) suggest, that the disclosure of sustainability aspects is "a mechanism by which firms

can gain visibility, legitimation and enhanced reputation and, as a result, improved firm performance". The often systematic way of disclosure, supported by frameworks such as the Global Reporting Initiative, is not of common use amongst SMEs (Steinhöfel et al., 2019) and not prevalent in parts of the food sector such as in German dairies (Westerholz & Höhler, 2021). Often, reports are not written according to a standard, which makes comparison difficult and threatens credibility (Westerholz & Höhler, 2021). Regarding more integrated approaches, new concepts combining measuring and reporting are evolving, as for example dashboard technology that can be useful even for very small companies (Shields & Shelleman, 2020). Contributing to successful and credible communication of sustainability performance (Amundsen & Osmundsen, 2020), *certification* functions as an assurance of a certain standard or level of sustainability. It can help to build a trusting relationship with stakeholders and create differentiation of goods for consumers. For a producer, this can mean market access (Amundsen & Osmundsen, 2020; Blackman & Rivera, 2011) and higher prices (Blackman & Rivera, 2011; Harris, 2007). In order to create high credibility, certification should be conducted by a third party (Blackman & Rivera, 2011; Tanner, 2000) and the process should be transparent (Blackman & Rivera, 2011).

Closing the brief description of possible components of sustainability management (s. Figure 2), the question arises as to what the actual content of these concepts should be. Sustainability can be seen as a complex system with multiple interactions (Ben-Eli, 2018), which concerns nature, society and economy. Thus, researchers have stressed the importance of an holistic perspective in sustainability assessment, certification and reporting (Chen et al., 2014; Moldavska & Welo, 2019; Morrison-Saunders & Pope, 2013; Pintér et al., 2012; Sala et al., 2015; Talukder et al., 2020). Holistic frameworks with application in the agri-food sector have been investigated (Küchler & Herzig, 2021; Schader et al., 2014; Talukder et al., 2020), yet it remains questionable how far this holistic perspective is feasible for SMEs in food manufacturing.

3.2.2 SMEs and their relation to sustainability

A witty quotation from Gerstenfeld & Roberts (2000, p. 117) states: "One thing that makes SMEs similar is that they are all different". Despite that great diversity, similarities of SMEs are reported in literature. They have strong regional bonds (Cohen et al., 2017; Tödtling & Kaufmann, 2001), are often owner-managed (Hillary, 2000; Lee et al., 2016; Revell et al., 2009), prefer to pursue more long-term oriented instead of short-term quarter goals (Grothe & Marke, 2012) and have a flatter and less formalized organisational structure (Jansson et al., 2017) compared to big enterprises.

If initial internal barriers such as the value-action gap by the owner-managers (Revell et al., 2009) or a reluctant attitude towards sustainable development and environmental management are overcome, "the first hurdle" (Hillary, 2004) towards sustainability is passed. However, further internal problems such as lack of knowledge and training (Hillary, 2004) as well as external barriers such as high costs of certification systems or unsuitable indicator and management systems (Grothe & Marke, 2012) exist. Despite these obstacles: since activities for a sustainable development are not only necessary but also a competitive

advantage (Morsing & Perrini, 2009; Oelze & Habisch, 2018), it is not a question of whether SMEs should engage but a question how it can happen.
Until now, SME engagement has often been happening in an unsystematic way. For instance, due to an often fragmentary understanding of sustainability, SMEs concentrate on environmental measures (Broccardo & Zicari, 2020; Carvalho et al., 2021), or measures and progress are not communicated (Bianchi & Noci, 1998; Oelze & Habisch, 2018; Revell et al., 2009) to the outside, missing a chance to stand out. In order to facilitate sustainability management in SMEs leading to sustainable development, appropriate tools need to be established (Hörisch et al., 2015).
Research is emerging examining sustainability in the context of food manufacturing SMEs (Bourlakis et al., 2014; Topleva & Prokopov, 2020) and approaches have been made to adapt sustainability management tools to the circumstances of food manufacturing SMEs (Arzoumanidis et al., 2013; Smith & Barling, 2014). However, the lack of implementation of such tools in SMEs mentioned in the introductions as well as the reported need for sustainability research in food manufacturing SMEs (Adams et al., 2021) raises the question as to what exactly a management tool for food manufacturing SMEs needs in order to improve sustainability performance.

3.3 Subject of research

Therefore, a Delphi study with experts in food production and/or sustainability management was conducted to collect aspects that a sustainability management tool and its possible components, namely sustainability assessment, reporting and certification, need to be applied by a food manufacturing SME. This insider perspective is preferable to a third-party perspective because it draws advice from practice and thus allows for a more transdisciplinary approach. To the knowledge of the researchers, this approach has not been chosen before and promises novel insights. In order to connect to the usefulness of a tool, the overarching research question was divided into sub-questions investigating factors for the decision to use, the implementation of and the communication about the use of a sustainability management tool:

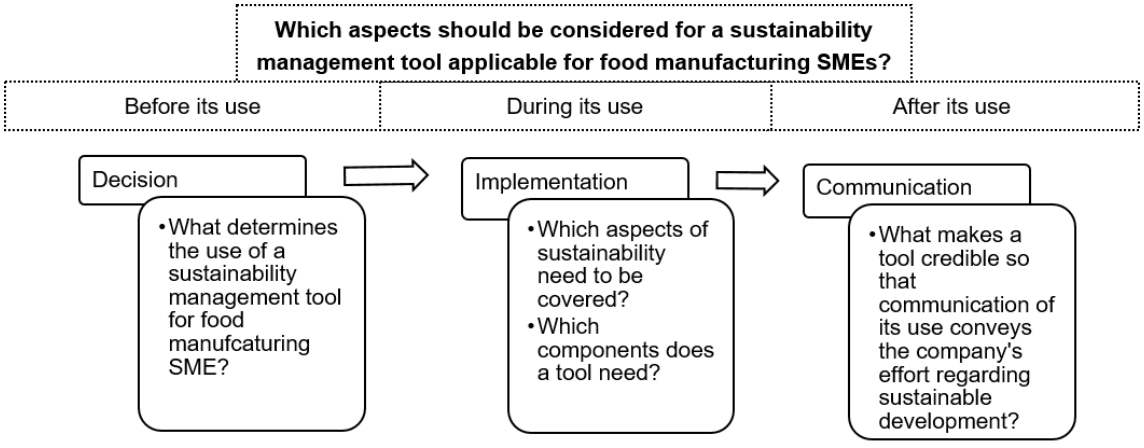

Figure 3: Visualisation of the research question and its subquestions

3.4 Method

3.4.1 Delphi technique

For the investigation of the research questions, a Delphi study design was employed to collect expert opinions and forecasts for the potential use of a sustainability management tool and its likely components and content. Delphi studies can be used as a forecasting tool (Kreuzhof et al., 2016), as a consensus-seeking tool (Gracht, 2012; Miller, 2001; Niederberger & Renn, 2018; Valentijn et al., 2015), as an analysis tool (to explore drivers and barriers, for example) (Barnes & Mattsson, 2016), and as a policy-developing (Fletcher & Marchildon, 2014) or framework-developing tool (Gbededo & Liyanage, 2020). They have been applied to various areas and issues (Seuring & Müller, 2008) and multiple variations have developed throughout the years; i.e., group Delphi workshops in real life (Niederberger & Renn, 2018) and as part of participatory action research (Fletcher & Marchildon, 2014).

Rather than seeking consensus, this research was carried out to deliver a broad overview of aspects concerning SMEs and activities in sustainability management, considering the whole facet of answers (qualitative part) and estimating application probabilities (quantitative part and forecasting element). This aim, although rare in comparison to consensus-seeking Delphi studies, has been previously pursued by other researchers (van Gelderen et al., 2021).

Regardless of different aims and applications, one common characteristic of all Delphi studies is the involvement of an expert panel "for capturing and refining expert opinion based on the experiences of those who are actively working in a domain" (Barnes & Mattsson, 2016, p. 2) in a structured process for group communication (Linstone & Turoff, 2002). The experts answer the questions while spatially separated and an overview of the results is handed back to them to initiate another round that is inspired by the cumulated results of the first round. This process is stopped if the aim of the study is reached or if no major changes are expected (Linstone & Turoff, 2002). The advantage of a Delphi study compared to an open discussion is the exclusion of interferences such as influence amongst the participants (Häder, 2002) prevented by anonymous responses (Toma & Picioreanu, 2016) and access to "a geographically dispersed group of experts" (Toronto, 2017, abstract) made feasible via the internet. Thus it was possible to conduct the study during Covid-19.

3.4.2 Question design

A mixed methods approach covering both qualitative and quantitative parts was employed. The Delphi study contained more questions but only thematically relevant ones are presented here. Three questions asked for the probability of a certain scenario and an elaboration on the estimated probability (see Table 6 for questions in detail). A seven-point Likert scale was used in which each Likert item was paired with a percentage and a term to create a full understanding of each number (see Table 5). Expressions of probability and matching percentages were derived from Intelligence Community Directive 203 Analytic Standards (2015). For one question, participants were asked to divide 100 per cent between given categories and to explain their division. A pre-test was conducted and, finally, the questionnaire was presented to the experts via the online questionnaire tool Analyzer.

Table 5: Scale of probability used in the questionnaire

1	2	3	4	5	6	7
Almost no chance	Very unlikely	Unlikely	Roughly even chance	Likely	Very likely	Almost certainly
1 - ≤5 %	>5 - ≤20 %	>20 - ≤45 %	>45 - ≤55 %	>55 - ≤80 %	>80 - ≤95 %	>95 - ≤99 %

Table 6: Questions evaluated

With what probability will SMEs commit themselves to a sustainability certification to assess and evaluate their level of sustainability?
With what probability will sustainability certification have a positive impact on SMEs? (Due to similar answers this question was merged with the question before in round 2, therefore only qualitative data is included into evaluation of the first question)
With what probability can an assessment of sustainability in an SME of the food industry be credible?
Will all four dimensions of sustainability mentioned by the FAO (environmental, social, economic and good governance) be equally important for assessing sustainability in SMEs of the food industry? Please divide 100 % between the four dimensions to show the estimated importance.

3.4.3 Participants

Out of 54 requested experts with a background in sustainability and/or the food sector (mostly from the study region Denmark and Germany), 30 agreed to take part in the study. Seven experts dropped out during implementation or did not participate. Therefore, 23 answers were received in the end. In the second round, five participants did not respond. Consequently, 18 participants took part in the second round. The average experience of the 18 participants was 22 years in the sustainability and/or food sector.

3.4.4 Data analysis

Due to the number of participants, statistical results are displayed in absolute numbers. In round one (R1) 23, in round two (R2) 18 estimations are shown. The dropouts are marked with white rectangles in the bars for R1, so the reader can see whether a bar changed because of a dropout or because of a change of answer.

Analysis of the qualitative data was conducted by methods from the field of socio-scientific research engaging in a summarizing method for qualitative analyses described by Mayring (2015). The text was organised according to the questions and not according to individual participants. After initial text work, for each question, internal codes were formed inductively; these were generated by the existent data (Kuckartz & Rädiker, 2019a). The first coding framework offered insight into the different aspects covered by the expert's answers and it was included in the feedback following the first round. After the second round, the analysis was deepened by working with in-vivo coding to a large extent, because in-vivo

coding can reduce the amount of interpretation by the researchers (Jaques, 2021). The code variety evolving was again summarized largely under existing codes from the first coding round and was partly summarized under new, more appropriate codes. For the first question, a mainly deductive approach was used for categorization based on a classification from Windolph, Harms, and Schaltegger (2014). Also, creative coding maps were used to reorganise the existing codes. Furthermore, a spreadsheet was prepared to visualize matching qualitative and quantitative data and the changes made from R1 to R2. MAXQDA was used as coding software.

3.5 Findings and discussion

In this section, both quantitative and qualitative findings are described for each question and the experts' answers are examined in conjunction with recent research. Although quantitative answers are presented to give an overview of the experts' estimations, more emphasis is placed on the exploration of the qualitative results to reveal and discuss important arguments. Original quotes from the experts' answers and coding categories are highlighted in italics. The findings are presented for each question separately, starting with two questions asking for a probability, continuing with a question asking the experts to divide 100 % between different options and ending with a framework summary.

3.5.1 Question: "With what probability will SMEs commit themselves to a sustainability certification to assess and evaluate their level of sustainability?"

In order to investigate the decision of an SME to apply a sustainability management tool, the question was connected to sustainability certification, including assessment, as this can be "seen as leverage for effectively promoting sustainability and not only for evaluating its progress and/or comparing options" (Sala et al., 2015, p. 323). The results are presented together with qualitative results from the question, "With what probability will sustainability certification have a positive impact on SMEs?" This supported and deepened the qualitative analysis of the other question.

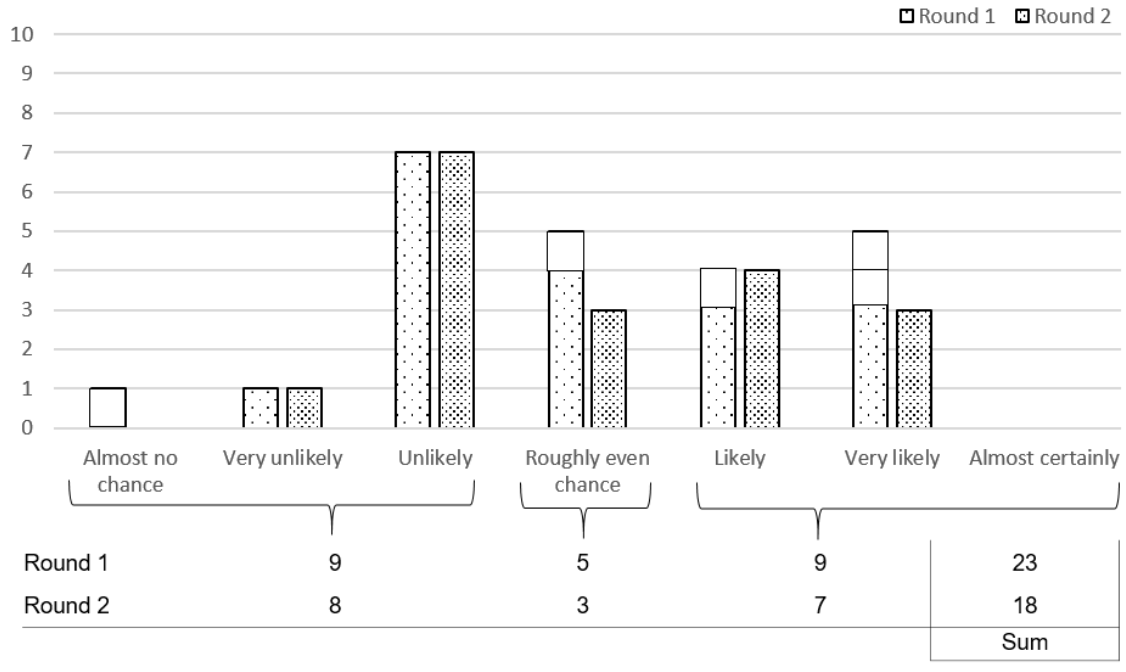

Figure 4: Absolute frequencies for the question: "With what probability will SMEs commit themselves to a sustainability certification to assess and evaluate their level of sustainability?"

No indication can be derived from the quantitative answers, as an equal number of experts rated the probability as unlikely and likely in round one. Eight experts rated the probability as unlikely and seven experts rated it as likely (due to dropouts and not due to change of mind, see Figure 4).

In relation to the estimation of probability, advantages, disadvantages and requirements were mentioned regarding the commitment of an SME to assess, evaluate and certify its sustainability performance. Advantages and motivation can be categorised into internal improvement, legitimisation and market success according to Windolph, Harms, and Schaltegger (2014) (s. Table 7).

Table 7: Code system overview for the question: "With what probability will SMEs commit themselves to a sustainability certification to assess and evaluate their level of sustainability?"

Code list - Commitment to sustainability certification					
Codes		**Frequency**	**Codes**		**Frequency**
advantages and motivation			**requirements and preconditions**		
internal improvement			realistic framework		
	performance evaluation	3		*costs*	3
	internal company process	3		*effectiveness*	4
	systematic approach	3		*sector-specific*	1
	decreasing other reporting	1		*support*	1
legitimisation				*transparent*	1
	external verification	1		*trustworthy*	2
	credibility	1	visible benefits		
	communication	2		*added value*	6
	marketing	1		*positive external effect*	3
market success			external pressure		
	competitive advantage	3		*competitors*	3
	additional margin	1		*customers*	3
	supports customer loyalty	1		*force*	1
	communication	2	internal conditions		
	marketing	1		*attitude*	1
disadvantages and risks				*experience*	1
resources		5			
bureaucratic		3			
complex		3			
lack of knowledge		2			
consumer confusion		1			

Internal improvement contained *performance evaluation*, strengthening of *internal processes* and benefit through a *systematic approach;* all aspects were mentioned three times. Also, the advantage of reducing other *reporting obligations* was brought up. The benefit of internal improvement through sustainability assessment has been reported by researchers (Jones & Mucha, 2014), as well as the internal inspiring and motivating character of a certification (Amundsen & Osmundsen, 2020; Carvalho et al., 2021) e.g., through the definition of focus areas (Amundsen & Osmundsen, 2020). An interesting aspect is the finding by some researchers, that often only front-runners, who know they will perform well, strive for certification (Amundsen & Osmundsen, 2020; Blackman & Rivera, 2011). This partly challenges the advantage of internal improvement and points to the need for other mechanisms than certification to get poorer performing SMEs engaged in sustainable development.

The possibility to legitimise through sustainability certification was further specified by *external certification* and enhanced *credibility*. Hatanaka et al. (2005) describe the connection between legitimisation and certification in the agri-food sector. Through third-party certification (external certification) higher credibility is achieved due to the perceived independence of the certification body. This in turn contributes to the legitimacy of an enterprise.

Market success through *competitive advantage* was mentioned three times and could also occur through *additional margins* and *customer loyalty*. Competitive advantage for SMEs through corporate social responsibility is of major interest in research (Morsing & Perrini, 2009) and Pintér et al. (2012) describe only extrinsic motivation such as competitiveness as real motivation.

Communication and *marketing* can be subordinated under both legitimisation and market success because both categories depend on the transmission of (advertising) information. Genç (2017) describes the communication of sustainability as a possibility to legitimise in front of decision-makers and/or the public. However, the aspect of legitimisation through marketing and strong communication is weakened by the observations of Oelze and Habisch (2018, p. 749): SMEs tend to see the marketing of efforts in responsible supply chain management as less important than multi-national companies and that they "neglect an effective communication to stakeholders". As a result, less competitive advantage is gained. While the qualitative results from this study do not reveal the importance of the different advantages for SMEs, they contribute to the assumption that the adoption of green practices (here broadened to sustainability practices) in SMEs is always multi-causal (Rekik & Bergeron, 2017).

Alongside the positive factors, disadvantages and risks are seen in needed *resources (financial, time, manpower)* (five times) for much *bureaucracy* – not fitting the lower level of bureaucracy in SMEs reported by Meredith (2000). The shortage of SMEs' resources with regard to sustainability management is also a present topic in literature (Arena & Azzone, 2012; Caldera et al., 2019; Grothe & Marke, 2012). SMEs are often limited in resources such as human and financial capital (Hillary, 2004; Kannan & Boie, 2003) and face higher capital and transaction costs (Thakkar et al., 2009). Also described as problematic was the *complexity of sustainability* (three times) and the corresponding *lack of knowledge*. When it comes to sustainable development SMEs are directly dependent on their owners and their attitudes towards sustainability (Jansson et al., 2017). However, owner-managers (i.e., SMEs) often lack the required skills and knowledge to implement an environmental or sustainable management system (Grothe & Marke, 2012; Hörisch et al., 2015; Perez-Sanchez et al., 2003; Schaltegger et al., 2012) and information about what and how to implement is missing (Grothe & Marke, 2012; Hillary, 2004). Due to the lack of workforces specialising in sustainability management, strategic and operational management is complicated (Grothe & Marke, 2012). Hörisch et al. (2015, p. 765) found that the possession of knowledge is "a key difference between SMEs and large companies as well as an important mediator to promote sustainability management". In summary, a variety of advantages and disadvantages exist and it remains an owner's consideration whether to engage in sustainability certification. As one participant put it:

> *SMEs will have to evaluate advantages and disadvantages of sustainability certification. Advantages of certification (systematic approach to sustainability, external verification) will have to be balanced against disadvantages (extra effort, extra costs).*

In addition to advantages and disadvantages, the experts also mentioned requirements and conditions for certification. One requirement is a realistic framework for certification regarding *finances, effectiveness, sector specificity, support, transparency* and *trustworthiness.* A solution for financing coincides with the problem of resource shortage, as discussed earlier. Considering that sustainability assessment and certification might lead to cost reductions due to internal improvement (Jones & Mucha, 2014), costs for certification could be offset after some time. However, this requires enough investment capital in advance. A proposed solution by one expert was:

> *Maybe the certification process could be cost neutral and/or subsidized at the beginning to ensure adoption and ongoing performance improvement of the business through the certification process.*

This could involve funding by official structures and could be a hint for policymakers to support sustainable development in SMEs more strongly.

Support is connected to the possible lack of knowledge in SMEs regarding sustainability and is mentioned by Hillary (2000). For the existing sustainability certification B-Corp, deficits of sector specificity and support for SMEs are discussed by Carvalho et al. (2021). If direct support is not possible, another way of a support system battling a lack of knowledge is through a network between different SMEs because "the network becomes the place where through collaborations and partnerships, an SME can start developing awareness and a practical approach toward sustainability" (Corazza et al., 2021, p. 3). Contributing to the need for support while compensating for a lack of resources and knowledge, the findings of Journeault et al. (2021) emphasise the importance of collaboration of SMEs with external stakeholders. They can take on the role that usually internal agents in larger enterprises can supply, such as trainer, analyst, coordinator, specialist and financial provider. A sustainability management tool integrating some sort of network character with external stakeholder support could thus be an alternative solution for SMEs. The aspects *transparency* and *trustworthiness* are discussed together with the matching qualitative results of the next question.

Another requirement for certification is visible benefits, especially *added value,* but also *positive external effects* such as *marketing.* Increased application of sustainability tools through the promotion of benefits is also addressed by Johnson (2015). (Blackman & Rivera, 2011, p. 1183) argue that "[w]idespread dissemination [marketing of the certification results] via websites and academic publication maximizes the benefit of evaluation". Although this is related to the consumer perspective, it can also have a positive external effect on companies undergoing certification. However, whether marketing a sustainability certification is possible remains uncertain, when taking the findings of Grunert et al. (2014) into account, which imply low relevance of sustainability labels concerning consumer choices.

The advantages and disadvantages mentioned in the qualitative results go toward explaining why there is such a variation in predictability when it comes to food manufacturing SMEs committing to sustainability certification (including sustainability assessment). The theoretical advantages of internal improvement, legitimisation and market success (Windolph, Harms, & Schaltegger, 2014) are contrasted by practical impediments such as SMEs tending to lack resources (Grothe & Marke, 2012; Hillary, 2004). Thus, a procedure

deemed to be bureaucratic with complex content such as sustainability assessment and certification seems not feasible. The rather reluctant estimation of the experts also indicates that, for a sustainability management tool for SMEs, the conventional components and strategies have to be altered to new concepts suiting the needs of SMEs.

3.5.2 Question: "With what probability can an assessment of sustainability in an SME of the food industry be credible?"

Communication of business sustainability is important (Genç, 2017) and addressees of sustainability assessment expect (amongst other aspects) trustworthy and accountable results (Silva et al., 2019). Additionally, as argued by Graafland (2018), if SMEs engage in activities for sustainable development, they need credibility in order to withstand the increased attention created by the company's sustainability engagement. Due to the high value of credibility, we asked the participants about the estimated credibility of sustainability assessment concerning food manufacturing SMEs. An assessment of sustainability in an SME of the food industry was predicted to be likely credible by 19 participants in R1 and 14 participants in R2. The rest of the participants, four in both rounds, predicted credibility to be unlikely (see Figure 5).

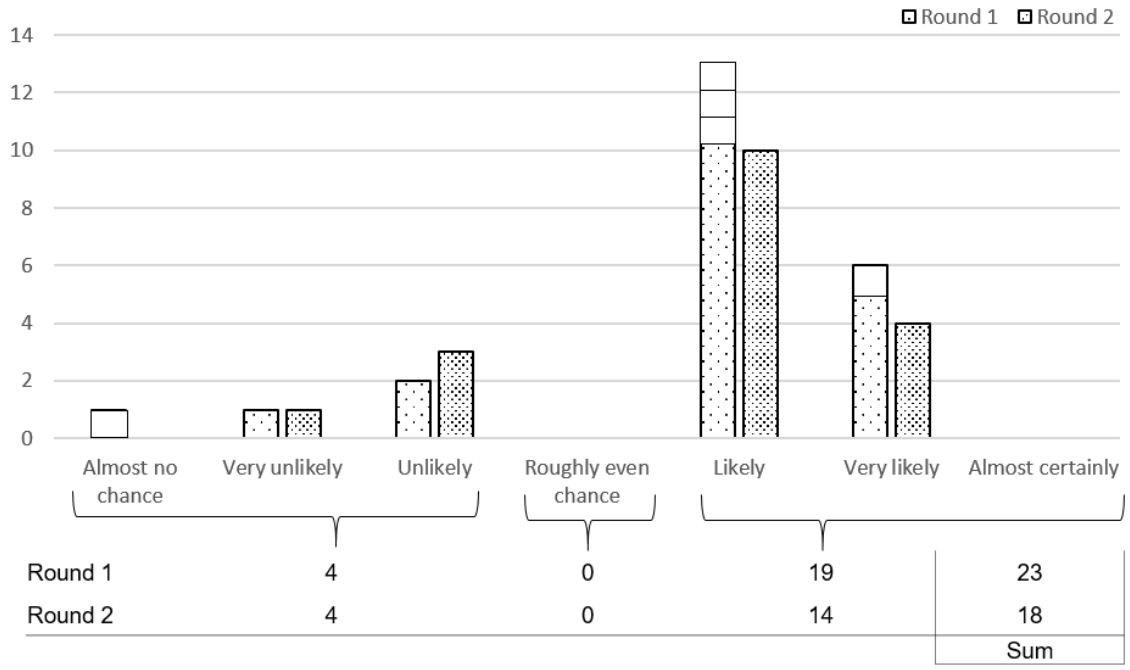

Figure 5: Absolute frequencies for the question: "With what probability can an assessment of sustainability in an SME of the food industry be credible?"

Table 8: Code system overview for the question: "With what probability can an assessment of sustainability in an SME of the food industry be credible?"

Code list - Credible assessment					
Codes		**Frequency**	**Codes**		**Frequency**
conditions			**conditions**		
company conditions			assessment communication		
	reasons and motivation	1		*reaching consumer*	2
	controlled by the topmanagement	1		*communication*	1
	type of production	1		*published*	1
	value chain support	1		*no fixed figures*	1
process			**difficulties**		
	assessment process	1	hard to assess		2
	certification process	1	complexity		1
	process of assessment set up	2	comprehensiveness		1
assessment characteristics			prioritize		1
	transparency	9	accuracy		1
	third-party certification	1	overall level		1
	simplicity	3			
	fixed indicators	1			
	honest (science based)	1			
	connection to existing framework	1			

The experts mentioned conditions and difficulties for a credible assessment. The conditions contain four main areas: company conditions, process conditions, assessment characteristics and assessment communication (see Table 8). Company conditions are not influenced by a tool itself and, therefore, this aspect is not discussed further here.
The *assessment and certification process* as well as the process of *assessment set up* is one determinant:

> *It is very important to be extremely thoughtful, patient, wise and almost philosophical when setting up such a framework.*

This statement is supported by Olde et al. (2017) who claim that the process of developing an assessment is even more important than the final version. Additionally, a thorough process contributes to *transparency,* which was mentioned by nine participants as the most prominent assessment characteristic needed for a credible assessment.

> *As long as you are transparent about what you measure and base the relevance and the measuring points by something credible like the SDGs.*

According to Pintér et al. (2012), transparency is one of the principles of sustainability assessment and measurement. Hereunder, the researchers name two important issues: public understanding of the assessment process (mentioned by the experts, see Table 8) and the public assurance of assessment results. Transparency is also used as an aspect to compare sustainability frameworks (Olde et al., 2016) and it is an important factor for the communication of assessment results (Silva et al., 2019) and influences the perception of customers (Kang & Hustvedt, 2014). Dando & Swift (2003) argue that, while important, a high level of transparency is not enough for credible assessment but needs to be complimented with other factors such as assurance. One possibility of assurance was alluded to by the experts: *Third-party-certification* was another needed assessment characteristic mentioned. Addressees of sustainability assessment expect external verification (Silva et al., 2019) and Hatanaka et al. (2005, p. 366) perceive third-party-certification as important for being objective but argue that for SMEs this type of certification poses a problem because

of high costs. It is not a realistic concept "[w]ithout financial, technical, or educational assistance", the authors argue.

Additionally, *simplicity* plays an important role as an assessment characteristic. Furthermore, connections to *science* and existing concepts (*SDGs)* and *fixed indicators* were raised. Supporting these demanded assessment characteristics, (Moldavska & Welo, 2015, p. 624) Moldavska and Welo (2015) point out that "the challenges of sustainability assessment" are (amongst others) "too complicated" and "lacking reliability of the results". Linking an assessment to already existing concepts contributes to understanding and relatability. However, in cases relating to SDGs, Heras-Saizarbitoria et al. (2021) remark that the way SDGs are often operationalized is more to take advantage of the colourful items and vaguely framed goals rather than to create credibility. Therefore, a connection to science seems a good option (Harris, 2007; Sala et al., 2015), however, understanding by the stakeholders needs to be assured.

Communication to consumers was seen as relevant for credible assessment as well as *published evaluation*. These arguments point in the direction of sustainability reporting. Yet, this practice is not common amongst SMEs (Steinhöfel et al., 2019). Additionally, communication in the form of reporting has also been used in an irresponsible way (Moneva et al., 2006), thus contradicting the aim of credibility. An expert mentioned a credibility advantage for SMEs through communication to consumers:

> *SME's have the possibility of direct contact between consumer and producer, to create trust.*

The close relationship between a small enterprise and a customer is also pointed out by Herzig et al. (2003). Direct communication about efforts in sustainable development and direct contact create a high level of credibility since it creates a first-hand experience (Rieh, 2015).

Perceived as a difficulty for credible assessment was the circumstance that sustainability is *hard to assess* because of its *complexity and comprehensiveness* and because *prioritizing factors* is difficult. Due to these problems with sustainability, *accuracy is impossible* and an *overall level* is hard to present. These general problems related to the nature of sustainability are reflected in observations by Moldavska and Welo (2015) that no tool has been invented yet covering all the needs emerging from the complex concept of sustainability including weighting and aggregating sufficient indicators in all three dimensions of sustainability. Chen et al. (2014, p. 438) acknowledge the complexity of holistic sustainability assessment for manufacturing SMEs, however, they suggest that "complexity needs to be hidden behind an easy-to-use interface, and the assessment results need to be easy to interpret". The balance between accepting as well as working with sustainability's complexity and providing credibility by transparently and understandably demonstrating an assessment process is a dilemma that needs to be considered if sustainability assessment is a part of a sustainability management tool for food manufacturing SMEs.

3.5.3 Question: "Will all four dimensions of sustainability mentioned by the FAO (environmental, social, economic and governance) be equally important for assessing sustainability in SMEs of the food industry?"

Holistic sustainability can, alongside environmental, economic and social aspects, be expanded with the dimension of management/good governance (Pintér et al., 2012) as seen in the guidelines for Sustainability Assessment of Food and Agriculture systems (FAO, 2014). The participants were asked to weight the four dimensions with regard to sustainability assessment of SMEs in food manufacturing. While some participants deemed one dimension more important than others, some weighted all dimensions as equally important but none of the participants rated any dimension with 0 %. This may make a case for an holistic approach in SMEs or it may be a result of question design; since the dimensions were predefined in the question and it was asked if all dimensions are equally important, this might have prevented the omission of one dimension in contrast to an open question.

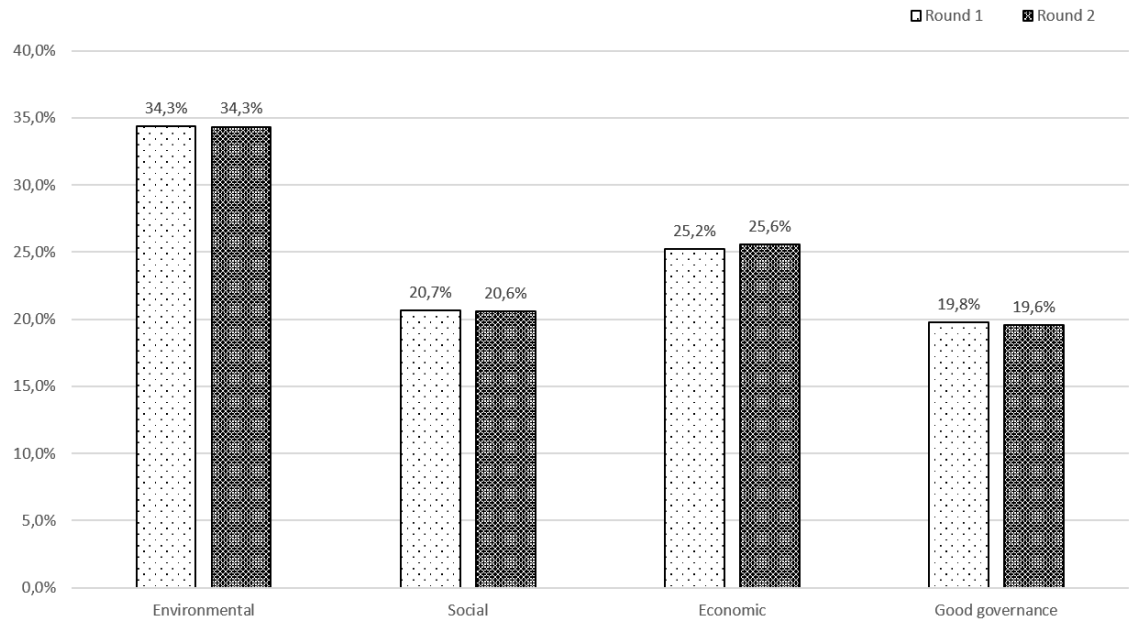

Figure 6: Mean statistical answers to the question: "Will all four dimensions of sustainability mentioned by the FAO (environmental, social, economic and good governance) be equally important for assessing sustainability in SMEs of the food industry?"

The average distribution of percentages shows the environmental dimension being judged as the most important one (see Figure 6). In the qualitative answers, the environmental dimension was described as *especially important* several times. Participants who rated this dimension highest stated that *sustainability hot spots in the food sector are related to environmental issues* (40 %) and that the *environmental framework is unalterable* (35 %). The high score of this dimension can thus be derived from the fact that food production is very closely connected to the planet's ecosystem.

> *For the food and agricultural sectors, the protection of the environment is essential to ensure that food continue to be produced and sold with good levels of quality, nutrition and within planetary boundaries. (40 %)*

However, next to the argument of nature's essentialism for food production, the environmental dimension was rated high because:

> *Within the public discussion environmental issues are the most popular ones. Plus they are often easy to measure and therefore success is easy to visualize. (65 %) / the consumer's focus is on that dimension (40 %).*

This argument hints in the direction of competitive advantage through the communication of assessment results or reporting and is supported by the statement of Shnayder et al. (2015), who "conclude that firms [of the packaged food industry] can better distinguish themselves from competitors by focusing more on Planet-based behaviour" (p.21). The role of environmental practices as a flagship is also described by Pintér et al. (2012) who state that "[m]anaging non-market issues, such as social and environmental performance, is important only as long as business can demonstrate how voluntary social and environmental management contributes to competitiveness and economic success" (p.22). In general, the relatively higher rating of the environmental dimension coincides with the notion that often sustainability is treated as environmental sustainability by SMEs (Broccardo & Zicari, 2020; Klewitz & Hansen, 2014) or in sustainability assessment (Ness et al., 2007; Schader et al., 2016).

Sustainability and *profit* in the economic dimension were described as *necessary* and *very important*, for the *continued existence* of a *company* (15 %) and of *industry* (45 %). The economic dimension is partly seen as a base for the existence of sustainable practices:

> *Without economic profit, the other three cannot be implemented. (50 %)*

From a sustainable supply chain management perspective put forward by C. R. Carter & Rogers (2008), environmental and social activities cannot be uncoupled from a company's strategical and financial framework. Yet, the statement was made that *economic issues tend not to be assigned to sustainability management* (10 %) and that *economic comes second* (25 %) (after environmental (40 %)). Overemphasizing economic aspects was also described as a threat to sustainable development:

> *While obviously the economic dimension is important, it should not be the absolute priority, otherwise we revert back to unsustainable practice. (10 %)*

It is a "chicken-and-egg" problem; does a business's profit depend on a functioning environment or does environmental conservation depend on functioning businesses?

The social dimension was referred to as *very important* but, in general, it was less commented on. Like the economic dimension, it was said to *come second* (25 % R1 to 20 % R2, compared to 40 % for the environmental dimension). This subordination of the social to the environmental dimension is observed frequently (Beske et al., 2014).

One participant claimed social standards as *already being high* in the study region Denmark and

Germany. This remark refers to local food production and neglects a food supply chain perspective that relies on ingredients sourced in regions without high social standards. In Germany, food and feed with a volume of nearly 50 billion Euros were imported in 2020 (statista, 2021), and therefore not under the control of national social standards. However, the participant changed from 20 % in R1 to 25 % in R2 because:

> *Social standards deserve increased attention - the high proportion of manual labor tempts unpleasant business models.*

Here, the participant relates manual labour to the vulnerability of workers in low-paid jobs. However, this is not only a problem in countries with low social standards; it is happening in the German meat industry, for example, too (Birke & Bluhm, 2020).
For the dimension of good governance, the qualitative answers described this dimension as an *enabler* (15 %) and the *key to successful sustainability management* (30 %) and that it *needs to be the base* (35 %). This is supported by the conclusion of Azapagic (2003) that "[b]uilding a sustainable business […] requires strategic thinking and a systems approach" (Azapagic, 2003, p. 315).
Comments on the division between the different dimensions were that it is *depending on the perspective* (*company/society*) and *on the business model of an SME*. One participant, rating every dimension with 25 %, answered:

> *[t]hese aspects of sustainability are all mandatory. You cannot compromise any of them. So they are equally important.*

Another participant, distributing percentages uneven in R1, changed to 25 % for each dimension with the statement:

> *After reading the report, I see how all of the dimensions [go] hand in hand and needs to be considerate when working with sustainability.*

In summary, four participants rated all dimensions equally after R2, other participants weighted the dimensions unequally. The results demonstrate that different definitions of and perspectives on sustainability can influence the estimated importance of the different dimensions of sustainability. Although there is no weighting to be drawn from the results, the implication for the integration of all four dimensions into a sustainability management tool for a food manufacturing SME can be derived. This is underpinned by the view that sustainability dimensions are interlinked (Gray & Milne, 2007).

3.5.4 Summarising the discussed findings in a framework

In this section, important aspects of a sustainability management tool for food manufacturing SMEs are presented (see Figure 7). All these aspects should be considered for a sustainability management tool to increase the likelihood of implementation. For practitioners and researchers working with and developing sustainability management tools for food manufacturing SMEs, it is important to note that there are also internal/company conditions and external pressure that have an impact on the use of a tool. Although company conditions

cannot be influenced directly, it is important to keep that aspect in mind (Dasanayaka et al., 2022) and to leave room for flexible adaption of the tool.

Since the need was expressed by the experts to communicate in a transparent and credible way, sustainability assessment alone is not likely to bring the visible benefits of added value about. Here, an integrated approach is recommended (Maas et al., 2016), which includes reporting and possibly certification of sustainability performance to communicate outwards. This way, not only internal improvement but also legitimisation and market success can follow the application of a sustainability management tool.

The demanded credibility was estimated to be likely created, depending on company conditions, process conditions, assessment characteristics and assessment communication. Considering these categories can help to engage in a structured development process of a sustainability tool. However, the discussion of these different aspects reveals difficulties that create doubt if total credibility can be achieved. The acknowledgement of the immense difficulty to capture and picture sustainability in a credible way can lead to two conclusions: 1) Since there is not "the one way" to assess and evaluate sustainability, transparency of the used methods and procedures is key to credibility; 2) Although assessment and certification of sustainability can add to a company's (internal and external) success, it should not be seen as the ultimate precondition to sustainable development.

While asked in the context of food production, the antecedent observations are not exclusively related to the food industry but can support sustainability tool development for SMEs in other sectors, too. This is different from the last sub-question this study focused on concerning holistic assessment. Here, the experts' answers have to be seen in the context of food production. Despite a higher than average rating of the environmental dimension, no direct weighting advice can be drawn from the results. Yet, important arguments were put forward for all four dimensions (governance, environmental, economic and social), thus hinting at the importance of an holistic assessment not only for big, but also for small and medium-sized, enterprises.

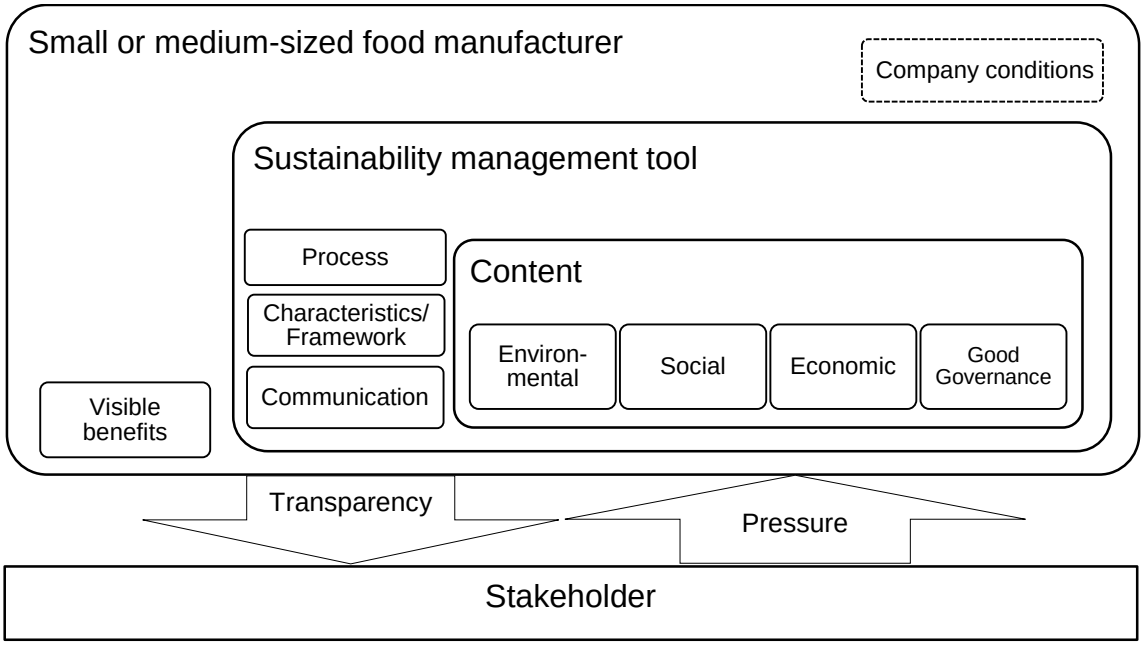

Figure 7: Aspects to be considered for a sustainability management tool for food manufacturing SMEs

3.6 Conclusion

The purpose of the present study was to shed light on which aspects a sustainability management tool, including possible components such as assessment, reporting and certification, for food manufacturing SMEs should entail. Overall, it can be stated that for SMEs in general, thorough consideration according to the special characteristics of smaller company size is needed. Yet, for food manufacturing SMEs this does not mean neglecting an holistic perspective. Rather, it emphasises paying attention to the required framework aspects mentioned in this paper, with special attention being given to credibility and a transparent process to increase the benefits for an SME.

This study adds to groundwork for further research and the development of sustainability and sustainability management tools and frameworks for SMEs in general, but also specifically for SMEs in the food sector. First, the study delivers evidence that for food manufacturing SMEs, despite their size and unique characteristics, an holistic perspective on sustainability is inevitable. Holistic perspectives have been stressed and demanded by other researchers and studies before (Chen et al., 2014; Moldavska & Welo, 2019; Perez-Sanchez et al., 2003), yet the present study has shed light on that aspect regarding SMEs in the food sector. Second, it supports the need for integrative management tools (Maas et al., 2016) covering both evaluation and credible communication.

Third, the findings reveal important aspects of an SME's sustainability management tool and conditions for its credibility. Credibility is crucial for communication, which is becoming increasingly important as consumer awareness of sustainable business activities rises (Lerro et al., 2018) and as sustainability reporting can increase visibility, legitimisation and reputation (Gallego-Álvarez & Pucheta-Martínez, 2021).

Fourth, it supports literature on the advantages and disadvantages for SMEs to engage in activities for sustainable development. According to Dasanayaka et al. (2022), this has been underrepresented from a qualitative perspective so far.

The main implication for practitioners and researchers adapting or developing a sustainability management tool is the amount of attention that needs to be paid to holistic (and thus comprehensive) content and the integration of both evaluation and communication. This is a continuous balancing act as, on the one hand, a transparent and credible process is desired, but on the other hand, considering SMEs' needs, concerning restricted resources, for example, is important.

An identified limitation of this study is one that is a general problem in the field of expert studies: despite thorough screening to assess the suitability of experts, it remains uncertain. As found by Tichy (2004), procedures like self-rating of expertise by experts themselves are questionable in terms of solving this problem. However, since top-experts tend to have an overoptimistic view of their specific subject areas (Tichy, 2004), the inclusion of different expert-levels seems sensible to mitigate against this. Regardless of the problems with expert foresights and estimations, further (quantitative) research could support the tentative results from the Delphi-study with more representative results. Also, the interplay of sustainability assessment, reporting and certification of integrated approaches for SMEs could be subject of further explorations. Furthermore, the conclusions from that study can be used in the

development of a sustainability framework or tool for SMEs, accompanied by description and evaluation thereof to derive advice from practice.

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Chapter 4 Multiperspective evaluation of a novel sustainability management tool for small and medium-sized food manufacturers

4.1 Introduction

Whether used as a buzzword or being an aspect of intrinsic motivation – sustainability has become an integral part of entrepreneurship. While many big players and multinational enterprises have already established whole sustainability departments and engage in sustainability assessment and reporting (Rajic et al., 2022), some of the small and medium-sized enterprises (SMEs) struggle to follow suit (Corazza et al., 2021). However, SMEs are the predominant company size and thus need to develop sustainably as well. This also applies to the food sector (FoodDrink Europe, 2020) which secures survival on the one hand but causes many negative impacts on environment and society on the other hand (Crippa et al., 2021; Poore & Nemecek, 2018). The food supply chain consists of many actors, each with different needs concerning sustainability. Tools for agricultural businesses are evolving (Olde et al., 2016), specific tools for SME-actors more downstream the food supply chain and corresponding research are scarce (Adams et al., 2021; Sloan et al., 2013).

Aside from a lack of tools, the characteristics of SMEs can be a barrier to implementing sustainability management (Lepoutre & Heene, 2006). A special role is assumed by the management of an SME, largely determining the motivation behind and the expected gains of sustainability management. In that context, a gap exists between what executives deem as necessary and what is implemented (Cassells & Lewis, 2011).

In order to support food manufacturing SMEs, a tool has been developed with attention to SMEs' characteristics and requirements, named sustainability compass. In the following article, first, the rationales for its development and then the tool itself are described. In order to expose the developed tool to critical evaluation and to discuss its effects, expert interviews were conducted and the results are presented and discussed after a brief description of the methodology and before a short conclusion. The presented findings and their discussion include the tool's content and output but foremost the tool's effect on the sustainability management of SMEs. Both the novel approach itself and its evaluation can be of great value to ongoing research in the field of sustainability management in SMEs and sustainability management in food production.

4.2 Background

4.2.1 SMEs and sustainability

SMEs differ from bigger companies and those differences need to be bared in mind when developing a tool for SMEs. In regards to environmental management, Gerstenfeld and Roberts (2000, p. 118) state that "a support programme for SMEs must be inexpensive, co-operative, locally based, flexible, unique and accessible. Furthermore, an effective

programme must provide training, legislative compliance support, and provide clear, concise, dependable sector-specific information and support." Both literature research (see Table 9) and the conduction of a Delphi-study (see below) strengthened and added to this quote, so that the sustainability compass was developed with special attention towards the characteristics and requirements of an SME.

Table 9: Characteristics of small and medium sized enterprises derived from literature

Characteristics of SMEs	Literature	Barriers/chances for SM	Requirements for SM
Lack of resources (human, financial, time)	Grothe and Marke (2012), Hillary (2004)	High costs (of certification), lack of sustainability managers	Quick, inexpensive, cost-efficient, low complexity, high accessibility
Lack of knowledge and skills regarding SM	Grothe and Marke (2012), Meredith (2000), Perez-Sanchez et al. (2003)	Many possibilities and information available	Help, guidance, support, building networks and clusters
Owner-managed	Hillary (2000), Jansson (2017), Revell et al. (2009)	Value-action gap between prioritising sustainability theoretically and implementing sustainable measures	External support, legal requirements
Flat and less formalised organisational structure	Grothe and Marke (2012), Hillary (2000), Jansson (2017)	Problems with data provision and implementation of managment system, quick ways to collect data	Suitable framework fitting organisational structure
Locally bound	Cohen et al. (2017), Tödtling and Kaufmann (2001)	Generic assessments	Local contextualization
Flexible and agile	Hillary (2000), Stubblefield Loucks (2010)	Quick changes	Recommended actions
SM: Sustainability Management, SME: Small and medium sized enterprise			

4.2.2 Underlying assumptions and preliminary studies

Sustainability management is a relevant field in theory and practice with well-known frameworks and concepts that can already be applied. However, often they lack possibilities and guidance for specific application. Moreover, definitions of sustainability vary and so do the concepts and methods to measure, evaluate and communicate it. Before developing a sustainability management tool, the scope and approach has to be defined. The sustainability compass was based on following preliminary studies, rationales and concepts:

COMPARISON OF EXISTING FRAMEWORKS

Two studies contributed to the development of the compass: First, a comparison of eight sustainability assessment and reporting frameworks applicable for food manufacturing businesses was conducted. It showed, that, if used in the food sector, a framework needs to include food-sector specific topics; otherwise it neglects important aspects of food production. However, frameworks being thematically tailored to the food sector tend to lack connectivity to the up- and downstream supply chain by neglecting, e.g., reporting possibilities (reference taken out for anonymisation). The Sustainability Assessment for Food and Agriculture systems (SAFA) framework developed by the Food and Agricultural

Organization (FAO) and the from the SAFA framework derived Sustainability Monitoring and Assessment RouTine (SMART) tool (Schader et al., 2016) were identified as the most comprehensive and suitable frameworks in regards to sector specific content. SMART, however, exists only as a tool for farmers and as a self-assessment questionnaire tool for food manufacturers. The latter was taken over and adapted for the compass.

EXPERT OPINION

A Delphi-study with 23, or in the second round 18 respectively, experts of the food and/or sustainability sector generated qualitative insights for the development of a sustainability tool for (food manufacturing) SMEs. It strengthened the need for an holistic perspective including all sustainability dimensions even for a tool in food manufacturing SMEs. Moreover, integrative management tools are advantageous when dealing with sustainability management, including various components such as sustainability assessment and reporting. Also, when employing a tool, credibility through high transparency is key to successful communication outwards (reference taken out for anonymisation).

HOLISTIC APPROACH INTEGRATING SUPPLY CHAIN MATTERS

Integration of all sustainability dimensions (environmental, social, economic) into a sustainability management tool is supported by numerous researchers (Moldavska & Welo, 2019; Morrison-Saunders & Pope, 2013; Talukder et al., 2020), also for sustainable supply chains (Narimissa et al., 2020). In order to facilitate and work on the 'traditional' sustainability dimensions, the dimension of governance or management is described as important (Fritz et al., 2017). Often, food manufacturing is embedded in complex supply chains with multiple interactions including the leverage to impact the upstream supply chain by engaging in buyer-supplier relationships (Küchler & Herzig, 2021). By managing these relationships, the sustainability of a supply chain and thus the sustainability of a company and its products can be increased (Kumar & Rahman, 2015). Although SMEs might be limited in their power towards suppliers/buyers, it is important to consider supply chain aspects when developing a sustainability tool for food manufacturing SMEs.

COMPANY BASED APPROACH

Sustainability management can include sustainability assessment of certain products, however, it should not consist of merely a product perspective because it ignores non-product-related aspects at the corporate level (Fritz et al., 2017; Moldavska & Welo, 2015). Although extended versions of product-based approaches have been developed, e.g. life cycle sustainability assessment (Guinée, 2016), a product-based approach still runs the risk to omit entrepreneurial aspects.

ELEMENTS FROM EXISTING SUSTAINABILITY MANAGEMENT/QUALITY MANAGEMENT FRAMEWORKS

In quality management systems described by ISO 9001 (quality management norm) or ISO 14001 (environmental management norm) respectively, the concept of continuous improvement belongs to the standards. This process is supposed to structure the management of measures and is implemented by the four steps: plan, do, check, act (PDCA)

(Caldera et al., 2019). In this cycle, goal setting is included in order to structure improvement and to make it verifiable. The in the food sector well-known International Featured Standard food works with knock-out criteria to assure the fulfilment of specific requirements (International Featured Standard, 2022).

4.2.3 Description of the tool

In order to develop a sustainability management tool for food manufacturing SMEs, different aspects were derived from already existing frameworks or concepts and combined in a novel way (see Figure 8), while considering SMEs' requirements. The so called sustainability compass consists of a self-check, a minimum standard, a sustainability talk and annual goals. Contentwise, the tool has been based upon an holistic approach, suggested by research findings (reference taken out for anonymisation) and the existing concept of the SAFA guidelines and SMART tool. This includes paying attention to especially the upstream supply chain regarding the content. Structurewise, the process of continuous improvement (PDCA-cycle) was derived from ISOs 9001 and 14001 as well as the IFS food standard. This includes the implementation of a minimum standard with specific criteria that have to be fulfilled and the setting of goals.

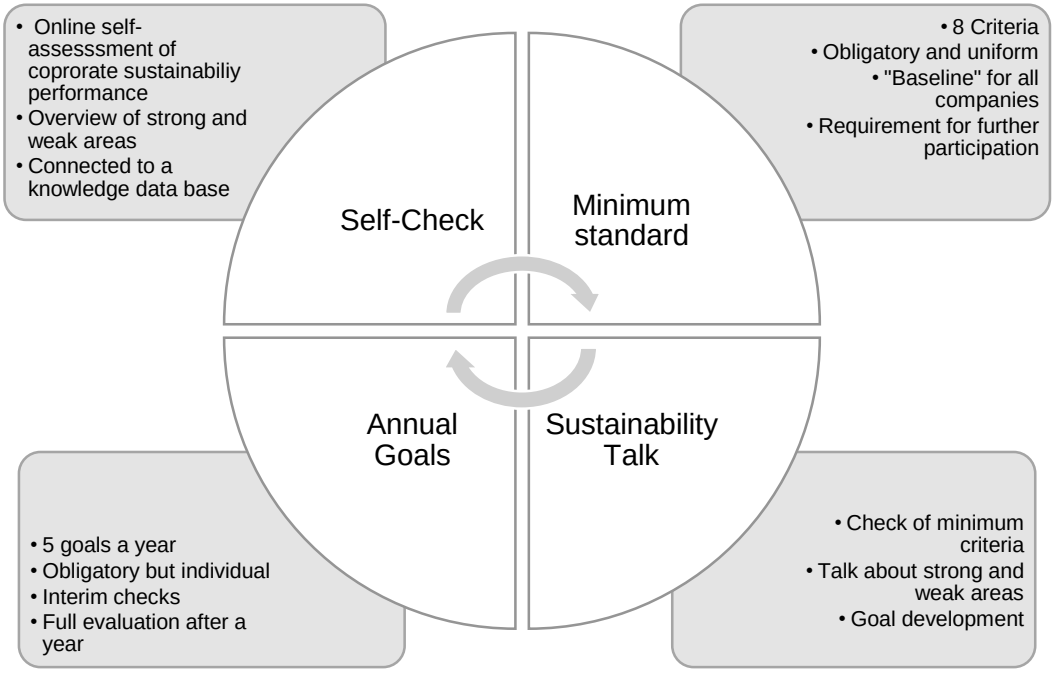

Figure 8: Compass process

SELF-CHECK

In order to enter the compass process, every company needs to go through the self-check. The self-check is a measure-based online-questionnaire, in which a company estimates its corporate sustainability performance and the connection towards its supply chain regarding all dimensions of sustainability (governance, environment, economy, social well-being, s. Table 10). In the beginning, a relevance filter tailors the self-check to the company size and its products. Two questions types exist: yes and no questions and percentage questions (0,

25, 50, 75, 100 %). A knowledge data base is connected to the self-check and the compass in general, so for every subtopic (see Table 10) one can inform oneself about the content or aim of a specific topic, the necessity for food production, the possibilities for companies to engage, application examples and links to further information. In the self-check, the answers are aggregated on subtopic and topic level and a fulfilment percentage is presented to the company, visualised in a polygon. In summary, through the self-check, strong and weak areas are highlighted based on self-assessment.

Table 10: Sustainability dimension, topics and subtopics present in the self-check, adapted from SAFA guidelines

Good Governance	Economy	Ecology	Social Wellbeing
Corporate Ethics	**Investment**	**Atmosphere**	**Decent Livelihood**
Mission Statement	Internal Investment	Greenhouse Gases	Quality of Life
Due Diligence	Community Investment	Air Quality	Capacity Development
Accountability	Long Ranging Investment	**Water**	Fair Access to Means of Production
Holistic Audits	Profitability	Water Withdrawal	**Fair Trading Practices**
Responsibility	**Vulnerability**	Water Quality	Responsible Buyers
Transparency	Stability of Production	**Land**	Rights of Suppliers
Participation	Stability of Supply	Soil Quality & Land Degradation	**Labour Rights**
Stakeholder Dialogue	Stability of Market	**Biodiversity**	Employment Relations
Grievance Procedures & Conflict Resolution	Liquidity	Diversity of Ecosystems, Species and Genetic Diversity	Forced Labour
Rule of Law	Risk Management	**Materials and Energy**	Child Labour
Legitimacy	**Product Quality and Information**	Material Use	Freedom of Association and Right to Bargaining
Remedy, Restoration and Prevention	Food Safety	Energy Use	**Equity**
Civic Responsibility	Food Quality	Waste Reduction and Disposal	Non Discrimination
Resource Appropriation	Product Information	**Animal Welfare**	Gender Equality
Management	**Local Economy**	Animal Welfare	Support to Vulnerable People
Sustainability Management Plan	Local Value Creation		**Human Safety and Health**
	Local Procurement		Workplace Safety and Health Provisions
			Public Health
			Cultural Diversity
			Indigenous Knowledge
			Food Sovereignty

MINIMUM STANDARD

The next step in the compass process is the accomplishment of the minimum standard: each company has to fulfil eight minimum criteria as a requirement to take part. The minimum criteria help a company to start and structure as well as to reflect its sustainable development, e.g., a risk analysis to systematically reflect on potential risks for sustainability in and around the company or a data sheet to collect data for energy, water and material (packaging) consumption (see Table 11). Additionally, the minimum standard sets an equal "baseline" for the further process among all companies and creates conditions for participation.

Table 11: Minimum criteria for minimum standard

No	Company Area	Criterion	Definition	Impact
1	MANAGEMENT	Mission statement	Required: Written mission statement	Self-reflection by defining and summarising the company's core values, activities and mission/vision.
2		Risk- and stakeholderanalysis	Required: Completed PP-risk and stakeholder analysis	Raising awareness of critical potentially threatening aspects and stakeholder
3	RESSOURCES	Water consumption	Required: Completed resource sheet with water, energy and material consumption of the last years	Starting to accumulate and to get an overview of environmental data
4		Material (packaging) consumption		
5		Energy consumption		
6	STAFF	Capacity development	Required: Evidence of training/education measures in the form of lists of participants, invoices or similar.	Enhancing staff identification and knowledge for sustainable development
7	INVESTMENT	Longterm and sustainbale investments	Required: Short description of the last 2 investments with an explanation of the long-term effect.	Self-reflection on investment behaviour
8	PROCUREMENT	Sustainable procurement	Required: List of the 5 raw materials with the largest volume with indication of origin and environmental and social standards.	Self-reflection on procurement

Sustainability Talk

After the self-check conduction and the fulfilment of the minimum standard, ideally a company should have developed ideas for improvement. In a sustainability talk, first the requirements for the minimum standard are checked. After that, strong and weak areas highlighted by the self-check are discussed. It is important to know what makes a company strong in one topic because it can reveal best practices and possibilities for peer coaching or inclusion in the knowledge data base. The weak areas are reflected to find possible goals for improvement.

Goals

Finally, together with the improvement ideas of a company, 5 goals are developed for a one-year period. The company can discuss the goals internally before they are fixed. Once fixed, a participation diploma is handed to the company and then the company tries to fulfil the goals within the next year. Interim check-ups accompany the work on the goals and after a year their level of fulfilment is evaluated. The whole process including the goals and their achievement can be communicated to the public. Then the process (see Figure 8) starts all over again. In the diploma for a new cycle, the fulfilment of the old goals is documented.

4.2.4 Research question

With regard to antecedent observations and research conducted, a novel format was developed to guide and support food manufacturing SMEs in their sustainable development. This format was put to test by six pilot companies and was evaluated by conducting 11 expert interviews. Despite considering special characteristics of SMEs, trade-offs are to be expected concerning the tool's application. Therefore, following research question is investigated in this paper:

- Is the tool responding to SMEs' requirements? And in this regard: What are the advantages and disadvantages of the tool?

Additionally, to elaborate on the output of the tool, following subquestion is asked:

- What does the aspect of setting goals need and what is the effect of it?

The interviews also yielded practical comments on the single components of the compass. Although those were registered for future improvement, they are not part of the research at hand which is supposed to concentrate on the effects of the novel tool rather than its content and practicality.

4.3 Method

For the evaluation of the novel sustainability management tool 11 expert interviews were conducted. Experts were chosen from different stakeholder groups to gain a multilayered perspective (see Table 12). Interviews were conducted based on guidelines and in a semi-structured way according to Bogner et al. (2014) and Helfferich (2009). Partly, snowball sampling was used. All interviews were conducted in German online and recorded. The final

number of interviews was derived from theoretical saturation. Transcription was conducted manually adapting transcription guidelines by Kuckartz et al. (2008).

Table 12: Overview of experts

Expert group	Number of experts
Research	2
Research and tool development	4
Organic association	2
State educational and counselling institution	1
Company (SME)	1
Economic development agency	1

Initially, the coding process was conducted deductively according to the semi-structured interview guideline as presented in examples in an anthology edited by Gizzi & Rädiker (2021). The content was organised after the overarching codes: SMEs and sustainability, difficulties/need for improvement, benefits and general (with deductive subcodes, for example, goals, holistic approach, core topics food and sustainability, see Appendix 1). This condensed the expert's answers. In order to explore the mentioned aspects belonging to each category, coding was executed inductively, creating codes from the data itself based on the method described by Kuckartz & Rädiker (2019b). Codes and memos were written in English; anchor examples were translated into English (s. appendix 1). For analysis, requirements/problems of SMEs regarding a sustainability management tool discovered through the interviews were listed and contrasted with the mentioned advantages and disadvantages of the tool.

4.4 Findings and discussion

First, the findings regarding the tool's content, then the tool's response to SMEs' requirements in sustainability management are presented. Subsequently, the output of the tool, the goals and their development, is analysed and discussed, before coming to a discussion of trade-offs in SMEs' sustainability management.

4.4.1 Tool content

Despite the contextualisation regarding the food sector, the findings are mostly of generic nature. Only the content and the holistic concept, which were approved by the experts, were commented on with direct relation to the food sector. All experts approved of an holistic approach because sustainability is an overarching concept, because including aspects from all dimensions broadens the understanding of sustainability and because interactions between all dimensions exist. No critical comments were made regarding the topics (see table 2). Despite being very comprehensive, an holistic approach has been favoured by previous research (Kanter et al., 2016; Küchler & Herzig, 2021; Moldavska & Welo, 2019; Ness et al., 2007; Pintér et al., 2012; Talukder et al., 2020). The novel tool gives an overview and mitigates the comprehensiveness by filtering the content according to firm size and products.

4.4.2 Tool response to SMEs' requirements

The findings of this research are organised according to the SMEs' requirements concerning the tool such as 'personalities/motivation', 'incentives', 'permeation/identification', 'resources', 'management/documentation', 'support' and 'communication'. Each requirement is contrasted with related characteristics of the tool mentioned by the experts and the effects are discussed down below. An overview can be found in Table 13. The requirement of the right personality and motivation is not impacted by the tool, the existent incentives are the beneficial aspects mentioned for the other requirements and for the requirements 'management/documentation' and 'support' no problematic aspects were mentioned.

Table 13: Overview of the tool's response to SMEs' requirements

Requirements SME	**Related aspects of the tool**	
	Beneficial	Problematic
Personalities /Motivation	*no impact*	*no impact*
Incentives	*s. beneficial aspects below*	Lacking information, lacking visible benefits
Permeation/identification	Commitment-check	Self-assessment
Resources	Low-threshold, Insights/knowledge	Effort, Self-assessment
Management/documentation	Structure, Improvement, Reflection	*no mention*
Support	Support	*no mention*
Communication	Communication	Lacking communication

PERSONALITIES

According to most of the experts (10 out of 11) the conduction of the compass and its outcome depend on the personalities involved and their motivation. A negative attitude or at least a hesitant attitude paired with personal incapability (incapability for self-assessment) of some people in the management or in the company on the whole were described as problematic for the application of the tool. One reason for a negative attitude was described by one expert as:

This feeling, I am doing it for someone else. That is very strong with many people, I have to do it and I am doing it for someone else.

Furthermore, intrinsic motivation a true interest and some basic, previous sustainability knowledge of the management were mentioned to be key for successful conduction. Although the tool set up is not able to influence that aspect, it is important to note that the personality of the person in charge of the tool or the personality of an executive person (owner, director) has an impact on the tool use: The owner-manager often decides whether to engage in certain activities or not, her or his attitude is relevant for a company to apply a sustainability management tool (Handrito et al., 2021; Herzig et al., 2003; Kutzschbach et al., 2021; Lee et al., 2016). Schaltegger & Burritt (2018) have elaborated on four categories of

different interlinkages between ethical motivations and business cases that affect sustainability management: The sceptic and conservative attitude perceives sustainability solely as a cost (1), the narcissist motivation primarily seeks reputation for short-term profits (2), performance excellence motivation recognises sustainability as improvement for long-term profit (3) and the motivation to improve nature's and society's condition pursues a collaborative and holistic approach (4). Taking the findings of this study into account, it shows that for appropriate tool use personality type 3 or 4 are needed. For practitioners this can be an indication whether the tool is suitable regarding the type of personality. The categorisation by Schaltegger & Burritt (2018) leads into the next category of SMEs' requirements:

INCENTIVES

The tool has to provide added value to engage in it, otherwise its broad application is unlikely. One incentive can be the "must-have" character of a sustainability tool, however, the most mentioned incentive was added value in terms of communicating the use of the tool outwards, partly using it for marketing. This can lead to higher prices and increased sales, which are other incentives pointed out. Also a competitive advantage, saving money and resilience were mentioned as possible incentives. Most of these aspects belong to the economic stability and prosperity of the company. If those incentives are lacking, tool use is threatened or at least the tool is not used in a serious way because

> *[…] often the problem is that it is still running on the side somehow, it is often a nice-to-have, too, and it is not seen as important for the company.*

The developed tool, although evaluated as beneficial on at least one level by every expert (described below in the other sections), lacks clear and visible benefits concerning the economic perspective and the information regarding benefits, respectively. Suitable information was missed by four experts, especially by the expert from the economic development agency. According to the expert this should include:

> *How much time resources and other human resources he [a company owner] may have to set aside.*

As depicted above, motivation to engage in corporate sustainability differs. Therefore, different tool incentives speak to different people. Incentives of the tool described here are more of a soft character: low-threshold, structure, reflection, insights/knowledge and support can be incentives if the focus of a company/owner-manager is not on short-term profits and but more on long-term improvement. However, to make the tool more attractive the current benefits should be marketed in a more obvious way and furthermore, new incentives could be created. For example, one expert suggested financial incentives. This could be created by political actors who offer subsidies for the use of the tool or for the institution supervising it. This way, the tool could be supplied with low costs or even free of charge. Another facilitator could be (retail) customers paying higher prices if the tool is used (Blackman & Rivera, 2011). Financial advantages gained from sustainability measures were observed by Cassells and Lewis (2011) to be more interesting to SME owners than motives for environmental protection. This supports the positive impact of financial incentives;

however, it also leaves room for doubt that the tool is used in a proper manner. Moreover, Brockhaus et al. (2017) point at the limited possibility for price premiums because of lacking customer appreciation and appeal to managers to interpret sustainability as an investment rather than a short-term profit. Another type of incentive is described by Revell et al. (2009) who recommend policy makers to back up voluntary sustainability initiatives with pressure through policies and regulations.

PERMEATION/IDENTIFICATION

For successful conduction of the novel tool six experts noted the permeation of the tool use and the identification with associated activities throughout the whole company being important for SMEs. Sustainability concerns all departments therefore its management and identification has to be connected to all employees:

> *If it is only the managing director saying: "we have to become a bit more sustainable, now", it will not work. Then they [the employees] throw away plastic and other waste together […].*

With regard to that, the self-assessment approach of the self-check is one problematic aspect of the compass, because, until now, it is only possible for one person to work with the self-check at a time. However:

> *[…] it is always good, […] if there are always several different actors in the group, so as I said, the managing director, procurement director, so not just from one perspective. So not just one person because that could be quite biased.*

10 experts mentioned difficulties with self-assessment, i.e. wrong assessment because of lacking knowledge, incapability or lacking motivation. Also, according to the experts, it can be hard to know what the requirements for e.g. 100 per cent are.

The other components, e.g. the minimum standard can be worked on by several employees in the company. Similarly, the goal setting can and should be pursued by different actors in the company:

> *Where there is a common idea of sustainability goals, it is also going very well and you can see that the people in the background are on board and you can also see from the communication that the people there, for example, are also involved.*

The compass does not actively contribute to that need of permeation and identification, which has been found to contribute to best sustainability practices in SMEs (Oelze & Habisch, 2018). Those aspects need to be brought in by the company itself, for example, by including more employees into the self-assessment or following activities. Further improvement of the tool could involve to include more accounts for one company. This could also facilitate the self-assessment and could make results more realistic. This is supported by Ankele & Grothe (2019) who see self-assessment as a method with high uncertainties and low relevance but state that a representative consortium of staff members can improve the outcome and that a self-assessment can show a company its status. Furthermore, if approaching the topic of permeation/identification the other way round, the

use of the tool could initiate more identification because once engaged in sustainability activities, it can influence and inspire the company culture in a positive way (Carvalho et al., 2021).

RESOURCE SHORTAGE

Every expert mentioned at least one aspect of resource shortage. In regard with the compass, mostly the aspect of lacking time was mentioned. The estimated time of 15 hours for conduction was seen as too much by some experts, especially for micro enterprises with only a handful of employees. Some experts evaluated 15 hours as realisable but not realistic for the compass conduction. In general, the noted difficulty of effort for the compass is not helping the resource shortage aspect. Gathering data could be off-putting, as well as documentation. On the contrary, one expert noted that sustainability, once integrated into everyday life, should not be seen as extra work but that some effort and resources have to be invested prior to that condition:

> *But if they understand, for example: I emigrate to a country where I don't know the language, then I either have to learn the language or I go and see what happens. And here it's the same: input-output. I have to invest at some point.*

Additionally, lack of knowledge and specialised staff was mentioned to hinder sustainability management and the application of the tool. Taking that last aspect into account, self-assessment can be difficult because competencies for conduction are necessary. On the other hand, the experts mentioned the low-threshold of the tool and the benefit of gaining insights/knowledge through its application. Four experts stated that it does not need a lot to start working with the tool, because of, e.g., a comprehensive scope which favours an SME with tight resources. Six experts commented on the possibility to gain knowledge through, for example, the knowledge data base or participating in the sustainability talk in which the self-check is put into perspective by externals.

Lacking resources are a distinct characteristic of SMEs as mentioned in the theoretical background and are counterproductive with regard to sustainability management (Arena & Azzone, 2012; Caldera et al., 2019; Grothe & Marke, 2012). The effort of applying a sustainability management tool can thus be problem. On the other hand, this effort, if seen more from a long-term perspective, can be of value later. First, as sustainability becomes more and more important, it is likely that customers demand disclosure of SMEs' sustainability performance (Fritz et al., 2017; Kolev & Neligan, 2021), so why not start early. Second, it can pave the way for a strategy that is an enabler of business sustainability (Caldera et al., 2019) and helps the company survive (if interpreted as contribution to resilience) (Miceli et al., 2021) and thrive (Revell et al., 2009). Referring to the expert statement above: if sustainability is integrated in the management of daily business, it will not be perceived as effort anymore. Brockhaus et al. (2017) describe the need for simultaneous commitment and capability in order for sustainability to become managerial mainstream. By offering an introduction into sustainability management including the option to gain knowledge, while being adapted to tight resources, the novel tool increases the capability of an SME to integrate sustainability management.

MANAGEMENT AND DOCUMENTATION

Six experts mentioned aspects that sustainability needs to be anchored in management and to be supported by documentation. Often sustainability goals or topics are worked on, however, their management and implementation happens rather in an unstructured way, for example:

> *They […] have some thoughts or goals that they want to improve, which are then discussed with the family at the evening table, which develops and is then implemented.*

Moreover, because not integrated into a management strategy in the business as usual with new challenges to tackle each day, goals are forgot or not pursued in a stringent way:

> *Because they do that [think about sustainability] in the evening and at night when they are lying in bed, but then they come the next morning and then they say: "Oh, my machine is leaking, I have to look at that first" […].*

Concerning the need for management and documentation, the tool was perceived as beneficial by the experts. First, seven experts mentioned the initiation of reflection: the tool helps to reflect on a company's sustainability performance. The realisation of what is and where the company wants to be, where strength and weaknesses are, the discovery of neglected topics and the identification of risks were mentioned to be side effects of the reflection process that all eventually can lead to structured goal development. Reflection is an important component of learning, often lacking in management education (Closs & Antonello, 2011). By offering the possibility of reflection through self-assessment, connecting it to a knowledge data base and a supportive talk, the present tool comes close to the demand of Moldavska and Welo (2015, p. 626) that "[i]deally, a sustainability assessment should serve to indicate specific problem areas in the company, while enabling identification of appropriate sustainability practices […]" Despite of self-assessment only, becoming aware of the company's performance can be the first step towards successful improvement.

Secondly, eight experts mentioned aspects of structure which is created by using the tool.

> *Just the check is nice, but there should also be a development. […] if you want to call yourself sustainable, then you have to do at least that [the minimum standard]. […] I also find it, let's say, feasible at first glance. Not excessively high demands. But it actually helps to get into the process, to deal with it and then the talk, which I also find very good.*

In SMEs, structure is often less formal than in larger enterprises (Jansson et al., 2017). This can lead to less strategic decision-making, with decision made more by effectuation than causation (Hauser et al., 2020). With concrete steps to follow, the tool aims at structuring sustainable development.

Thirdly, seven experts described the possibility to improve through the application of the tool. Continuous improvement should be one outcome from sustainability management. The SME-owner described it as a domino effect:

> *You start working on one thing and all of a sudden you realise, okay, the other thing, there's something else too, that's not so difficult to implement, yeah let's do it.*

Continuous improvement has been identified as an enabler of sustainable business practices (Caldera et al., 2019) and as a motivation for sustainable development (Windolph, Harms, & Schaltegger, 2014). What is needed for strategic improvement is data for decision-making. The tool partly encourages and initiates data gathering by including first steps into the minimum standard. However, for thorough and comprehensive assessment, e.g. of environmental impact, additional tools and methods, e.g. a life-cycle analysis, have to be applied. Methods to measure certain indicators can be suggested and explained in the sustainability talk. Moreover, the component of goal setting is a step towards continuous improvement and is discussed further below.

SUPPORT

Not only the reflection by the company itself but also the sustainability talk was perceived as beneficial by the experts in order to scrutinise and strengthen the reflection. That aspect contributes to the need of SMEs to receive support for their sustainable development. According to the experts, SMEs sometimes feel left alone and helpless. Eight experts mentioned the supportive character of the tool, especially through the sustainability talk in which personal assistance is provided and the self-assessment is talked through. As the SME owner put it:

> *Hearing again from the outside […], these possibilities could be done and if you do this and this action, then you could make this area of the company more sustainable or strengthen it. That helped me a lot.*

Taking the characteristic lack of knowledge and resource shortage into account, the support provided by the tool is vital for successful conduction. In literature, lacking support in the context of sustainability tools is evident (Coteur et al., 2020). The support included in the present tool partly substitutes the role of employees with specific sustainability knowledge SMEs are (often) lacking (Journeault et al., 2021) and helps to put the self-assessment into perspective. Many experts mentioned that this aspect is worth strengthening further, for example, through elongating the talk. Journeault et al. (2021) describe how external stakeholders can take over roles which an SME is not able to pay employees for. Their findings indicate that external support is very important for SMEs and that further support for the tool could be achieved by connecting the tool to more activities with external stakeholders. This is strengthened by Corazza et al. (2021) who point out the importance of networks for the sustainable development of SMEs. Thus, a peer-process for example with groups of similar businesses (bakeries, dairies…) could bring in more specific expertise and knowledge exchange into the compass process.

COMMUNICATION

Communication towards external stakeholders remains a problem for many SMEs as mentioned by five experts, e.g.:

> *Where I see that our partners often encounter difficulties is in communication. Sometimes this has something to do with the anchoring of the topic in the company as a whole, but probably also with resources.*

In that context the tool was perceived as in need of improvement by five experts since the process of the tool is not made for communication. B2B communication was seen as more reasonable than towards consumers. However, six experts mentioned possible aspects of the tool that can be communicated outwards such as the goals and the fact of using the tool; the "we are on the way" aspect and the fulfilment of the minimum criteria. One expert described this as a contribution to transparency. Previous research stressed the need for high transparency regarding sustainability management (Küchler et al., 2022). The tool does not provide possibilities for certified disclosure of many assessed indicators, however, it offers the possibility to show a sustainability journey with continuous improvement in a transparent way and to transfer the message that the company deals with business sustainability. The latter, although already happening, is often not communicated (Kutzschbach et al., 2021; Revell et al., 2009). This could be due to missing frameworks that are suitable for SMEs (Kutzschbach et al., 2021) or to lacking knowledge about sustainability (Journeault et al., 2021).

4.4.3 The effect of setting goals

The last compass component is the development of five individual goals per company which are evaluated after one year. As this can be interpreted as a concrete output of the tool, it is elaborated on separately.

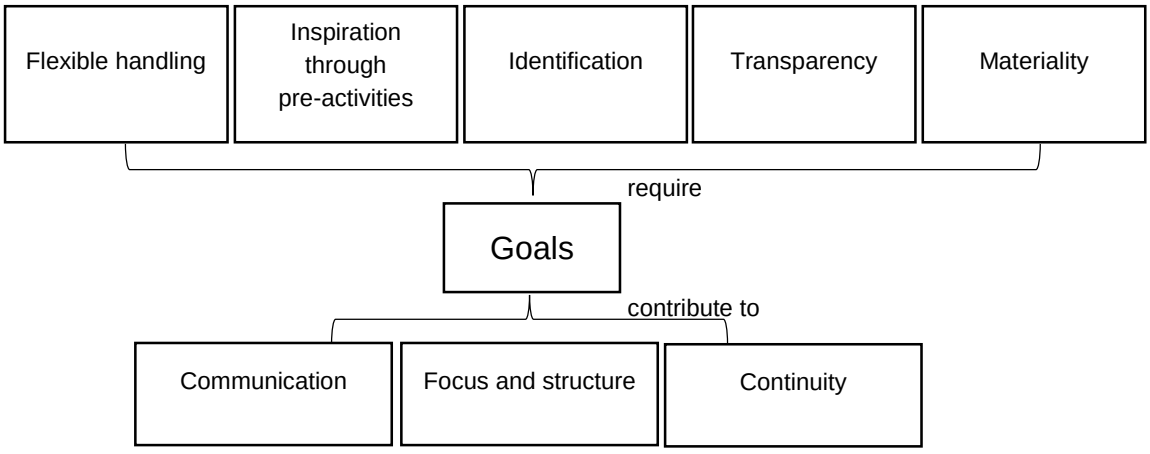

Figure 9: The requirements for and effects of goals set in the compass process

Seven experts suggested flexible handling of the goals to adapt it to the different requirements of different SMEs. For example, some goals are not feasible within one year, therefore the duration of a goal should be amendable to short (1 year), medium (3 year) and long term (5 year) goals and big goals should be divided into subordinated goals. Or, if other goals are derived in the process or less goals are achieved, this should be handled flexible, too.

Pre-activities such as the self-check or the fulfilment of the minimum criteria were described as inspirational for the goals by four experts. As noted above, identification of the staff with the goals set is important and one expert suggested to involve staff members into the goal setting process. Another expert pointed out that materiality of goals is important and another expert commented on required transparency:

> *[…] whether it [the goal] can be achieved raises many questions. One would have to look at how this is communicated and to what extent there is an obligation to provide proof if someone is interested, in other words, how transparent such a goal is made.*

If the goals are successfully set, they can have an effect on the communication of a company. This was mentioned by seven experts. For example, they can be used to communicate towards buying departments of customers or even end customer by communicating the process. Doubts were raised whether a company would communicate a negative goal experience and this was confirmed by the company owner:

> *Especially if you haven't achieved 5 out of 5 goals, I wouldn't spread it on social media. That is rather harmful for the company and you don't do that.*

Moreover, goals can contribute to focus and structure according to five experts, since they determine the main activities in sustainability management and narrow down the scope from a vast field of possible activities that can be overwhelming. Additionally, they are validated in the sustainability talk before starting to work on them which adds to a sorted structure. Four experts furthermore commented on the goals as an instrument to initiate but also keep up the effort for sustainability, however, a continued support is beneficial for continuity.
According to Morrison-Saunders and Pope (2013), goals help to contextualise a sustainability vision. This helps often creative but unstructured SMEs to bring their visions concerning sustainability to life. Furthermore, goals belong to the concept of continuous improvement that enables sustainable development (Caldera et al., 2019), discussed above as a benefit of the tool, and the use of a sustainability tool has to lead to sustainable development (Moldavska & Welo, 2015).

4.4.4 Observed area of conflicts in SMEs' sustainability management

Derived from the findings and discussion above, two general area of conflicts in SMEs' sustainability management are discussed briefly in the following. One critique of the compass is the lack of communication possibilities. Yet, to gather data and to obtain reliable results usable for communication, an SME has to invest much more resources than for the conduction of the present tool, often perceived as extra work (Walker et al., 2008) any beyond capacity (Steger et al., 2007). Here, a typical contradiction in the behaviour of SMEs becomes obvious: If sustainability is considered as extra work, chances are small that it will be integrated sufficiently into SME business practice because extra work is in conflict with resource shortage. Moreover, dealing with current matters and crises are always prioritised over this extra work due to higher importance of the daily business (Lepoutre & Heene, 2006; Steger et al., 2007). This is a vicious circle because a next crisis might be just around

the corner, likely caused by lacking sustainability which in turn is not paid enough attention to because of the short-term focus on tackling the symptoms of the crisis (see Figure 10). Furthermore, incentives are lacking to use the tool, at least in terms of a direct (financial) gain. This alludes to another typical conflict regarding business sustainability: the motivation of the company (or the persons in charge) is a crucial determinant for the conduction of sustainability management and the perceived values behind it (Bos-Brouwers, 2009; Handrito et al., 2021). Whether the application of a certain tool is beneficial or not is thus subjectively evaluated by an SME's owner or manager looking at the tool's contribution to the expected gains of sustainability management. If those expected gains are prompt paybacks rather than long-term return of investment, SMEs with restricted resources are likely disappointed (s. Figure 3). As they are (often) not able to apply comprehensive tools that produce data-driven evidence for substantial sustainability assessment and reporting because of lacking resources (Bos-Brouwers, 2009; Caldera et al., 2019), the beginning of structured sustainability management remains a first step towards internal improvement and an investment into the company's future. On top of that, findings of Cassells and Lewis (2011) indicate that if quick paybacks such as cost-savings are gained, they are often not perceived as such. Therefore, the motivation for sustainability management as reputation for short-term profits can be considered as, especially for SMEs, a barrier towards sustainable development.

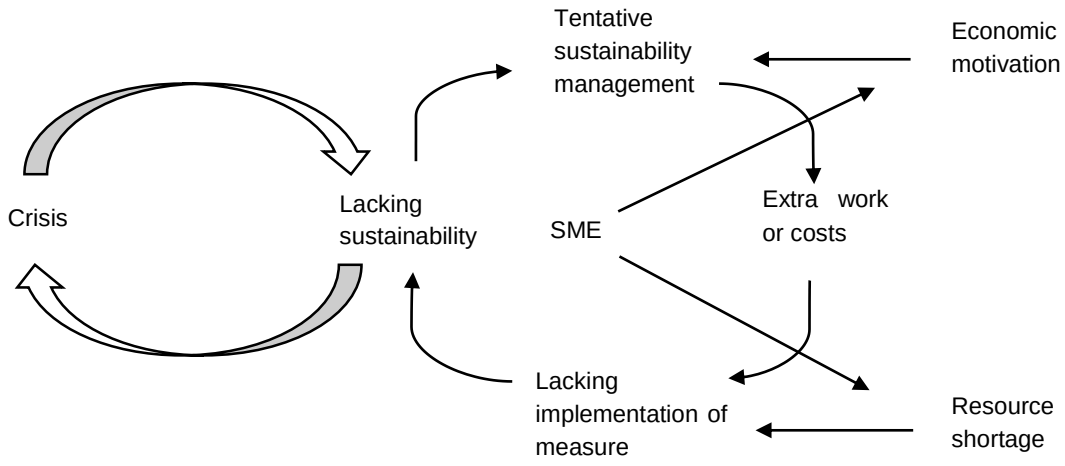

Figure 10: Vicious circles between sustainability (management) and SMEs

4.5 Conclusion

As evaluated by a range of experts with different backgrounds, the sustainability compass meets a number of SMEs' requirements. It provides an introduction into sustainability management for small and medium sized food manufacturers. A novel format integrates components of sustainability assessment (self-check), the possibility for continuous improvement as well as the reporting thereof (goals) and adds a component similar to certification (minimum standard). This combination has been demanded by researchers (Maas et al., 2016) and can help an SME to get accustomed to components of sustainability management. By offering a structured, relatively quick process including external support, the tool meets the requirements of an SME (see Tables 9 and 13) without compromising on

the concept of holistic sustainability (see Table 10). Indeed, the self-check can seem very comprehensive at first, however, it serves to get an overview and to educate oneself before concentrating on the most important aspects. Furthermore, the relevance filter adapts the check to the company size and its products, paying attention to local context. However, some requirements of SMEs regarding sustainable development are not yet ultimately covered: Although the message of engaging in sustainability management and improving continuously as well as the goals themselves can be communicated, this approach does not deliver a comprehensive assessment or sustainability report a company can use for its communication outwards and marketing. Moreover, incentives for the tool's application are lacking or are not demonstrated sufficiently. Further improvement of the compass should entail the increased integration of employees and other stakeholders and the development of connected incentives to increase the number of application.

At present, the compass can be used by SMEs as a stepping stone for further activities in sustainability assessment, reporting and certification. However, it is only attractive for companies with a minimum level of true interest and intrinsic motivation for sustainability, willing to put in at least a minimum of resources and considering this input more as investment than extra costs. To ask solely 'What's in it for us?', meaning quick earnings, is too shortsighted when dealing with sustainable development.

Some implications can be drawn from this research: policy makers are recommended to develop more incentives and support programmes for (food manufacturing) SMEs in order to increase sustainable development in the food sector. Professionals working in consulting can use the findings regarding the requirements for goals and should encourage SMEs to engage in sustainability management, not only for financial but also for long-term reasons. Further research could transfer the novel format of the presented sustainability management tool to other sectors and investigate its effects there. Moreover, improvements of the novel format can be developed taking this evaluation into account and efficient connection to up- and downstream supply chain actors can be investigated and established.

Limitation of this work is the qualitative approach for evaluation that was conducted by interviewing experts. Despite insightful findings, a quantitative research design among actual users of the compass could yield complementary information for the improvement of the tool. Due to too little pilot companies testing the compass, this has not been possible (yet).

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4.7 Appendix

Coding definitions, frequency of a code and number of experts having mentioned an aspect related to a code.

Requirements SME	Text anchor	Memo	Frequency	No. of expert out of 11
Personalities/ motivation	*That would also be a question for the people who fill in the compass, what kind of previous education in sustainability do they have and also what kind of motivation is behind it.*	The conduction of the compass and its outcome depend on the personalities involved and their motivation	27	10
Incentives	*And then, precisely, this question of added value. So to speak, what can I generate with it.*	Incentives to engage (in the sustainability compass)	24	9
Permeation/ identification	*[...] because in my opinion, the entire company has to be involved, because the goals that are set do not only affect the sustainability department, if there is one, or the person who takes care of sustainability, but it affects the person in purchasing, the person in processing, I don't know, actually at all levels of the company, so they have to be on board in some way.*	Sustainability concerns all departments therefore its management and identification needs to be connected to all employees	15	6
Resources	*I think that is always the question of whether they have the resources to implement it[…]*	Time, finances and knowledge are restricting resources for SMEs	33	11
Management/ documentation	*Many things are done automatically in everyday life, but are not actually documented and therefore not verifiable. This is exactly where you have the source of error: I still do this, that, etc. and my employees know about it, but if I have a real management system [...] I must have defined the work steps clearly beforehand in order to simply see if I am doing this and if I am really doing it the way it is prescribed. Not: "yes, you don't have to be so precise " or something like that. That happens again and again in everyday life. Especially when I have the topic of sustainability.*	Sustainability needs to be anchored in management and to be supported by documentation	10	6

Support	*And if you offer them something again and again through workshops or talks, that they deal with it, especially with how they can implement their own ideas that they have, how they can support them so that they also try to implement them in the company.*	SMEs need support in their sustainable development	16	6
Communication	*Where I see that our partners often encounter difficulties is in communication. Sometimes this has something to do with the anchoring of the topic in the company as a whole, but probably also with resources.*	Problems with communication	12	5
Difficulties of the tool	**Text anchor**	**Memo**	**Frequency**	**No. of expert out of 11**
Information	*And maybe it would be good to show people briefly what possibilities there are and how this can help them.*	Information about the compass and how it works	14	4
Specificity	*[...] to start where the greatest leverage is, presupposes that you have a group that is as homogeneous as possible. And that is rarely the case [related to the minimum standard].*	Different areas of the food sector need different treatment	4	3
Benefit	*And what is a bit of a problem is that [there is], as I said, often intrinsic interest, but that the added value is not seen in making this scientific or written down, so to speak, and therefore the resources are not made available and this then prevents SMEs from actually benefiting from their own commitment as corporate citizens [...].*	Benefits of the compass need to be visible	11	5
Communication	*It is not a process now to also carry this outwards in the sense of simply a supervised self-development for the companies.*	Process is not made for communication/too little communication possibilities	7	5
Effort	*Not having the data and then still shying away from the time and thinking: as I said, that's extra work.*	For some companies it could be too much effort	14	9
Self-assessment	*What is the 100 % requirement? Sometimes it's not so clear, quantitatively. That is an assessment and some have said that it should be possible to make a clearer quantitative statement, then they would feel more comfortable than clicking on something where they are not sure.*	Difficulties with self-assessment	17	10

Advantages of the tool	Text anchor	Memo	Frequency	No. of expert out of 11
Commitment	*And I can imagine if there is such a coaching process and someone participates voluntarily and wants to and also consciously says: yes, I would like to work towards setting myself goals [...].*	The compass creates commitment for sustainable development	7	5
Improvement	*You start working on one thing and all of a sudden you realise, ok, the other thing, there's something else too, that's not so difficult to implement, let's do it. That's how it happens, that's the domino effect a bit.*	Using the compass leads to improvement and action	11	7
Low-threshold	*[...] if you start from scratch, you feel you are in good hands and cared for, and it is comprehensible and not such a huge wall where you think: Oh my God, I'll never manage this, who is going to do it here? You can also do it in bits and pieces: save it, go out again and then at some point say: OK, and now the full programme with the support, with the target agreement, with the check after one year. So I think so. A low threshold value, because it's very manual and if the time you have at the end is [correct].*	Starting the PP-compass does not require a lot	7	4
Support	*[...] but it is this support that makes the difference, I think, whether something is implemented or not. Because when you know that someone from the outside is coming, on the one hand it's a help, but on the other hand it's also a way of having to justify yourself if you haven't implemented something. It is a kind of control, although it is not supposed to be one. That's why I think the support is the main added value for me.*	The compass provides support, especially through the exchange with external members and common reflection	12	8
Communication	*The goals that are set are transparent. The minimum stories, the minimum standard that you have to fulfil, anyway. And of course you can show that you have used this compass and this SC to make the goals, the measures that you then set and make on the basis of the result.*	Communicating aspects of the compass outwards to stakeholders is possible	8	6
Structure	*Because that is exactly what is often lacking. There is somehow a vision and also an intrinsic motivation, but when it comes to implementation and realisation, there is a lack of actually doing this, this structuring, and I think that is really a very good structure [...]*	The compass helps to find structure, including continuous improvement, documentation and goal setting	15	8

Insights/knowledge	*And that background information combined with the conversation afterwards, that's so valuable for a company.*	By conducting the compass, knowledge, insights and understanding are gained	16	6
Reflection	*[...] that you simply have this self-reflection, that you also become aware of where your strengths and weaknesses are.*	The compass helps a company to reflect on its sustainability performance	23	7

Chapter 5 General discussion and conclusion

This thesis aims to contribute to sustainability management in food manufacturing SMEs by exploring and analysing requirements caused by sector specificity and requirements caused by SME characteristics, finally leading to the suggestion of a novel sustainability management approach and by drawing insights from the evaluation of this approach. The major contributions of the thesis are three-fold: Firstly, the thesis identifies important criteria regarding sustainability management, coming from both food sector and SME requirements, and discusses them in combination. Secondly, it introduces a novel sustainability management tool for food manufacturing SMEs and its evaluation. Thirdly, building upon the previous work, it discusses conflicts of interest which complicate sustainable development in SMEs in general and presents tentative solutions. Thereby, practitioners and policy-makers can integrate parts of the findings in their daily work to support SMEs' sustainable development, and scholars from the field of SME research and/or research in the food supply chain can build upon the findings and apply the suggested approach, either in the same way or in an extended or altered version. As demonstrated in the general introduction, sustainability management tools for SMEs are scarce, particularly at the manufacturing stage of food production. Finding a balance between the requirements of SMEs regarding sustainability management and food sector specificity is an ongoing challenge (rudimentarily visualised in Figure 11) because of apparently irreconcilable conflicts of interest. For instance, an holistic approach demands a comprehensive framework that in turn might overstrain SMEs and thus is not realistic for daily business life application.

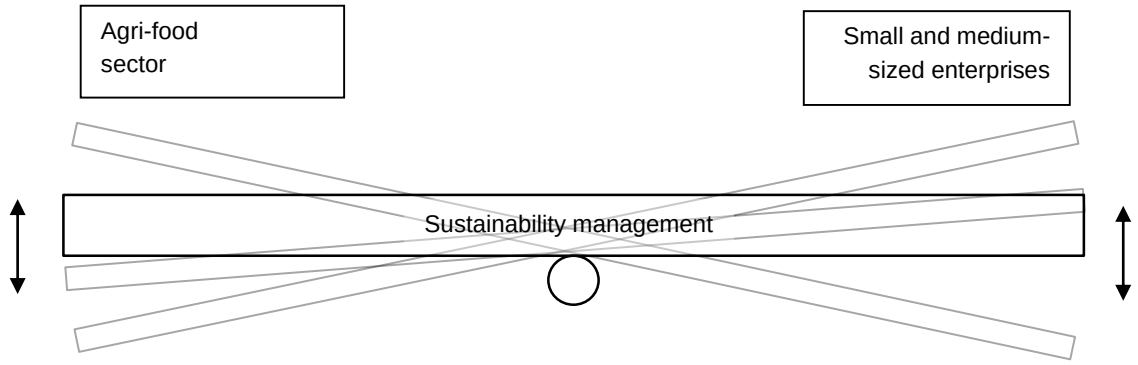

Figure 11: Balancing act between agri-food sector and SME requirements

In the following, the findings of this thesis, aiming at the (partial) solution of those antagonisms, are discussed in an integrative manner. The discussion starts with the exploration of the constraints peculiar to the agri-food sector in the light of SMEs' characteristics and requirements, followed by a second part viewed through an SME-lens, before coming to a third part in which tool aspects are considered which have not been addressed in this thesis so far. Then, parts of the insights are summarised in figure 12 and a decision-tree is presented (Figure 13) that can support the application of a sustainability

management tool in food manufacturing. Finally, limitations of the thesis and suggestions for future research are presented.

5.1 Discussion

5.1.1 Food sector aspects

COMPREHENSIVENESS (HOLISTIC APPROACH)

The requirement for holistic content was derived from analysis of seven existing tools applicable for the food manufacturing stage. This covers integration of the environmental, social, economic and management dimensions of sustainability (Chapter 2). An holistic approach has been demanded by scholars before (Morrison-Saunders & Pope, 2013; Ness et al., 2007; Pintér et al., 2012; Talukder et al., 2020), however, the food manufacturing perspective has so far been neglected. Although topics such as water consumption, land degradation or child labour are primarily associated with the agricultural production stage of the food supply chain (Chapter 2), they need to be integrated into sustainability management of food manufacturing enterprises, too. A food manufacturer has the power of supplier choice and therefore can exert influence on the upstream supply chain, just as a food manufacturing business is exposed to pressure from downstream actors.

An holistic approach was also favoured by the experts participating in the Delphi-study (Chapter 3). Even in the context of SMEs with their unique characteristics, the inclusion of all sustainability dimensions was regarded as necessary. Although the importance of the dimensions was weighted differently, none of the experts excluded any of the dimensions. Both the insights from framework analysis and from the Delphi-study encouraged an holistic approach for the development of the novel tool. Consequently, the suggested tool comprises a comprehensive catalogue of topics and questions in the self-check (Chapter 4). In the evaluation of the novel tool, all experts supported and strengthened this holistic and comprehensive approach "because sustainability is an overarching concept, because including aspects from all dimensions broadens the understanding of sustainability and because interactions between all dimensions exist" (p.85).

A counter argument are the tight resources of SMEs, requiring a compact scope and as little as possible effort. This has been stressed by literature (Grothe & Marke, 2012; Hillary, 2004) and in both expert studies (Chapter 3 and 4). However, it is important to include all topics and dimensions in order to address the varying needs of SMEs. The inhomogeneity within the group of SMEs and a corresponding need for differentiated treatment of each sub-group (micro, small, medium-sized) has been noted by scholars (Cassells & Lewis, 2011). The proposed tool includes a relevance filter, which reduces the number of questions per topic depending on enterprise size, thus helping to balance between the necessity for an holistic approach and SMEs characteristics as well as to decrease effort for micro enterprises. However, the exclusion of questions runs the risk of distorting results and losing comparability, because the summarised result relies on less questions than for bigger SMEs. A (sub)-topic might be represented by only one question, possibly ignoring relevant aspects. In general, sustainability assessment only measures what is included and thus the picture

delivered is dependent on the assessment's set-up (Alrøe & Noe, 2016; Moldavska & Welo, 2015). When compacting a tool, this has to be gauged thoroughly and, at least, the reduced amount of questions has to be taken into consideration in the proceedings.

SECTOR SPECIFICITY

While comprehensiveness demands a wide variety of topics, the topics' content should be tailored to the agri-food sector. In the analysis of frameworks potentially applicable to the food manufacturing stage of the supply chain it became apparent that generic frameworks lack topics indispensable to the food sector. The topics partly missing in the scope of the more generic frameworks are soil & land, biodiversity, animal welfare, indigenous rights and product information (Chapter 2). All of these topics are closely related to food production and are impacted mostly by the agricultural stage of the food supply chain. Apart from product information - a topic clearly belonging to the manufacturing stage - they might seem superfluous to the manufacturing stage. However, with regard to supply chain connectivity, these topics should not be left out. By integrating them, a process for a food manufacturing SME may be initiated to think about its suppliers' sustainability performance regarding these agricultural topics and if the SME can impart indirect action for the topic via supplier choice, or if the SME itself can implement measures to contribute to the topics.

One could argue that if any of the topics is especially relevant to a food manufacturing SME and its supply chain, this topic can be covered by employing a special tool for this very topic, e.g., a tool to measure and improve biodiversity concerning its agricultural suppliers (Cool Farm Alliance, 2022) or a tool for monitoring child labour (Tony's Chocolonely, 2022). Certainly, this is always an option to deepen and scrutinise a particularly relevant topic, but it is vital for a sustainability management tool to present an overview of relevant topics, giving an SME familiarity with potentially important topics, and the ability to weigh up the importance of each topic, and make strategic decisions on suitable measures. As a consequence, an SME might then decide to use another, additional tool. Excluding relevant topics for a food manufacturing SME right from the beginning could cause neglect of the topic due to lack of knowledge or competence (chapter 3).

Scarcity of KNOWLEDGE is also a problem when applying a generic framework: topics and questions of a generic sustainability framework are likely to be abstract without connection to a certain sector. This in turn impedes application in SMEs because of a lack of knowledge (Caldera et al., 2019; Hörisch et al., 2015). Therefore, the more concrete the content of a tool, the more convenient it is for an SME. The novel approach integrates a knowledge data base with information on the different topics, providing relation to the food sector, describing measures for improvement and also providing examples of food manufacturing companies that have already implemented measures. The aim is to deliver information for SMEs in a suitably convenient manner. In the evaluation (Chapter 4) the knowledge data base was found to support SMEs in gaining knowledge and in guiding tool application. Talbot et al. (2021) state that sustainability management tools are crucial to sensitise enterprises and their owner-mangers. Therefore, the sector-specific knowledge data base does not only contribute to content knowledge but can also support awareness of sustainability in general.

Connectivity

As mentioned above, the inclusion of sector-specific content relates to all stages of the food supply chain. The importance of connected sustainability management throughout the different stages of the supply chain is stressed by the findings of Chapter 2. Regarding the upstream supply chain, it means integrating food sector-specific content, including topics that are mainly influenced by the agricultural stage. For the food manufacturer, this aspect of integration can relate to choosing where to procure raw materials: Evaluation of agricultural topics and sustainability performance at agricultural level can be integrated into the purchasing decisions of a food manufacturer. This mechanism can contribute to sustainable supply chain management, and sustainability throughout the supply chain can be increased by buyer-supplier relationship management making sustainable purchasing decisions (Kumar & Rahman, 2015).

Moreover, connectivity to the upstream supply chain is important for facilitating assessment at the manufacturing stage. Many statistics are dependent on data derived from the agricultural stage. For example, in the context of carbon footprint calculation, if only scope 1 and 2 are included, the indirect emissions from the agricultural stage belonging to scope 3 – which may be the largest contributor in food production - are neglected. However, this contains a crucial determinant in the contribution to the reduction of greenhouse gas emissions in most manufacturing businesses (Berners-Lee et al., 2011). Supposing scope 3 is included, data for the indirect emissions are needed. Databases such as Agribalyse or Ecoinvent provide data, yet calculations become rather unspecific using generic datasets (Notarnicola et al., 2017) and only become more specific if primary activity data are supplied (Richards, 2018). This also applies for data on water or soil. A connected sustainability assessment between the agricultural and the manufacturing stage could facilitate the assessment and improve output at the manufacturing stage (Fritz et al., 2017). Hamprecht et al. (2005, pp. 7–8) describe an ideal collaboration between supply chain actors where "one piece of information on a supply chain should serve multiple purposes in order to minimise time for data collection". However, this requires robust and manageable assessment at the agricultural stage which still comes with challenges and is an ongoing topic for research (Notarnicola et al., 2017; Talukder et al., 2020). With agriculture becoming more and more digital, chances for easier data handling and transfer (Weersink et al., 2018), and maybe even real time data transfer, are improving. Businesses implementing similar approaches for food manufacturers exist already (Nature Preserve, 2022).

A more connected assessment could improve supply chain sustainability not only for the environmental dimension but for the social and economic dimension as well. Being able to investigate prices paid for workers in primary production in a quick and easy manner, for example, could help a food manufacturer regarding its buying decision. In summary, connecting sustainability assessment to the agricultural stage could support informed decision-making at the manufacturing stage and thus contribute to higher sustainability in the supply chain.

Regarding the downstream supply chain, connectivity is mainly created by reporting assessment outcomes towards downstream actors (Chapter 2). These actors, both retail and

consumers, can in turn then base their buying decision on the reported/communicated results. Consequently, if decisions are based on sustainability criteria, the sustainability of the whole supply chain can be enhanced (Kumar & Rahman, 2015).

Sustainability dashboards could provide a solution to the problem of facilitating supply chain connectivity regarding sustainability management (Shields & Shelleman, 2020). They could help food manufacturing SMEs not only to compile data from suppliers but also to transfer data to downstream actors of the supply chain, such as large retail customers. This is supported by the findings of Manavalan & Jayakrishna (2019), who present support and development of sustainable supply chain management by the Internet of Things. It can include monitoring the whole supply chain or fostering supplier collaboration. As an concrete example, supply chain sustainability can be increased by reverse logistics which is optimised by implementing smart systems (Rejeb et al., 2020). In the food industry, Internet of Things technology is still scarce and if existent, it is often used only within one company to facilitate strategic decision-making on energy or water consumption. However, it has the potential to improve data transfer throughout the whole supply chain (Jagtap et al., 2021).

Although connectivity is needed for increased food supply chain sustainability, it is frequently in contrast to the way real SMEs operate. To start with, connected assessment requires effort in gathering and using information supplied which can overstrain SMEs' capacities (Chapter 4). Also in regard to implementation of Internet of Things technology, restricted finances are a barrier. Secondly, buying decisions in SMEs are often influenced by factors other than the sustainability of a supplier. The findings of Pressey et al. (2009) show that many SMEs do not have defined purchasing strategies, frequently lacking any form of supplier evaluation. The authors infer that owner-managers may use more informal purchasing decisions through personal relationships. Strong relationships of SMEs and their suppliers that render certification redundant were also observed by Feng & Huatuco (2022). In addition, the authors mention community forces, - and, last but not least - economic reasons as possible distractions from sustainable purchasing decisions, that make an associated assessment superfluous.

Regarding food supply chain sustainability including SME actors, harmonisation of content and easy-to-use solutions are needed for efficient assessment and reporting. Harmonised content could also benefit SMEs' characteristics because a harmonised approach provides a fixed scope and indicator set. By that, effort is reduced regarding decision-making for SME sustainability management.

INTEGRATION

Both assessment and reporting were analysed as important components of sustainability management in food manufacturing businesses. From the food manufacturing perspective, an integration of both components supports supply chain connectivity (Chapter 2). Assessment covers mainly the agricultural and manufacturing stage while reporting can be used to connect to the downstream supply chain as a means of communication. The need for communication was stressed both in the Delphi-study (Chapter 3) as well as in the evaluation of the developed tool (Chapter 4). According to Gill et al. (2008), online communication is an important tool to disclose information and to engage with stakeholders.

Da Giau et al. (2016) derived four communication types in web-based communication of sustainability: low commitment (low sustainability practices and low communication), marketing-based (low sustainability practices but high communication), low disclosure (high sustainability practices and low communication) and high commitment (high sustainability practices and high communication). While starting at the lowest level, the goal should be the last level of high commitment, where both practices and communication are on a high level. Communication can contribute to planning and development of sustainability and is necessary to maintain sales levels and to legitimise behaviour Genç (2017). Thus, a sustainability management tool should go beyond assessment and decision-making, and offer possibilities for reporting (Maas et al., 2016).

Regarding COMMUNICATION of sustainability performance, credibility is vital (Chapter 3). With respect to customers, it becomes more and more important because customers' interest in business activities is rising (Lerro et al., 2018). If credibility is high, sustainability claims of a food manufacturer have an impact. Without credibility, sustainability efforts will not be rewarded. The findings in Chapter 3 describe important aspects to achieve credibility: company conditions, process conditions, assessment characteristics and assessment communication. Communication has been discussed above. Company conditions cannot be influenced by a tool or framework and are partly discussed further on (see 5.1.2). Process conditions and assessment characteristics concerning a sustainability management tool should be communicated openly. For instance, communication about how the assessment is conducted can increase credibility. In addition, assessment characteristics such as simplicity promote the understanding of the process and consequently foster credibility.

Another component of a sustainability management tool contributing to credibility can be certification. Assurance of a certain level or standard by an independent party conveys credibility and can lead, in addition to internal improvement, to legitimisation and market success (Windolph, Harms, & Schaltegger, 2014). In the food context, retail driven certification has proved to be an enabler of sustainable supply chain practices (Chkanikova & Sroufe, 2021). However, as discussed in chapter 3, the likelihood of SMEs committing to a sustainability certification is low due to the high complexity, effort, and necessary knowledge which an SME is not likely to tackle or provide. Furthermore, although certification was regarded as important by the experts, it was also described as often having an unpropitious cost-value ratio. Therefore, for SMEs the cost of certification likely does not outweigh the benefits (Oelze & Habisch, 2018) and despite being regarded as helpful in terms of credibility, the findings of the thesis imply that certification, at least in such a comprehensive way required by holistic sustainability, does not fit an SME context. However, Carvalho et al. (2021) report an example of a food manufacturing SME that successfully applied a sustainability certification scheme (B-Impact Assessment). The authors observed certification as a driver of internal improvement. Based on this observation, they suggest a variety of measures to adapt the certification better to SMEs' needs including distinction between different sizes within the SME group. In summary, certification is ideal to add assurance and validity to a sustainability management tool but in the end it is dependent on the resources of an SME and therefore it is difficult to include traditional

certification into a sustainability management tool that is supposed to fit SME context in general. In the novel approach the minimum standard represents a small certification of only eight criteria in order to offer a minimum of certified contributions towards sustainable development and also in order for SMEs to grow accustomed to that process, if not already experienced.

If credible communication cannot be established via certification, another way to achieve credibility concerning sustainable development is TRANSPARENCY (Chapter 3). This can be established by disclosing information about sustainability management and sustainable business development. It includes communication of employed tools or approaches (Pintér et al., 2012) and is one way to counteract the lack of certification. If certification is possible, high transparency is advantageous, too, because it is essential to promote credibility (Blackman & Rivera, 2011). Moreover, transparency facilitates application of sustainability management tools (Alrøe & Noe, 2016). Consequently, food manufacturing SMEs should disclose their approach to and results of sustainability management as transparently as possible. Here lies another difficulty: Reporting is facilitated through compacted information such as aggregated indicators (Hák et al., 2016). However, the more compacted, the less comprehensible and transparent information can be. A balance has to be established between convenience and maintaining the highest transparency possible. In the application of the novel tool, transparent communication can be achieved if a food manufacturing SME discloses tool application and the tool's content, if it refers to the tool's website and if it talks about outcomes, e.g. if goals are communicated (the goal component is discussed further below). A standard sustainability report is not part of the tool because not all topics are evaluated in depth and therefore, a standard sustainability report would be incomplete. As commented on in Chapter 3, transparency is especially important to SMEs who might engage in sustainability management in a more unconventional way but as long as the process is transparent, credibility can be achieved. Coming back to the demand of integration which stems from requirements of the agri-food sector, this thesis demonstrates, that although important from a food perspective, the integration of the different sustainability management components can be challenging for an SME and the single components need to be thoroughly adapted.

5.1.2 SME aspects

Having discussed the thesis' results from a food sector angle, the next part is elaborated on from an SME's perspective. One of the major challenges regarding sustainability management in SMEs remains the balancing act between SMEs' characteristics and the nature of sustainability MANAGEMENT itself. Strong and strategic management is not usually one of SMEs' strengths. Yet, sustainable development is often connected to wicked (Crowley & Head, 2017) or even super-wicked problems (Levin et al., 2012) that cannot be understood and solved intuitively. According to Levin et al. (2012) long-term orientation is needed to solve super-wicked problems, rather than short-term solutions. Therefore, to attempt solutions or improvement and to develop a sustainable organisation, sustainability has to be included into operational management (Baumgartner & Rauter, 2017). Management brings

about a more structured approach that helps to focus on sustainability in the long run, to prevent reactivity and to tackle complex and more-dimensional consequences through thorough and informed decision-making. Reflection is one component which contributes to a thorough management process. In the novel tool, reflection is established through self-assessment and the sustainability talk in which the results are discussed. Shields and Shelleman (2015) report a lack of structured approach to sustainability management in SMEs and suggest a low-threshold sustainability SWOT-analysis for initial engagement in sustainability management. So, the question, whether sustainability management tools are necessary for SMEs, can clearly be answered with yes. However, in order to find suitable approaches, to motivate SMEs and to prevent overstraining, special attention has to be paid to SMEs' characteristics and requirements when it comes to sustainability management.

An important aspect is the SME-characteristic of OWNER-MANAGEMENT. Due to the large influence and personal connection of the upper echelon and the enterprise, sustainability management and its measures are impacted by personal values and motivation of the owner-manager. This is supported by Dasanayaka et al. (2022) who have identified owner-managers as internal triggers for environmental management. The findings of chapter 3 and 4 also imply an initial and important role of the owner-manager regarding the choice and application of a sustainability management tool. Therefore, it is vital to understand their behaviour and attitude towards sustainability management.
In Chapter 4 of this thesis the SME characteristic of owner-management is discussed in the context of ethical motivations and business cases that affect sustainability management (Schaltegger & Burritt, 2018), arguing that an SME (or its owner-manager) is only likely to apply a sustainability management tool, if at least some value beyond short-term profits is perceived. Grimstad et al. (2020) found SMEs' motivation for sustainability activities to be driven more by intrinsic than extrinsic motivation and findings by Graafland & van de Ven (2006) conclude that actual sustainability performance correlates more strongly with intrinsic than extrinsic motives. Both results favour the likelihood of sustainability management tool application. Courrent & Omri (2022), however, found SMEs to engage in sustainable activities when they could "profit from business opportunities arising from sustainable development" (p.22). The authors observed that owner-managers were prone to prioritising activities for survival, (improving business performance), which can lead to neglect of sustainable engagement. This is supported by Pintér et al. (2012, p. 22), who claim that "managing non-market issues, such as social and environmental performance, is important only as long as business can demonstrate how voluntary social and environmental management contributes to competitiveness and economic success". Both findings are alarming in the light of the previous implication regarding ethical motivation and business cases. If sustainable development is only pursued because of expected business opportunities and profits, and always seen as subordinate to short-term survival, sustainability management is not likely to be applied by an SME since it is perceived as costly, both in terms of finances and effort.
The dependence on the personality of an owner-manager implies that an holistic approach

towards sustainability which includes a management dimension is important (Chapter 2) because the managerial processes and approaches behind actual sustainability performance is important to consider as well (Revell et al., 2009).

Connected to the context of business case, for SMEs to employ a sustainability management tool there must be VISIBLE BENEFITS. These will depend partly on the perception of the SME and its management. An SME or owner-manager driven by the wish to contribute to a more sustainable future might perceive structure and introduction to sustainability management as a benefit, whereas an SME or owner-manager driven by short-term profit might not. Since the novel tool tries to approach sustainability management integrating different components, the output is distributed over multiple benefits (commitment-check, low-threshold, insights/knowledge, structure, improvement, reflection, support, communication insights, see Chapter 4). In this it differs from a certification result, a sustainability report, or a one-size solution for sustainable improvement, each of which may only target one major benefit. In a best case scenario, benefits are not only visible for the management but all the employees of an enterprise. This is can be implemented by considering the following aspect.

PERMEATION AND INFORMATION of sustainability throughout the company was regarded as a requirement for SMEs' sustainability management. Lülfs & Hahn (2014) derive the need for sustainability education, role models and a sustainability-related climate in a company from their investigation of sustainable behaviour in enterprises, and stress the need for information, training and peer education. Relating those findings for corporate sustainability in general to the background of SMEs, including lack of knowledge (Hörisch et al., 2015), it becomes clear that a sustainability management tool for SMEs should comprise more components than pure assessment and reporting components. The novel tool, despite lacking a concrete mechanism for permeation by, e.g., multiple accounts for one enterprise, can contribute to an educational approach. The person conducting the self-check, for example, can present the results to colleagues and the knowledge data-base can be used for educational content. Furthermore, in the sustainability talk, a group of employees can take part. An important aspect to successfully establish permeation and information is a minimum of resources, which leads to the next part of the discussion.

RESOURCES such as money, time, staff and knowledge are needed by SMEs in order to conduct sustainability management and apply a corresponding tool. However, SMEs are reported to fall short of resources which leads to the main antagonism between SMEs and sustainability management. On the one hand, as required for the food sector, a sustainability management tool needs to be comprehensive by nature in order to include all relevant and specific aspects (Chapter 2). On the other hand, it should suit the restricted resources of an SME (Chapter 4). Using resource shortage as the only explanation to not engage in sustainability management is a deadlock: even if a sustainability management tool is as compact and slim as possible, the argument of resource shortage can still be used because the application of a tool will require some resources, however small. Here, again, the attitude of an SME, often connected to its owner-manager comes into the discussion: if sustainability management is regarded as extra cost and the only incentive is quick pay-backs, resource

shortage is a valid argument and decreases the likelihood of tool application. However, if sustainability management is regarded as a necessary component in daily business and as investment for the future, resource shortage is still an issue but at least some resources are likely to be directed towards tool application. Research has stressed this, too: Baumgartner and Rauter (2017) plea for sustainability to be integrated into the strategic context of an enterprise and thus also into daily business life. Giddings et al. (2002, p. 195) describe the need for change towards perception of sustainable development: "Sustainable development will require more than technical changes at the end of the pipe or modifications to cost/benefit analysis. It will need a shift in how humans see the world". Although this is meant in a more general way, it underlines the need for a change in people's mindset, be it as an individual or in a role like that of an owner-manager.
For the novel tool, resource shortage has been considered and is reflected in the following aspects: (1) the self-check is adaptable according to SME-size, (2) the whole process is estimated to require 15 hours, (3) only eight important criteria are checked in depth, (4) in the sustainability talk, support is provided regarding the self-assessment and goal setting, (5) estimated costs of the tool process amount to payment for the sustainability talk and maintenance of the tool, no high audit costs evolve.

As mentioned above, resource shortage also includes lack of knowledge. This explains the circumstance that SUPPORT is an elemental aspect for SMEs regarding sustainable development (Hillary, 2000). It can be conveyed in multiple ways. One way is the development and provision of a sustainability management tool. An outcome of the interviews with experts was the recognition that a tool provides structure and therefore managerial support and the novel approach also integrates consulting in form of the sustainability talk (Chapter 4). A tool alone is however unlikely to be enough. SMEs rely on access to experts for specific topics, in order to compensate for lacking internal expertise. One way to find expertise is by involving external stakeholders (Journeault et al., 2021). Another possibility is hiring external expertise. Yet, a common barrier is the lack of overview of what expertise is actually needed and where to find it. Thus, access to information on concrete sustainability topics and best practices as provided in the knowledge data base or general consulting as in the sustainability talk can enable SMEs to make informed decisions about expertise procurement. Here, sector specificity (Chapter 2) plays an important role, because in a generic framework concrete information and best practices are difficult to include. In the food sector, sector-specific support can be achieved by connecting sustainability management and its tools to already existing initiatives such as sector-specific (and local) associations, e.g., Bioland (Bioland e.V., 2022) or Feinheimisch (Feinheimisch - Genuss aus Schleswig-Holstein e.V., 2022).
Support can also be provided by networks: SMEs inherit an already important characteristic that facilitates participation in local networks: local embeddedness. Participating in local networks can compensate SMEs for lack of resource such as finances, time and knowledge (DiBella et al., 2022). In turn, networks can be strengthened through sustainability management tools. For example, the use of the same tool enables multiple enterprises to

work on their sustainable development with a common understanding, provided by the tool (more thoughts on that below).

5.1.3 Tool

As can be deduced from the discussion above, the ideal sustainability management tool for food manufacturing SMEs is probably unattainable due to the conflict between mutually exclusive requirements of the food sector and the requirements of SMEs. However, as described in chapter 3, more and new concepts for sustainability management in SMEs are needed, and consequently, this thesis suggests a novel approach that combines aspects of traditional sustainability management in a rather unconventional way. The evaluation is presented in Chapter 4. In the following, three aspects derived from tool development, that go beyond the aspects regarding sector and SME characteristics already discussed, are presented to illustrate possibilities for further tool or framework development.

CONNECTION OF GOAL SETTING AND STAKEHOLDERS

One component of the novel approach developed is the setting of five individual, annual sustainability goals. In his book about organisational behaviour, Miner (2015) summarises goal theory developed by Locke & Latham. Goals can be beneficial: they motivate to exert effort, they cause persistent behaviour and they gather attention towards important aspects. In that context, challenging goals are particularly stimulating. In the expert interviews (Chapter 4), alongside focus and structure, continuity was also mentioned as an advantage, in agreement with the predictions of goal theory. Furthermore, possibilities for communication through goal setting were regarded as beneficial by the experts. Goals can thus be regarded as stimuli in the SME context, partly as substitute for comprehensive strategy which SMEs tend to lack (Revell et al., 2009). By giving direction and motivation, they are an important part of the novel sustainability management approach for SMEs. Moreover, in comparison with comprehensive reporting, goals offer the possibility to display sustainability efforts and performance in a reduced and compact way. However, requirements for successful goal setting could be drawn from the experts' answers including flexible handling, inspiration through pre-activities, transparency, materiality and identification. One aspect that could be worth adding to the novel concept is a materiality analysis in order to extract goals with high impact. In a materiality analysis potentially important topics are sorted according to the enterprise's and their stakeholder's priority (Adams et al., 2022). This method is connected to stakeholder theory which tries to include various stakeholder interests into enterprise's activities. Hörisch et al. (2014) identified, amongst other aspects, the challenge to create mutual interests with stakeholders while exploring the connection of stakeholder theory and sustainability management. This is supported by Talbot et al. (2021) who stress the important role of stakeholder consultation when engaging in sustainability management. Consequently, the necessity to integrate stakeholder interest into sustainability management strengthens the application of materiality analysis. This is supported by Courrent and Omri (2022) who state that owner-managers

should not see sustainability management as a lonely task based on their own decision-making. Instead, they should be encouraged to engage in novel stakeholder management, based on stakeholder theory but in a more dynamic way than ranking stakeholders from close to distant, in order to pay attention to all stakeholder interests. The consideration and inclusion of external stakeholders is not only beneficial for joined sustainable development, it also contributes to and improves the functionality of an SME. External stakeholders may be able to supply knowledge and skills to an SME which in larger enterprises would be available internally and thus contribute to the sustainable development of an SME (Journeault et al., 2021). Moreover, increased stakeholder integration can also contribute to the necessary connectivity in sustainability assessment and reporting throughout a food supply chain. In future research, the connection of goal setting theory and stakeholder theory could be investigated in an SME context, further to explore the overlaps and synergies between both theories.

NETWORKS AND PEER PROCESSES

The great importance of stakeholders for SMEs' sustainable development leads to another aspect gaining impetus in recent research. Networks are key for SMEs to compensate for lack of knowledge und resources: "[…] the network becomes the place where through collaborations and partnerships, an SME can start developing awareness and a practical approach toward sustainability" (Corazza et al., 2021, p. 3). Grimstad et al. (2020) stress the collective advantage of joint action between SMEs leading to the cost reduction and improvement that a single SME could not achieve. This also comprises "achieving economies of scale and better negotiation power" (Thakkar et al., 2009, p. 978). Furthermore, through enterprise networks, sustainability activities can be stimulated and spread out (Lülfs & Hahn, 2014). A collaborative advantage for efforts against environmental challenges was also observed by Revell et al. (2009). In terms of sustainability management, networks could facilitate exchange about topics included in a sustainability management tool and they could bring together enterprises working on the same topics, supporting each other, or taking collaborative action. A network could use the same tool, supporting each other with the assessment and use of it. In the case of the novel tool presented in the thesis, this could range from conducting the self-check in groups to analysing results, conducting the sustainability talk in groups and even setting collaborative goals. However, the establishment of a network once more depends on the SME's and its owner-manager's willingness to engage in a network, which can include sharing of sensitive information, effort in terms of time for participation and organization, or the diplomatic act to agree on common strategy and proceedings (Thakkar et al., 2009).

INCENTIVES THROUGH STAKEHOLDER PRESSURE

Networks and peer processes cannot only be of supportive character; they can function also as incentives for sustainability management by creating stakeholder pressure. External pressure as a form of incentive can be important for SMEs (see 3.5.1). Incentives to apply a sustainability management tool are not only dependent on a tool's set-up but also on the expectations of a person or enterprise dealing with and applying it (see 4.4.2). As discussed

before, if the business case is the only reason to engage in sustainability management, a tool for SMEs is likely to disappoint. The business case incentive is primarily steered by the owner-manager of an SME. In order to prevent sustainable development of an SME being so dependent on an SME's owner-manager, pressure should be applied by external stakeholders such as government, based on policies and legislative frameworks (Courrent & Omri, 2022). Legislative bodies could define standards and guidelines to regulate sustainability management in SMEs. By becoming mandatory, the perception of sustainability management could change from being costly to being a part of daily business life, just as quality management is. "[A] legal instrument could help break down the juxtaposition between economic efficiency and sustainability, which is often used as the main barrier by small entrepreneurs" state Corazza et al. (2021, p. 10). Additionally, support structures would be needed such as consulting and practical help to increase transparency through web-reporting, for example. As discussed above, networks and peer groups could also belong to support structures initiated by the government, becoming a "public policy tool" Corazza et al. (2021, p. 10). Despite some (organisational) efforts, this could activate the potential hidden in SMEs to contribute to global sustainable development. The pressure to engage in sustainability management could also be exerted by buyer pressure through customers. Findings by Baden et al. (2009) demonstrate that a majority of SMEs considers this as an incentive for corporate social responsibility practices. However, through this mechanism, an SME is dependent on its buyer's definition of sustainability and the buyer's willingness to connect with its suppliers. Thus, a superordinate, legislative framework could harmonise sustainability management and motivate it at the same time. An example of possible legislative incentive is the novel corporate sustainability reporting directive (European Commission, 2021). It will be interesting to see whether this framework will have a positive effect on sustainable development of enterprises and if enough support structures exist. Since this framework concerns only capital market oriented SMEs, it leaves the largest share of SMEs without direction. Some scholars, however, predict a trickle-down effect on SMEs (Ortiz-Martínez & Marín-Hernández, 2022).

Figure 12 (see below) concludes the discussion of this paper and gives an overview of the results discussed. The tool characteristics of a sustainability management tool for food manufacturing SMEs are influenced by requirements of SMEs and the agri-food sector. These requirements were considered in the best possible way for the development of a novel sustainability management tool – a sustainability compass (see Figure 8 and 4.2.3). However, as the discussion above demonstrates, the novel tool is only a tentative approach and far from being perfect.

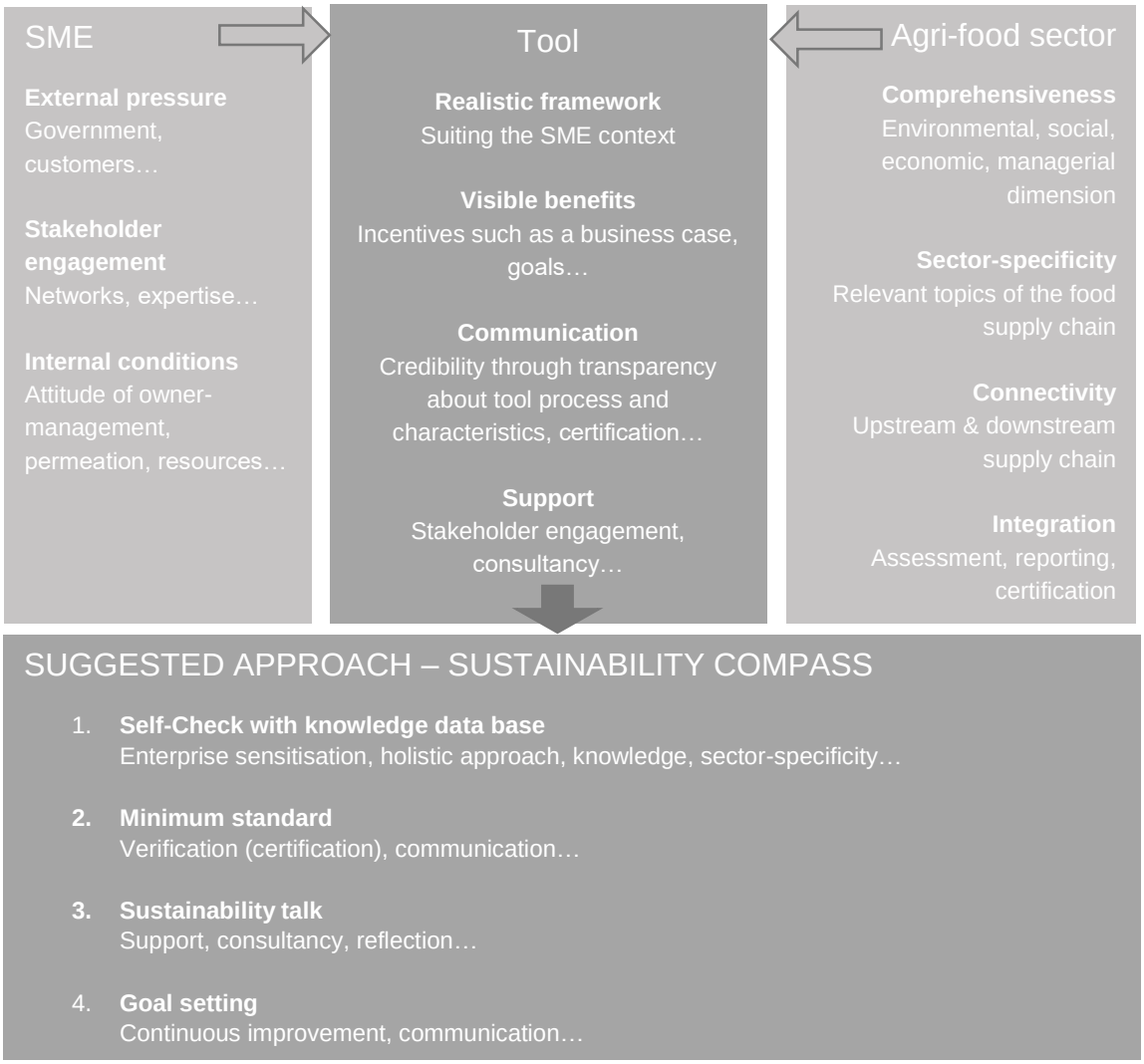

Figure 12: Overview of the discussed results

5.2 Limitations and Future Research

Some limitations are connected to the thesis at hand. Firstly, the findings of the thesis are based mainly on qualitative methodology. That approach was chosen because, until now, research to explore and support sustainability management in food manufacturing SMEs is scarce. The thesis thus aims at collecting and discussing important aspects. The only quantitative part are probabilities collected in the Delphi-study using quantitative methodology. Due to the relatively small sample size of Delphi-study participants, the explanatory power of this part is rather low. Therefore, verification of the aspects for sustainability management in food manufacturing SMEs by empirical analysis of a large sample is still pending. However, the concentration on qualitative research yielded a broad spectrum of relevant aspects which can be used for quantitative evaluation.

Secondly, both analyses of the qualitative studies (Chapter 3 and 4) were conducted by a single individual. Conducting qualitative coding with more than one researcher mitigates subjective bias that naturally occurs due to experiences, perception and knowledge of the

researcher. Acknowledging that, Malterud (2001, p. 484) argues that "the question is neither whether the researcher affects the process nor whether such an effect can be prevented" but how to find suitable handling. Due to single research no intercoder reliability could be measured. However, intercoder reliability is controversially discussed in qualitative research: it helps to "improve both the internal quality and external reception of qualitative studies" by adding structure, reflection and transparency but "it is no guarantee of the trustworthiness of either prior data collection and preparation or subsequent theme generation and reporting" (O'Connor & Joffe, 2020, 11). Consequently, coding with more than one person can be advantageous but is not an ultimate step towards sound results. Since consensus is not the aim in qualitative research, single research is permitted but should be evaluated and reflected upon critically (Malterud, 2001). The step of research evaluation could have been intensified in this thesis in order to strengthen further the quality of the findings. However, it was beyond the capacities of the research team to provide more evaluation.

Thirdly, evaluation of the tool should be undertaken by collecting practical evaluation of SMEs. However, not enough SMEs had applied the novel tool so far, thus, expert interviews were conducted instead. This gap poses another connecting factor for future research. In addition to evaluation by SMEs themselves, measurement of potentially increased sustainability activities/improved sustainability management could be an interesting approach to investigate the tool's effectiveness. In the light of a recent study by Schaltegger et al. (2022), not only the effectiveness of the tool regarding enterprise context and triggered action, but also its transformational potential could be investigated.

Another interesting aspect is the reception and effectiveness of the knowledge data base. Does the collection and explanation of topics contribute to organisational education and knowledge, as required by Hörisch et al. (2015)? Another question is how well the novel approach is adopted in practice. According to the findings of Schaltegger et al. (2012), knowledge about a tool can increase its application. This knowledge can be promoted by the website-based approach of the novel tool. In addition, the time between tool development and broad application could be investigated according to Schaltegger et al. (2012).

Apart from further tool evaluation, a variety of possible aspects for future research can be drawn from the thesis. It demonstrates potential in research for sustainability management in SMEs in general. In correspondence with future research suggestions by DiBella et al. (2022), an important research question is: What are the mechanisms to integrate holistic sustainability into daily business life? The work of Talbot et al. (2021) demonstrates that one solution for this is the integration of stakeholders into sustainability management. Therefore, processes to include stakeholder exchange regarding sustainability efforts remain to be investigated in the SME context. The novel tool could be used as a basis for stakeholder exchange on sustainability. Some gaps have to be filled regarding the connection of organisational theory/behaviour and their effect on sustainability management: How does the attitude of owner-managers affect sustainability management in SMEs? What can change the perception of sustainability management as costly, towards valuable/worthy of investment? For that, a first step could be the identification of ethical motivations in SMEs according to the classification of Schaltegger and Burritt (2018) before investigating possible

leverage factors. Similar to the topic and research design of Courrent and Omri (2022), the influence of leverage factors could be investigated using a bivariate regression model. In that case, leverages could represent the independent variable and strength of ethical position could represent the dependent variable.
Further questions for research are: Which support mechanisms and policy frameworks facilitate sustainability management in SMEs? Do, for example, legislative measures for larger enterprises have a stimulating effect on SMEs as predicted by Ortiz-Martínez and Marín-Hernández (2022)? Additionally, support mechanisms in the form of networks are worth investigating: How can supportive networks be established and practised? According to Corazza et al. (2021) also the competitiveness and economic sustainability, in the context of SMEs joining a network, are interesting aspects for research. An ex ante and ex post investigation could reveal cause-effect links.
Furthermore, research implications can be derived for sustainability management in the food sector. For example, in line with demands for supply chain-wide sustainability assessment by Fritz et al. (2017), a more in-depth analysis of indicators for holistic and company-based sustainability assessment, reporting and certification throughout the food supply chain could favour harmonised proceedings. Research on practical implementation of theoretical findings is necessary in order to work out how to facilitate data transfer from each supply chain link to the next one and to find synergies so that the effort for each actor is minimised and double work is prevented. This could lead to research for a tool or framework, which is applicable to each stage of the food supply chain and is connected towards the up- and downstream stages. For this, more research on each of the stages and on how to connect the respective requirements is needed, including research on the consumer perspective: how can and should holistic sustainability efforts be communicated towards the consumer (Grunert et al., 2014)? What is the level of complexity a consumer is willing and wishing to deal with? Lastly, findings from both areas need to be combined in further research for sustainability management in SMEs of the food sector in order to enable this large group of enterprises in one of the most essential sectors to thrive in a compatible way for environment and society.

5.3 Implications for practitioners and policy-makers

The importance of SMEs to engage in sustainable development is demonstrated in this thesis. Therefore, SMEs should consider integrating sustainability management measures and tools despite their tight resources. The novel approach offers support for initial engagement if there is genuine interest in long-term improvement rather than just short-term profit. Additionally, SMEs should intensify their stakeholder dialogue in order to connect with the up- and downstream supply chain concerning sustainable development. Consultants and other practitioners working with SMEs should continuously encourage SMEs to integrate sustainability management into their daily business life. Moreover, they should provide support. This includes up-to-date information on which tools and possibilities are available but also support for the implementation of concrete measures. Since it is difficult for one person to cover the whole variety of topics, consultants should at least be able to forward an SME to a suitable institution or person concerning a special topic. Here, education of

supporting actors is crucial and can be facilitated by government structures, such as networks. Policy can support sustainability management in food manufacturing SMEs by providing a legislative framework, similar to the corporate social responsibility directive or supply chain law. Legislative pressure creates an external incentive so that the question of whether enough internal incentive exists (for example of the owner-manager (see 4.4.2 and 4.4.4) loses weight. Furthermore, if sustainability management is demanded or organised by law, all SMEs have to engage in it and with this collective action, a big contribution towards general sustainable development can be made. Rewarding the application of a sustainability management tool could be another incentive created by policy makers, government or within the supply chain, e.g., by retail. Moreover, funding and supporting the maintenance of the tool can be a subsiding measure to support SMEs. In addition, structural support for SMEs such as educational programmes or networks can be initiated by governmental institutions. Increased knowledge can empower SMEs and increase efficient approaches towards sustainability. Drawing from the findings of the thesis, a collection of aspects is presented in the following decision tree (see Figure 13). It is designed to support both SMEs and practitioners working with and consulting SMEs. It is not claimed to be complete but tries to help and structure the decision process for or against the application of a sustainability management tool. The questions asked are recommended to consider before applying a sustainability management tool. There are different levels of which each should be accomplished before taking it to the next level. The first level concerns the owner-manager, the second level comprises consideration of company conditions, the third level concerns possible tools and their set-ups and the last aspects to consider on the fourth level belong to food sector specificity. If an SME is in doubt with or has to negate some of the questions, it is suggested that it reconsiders the application of an holistic sustainability management tool or that it tries to change so it is able to affirm the questions.

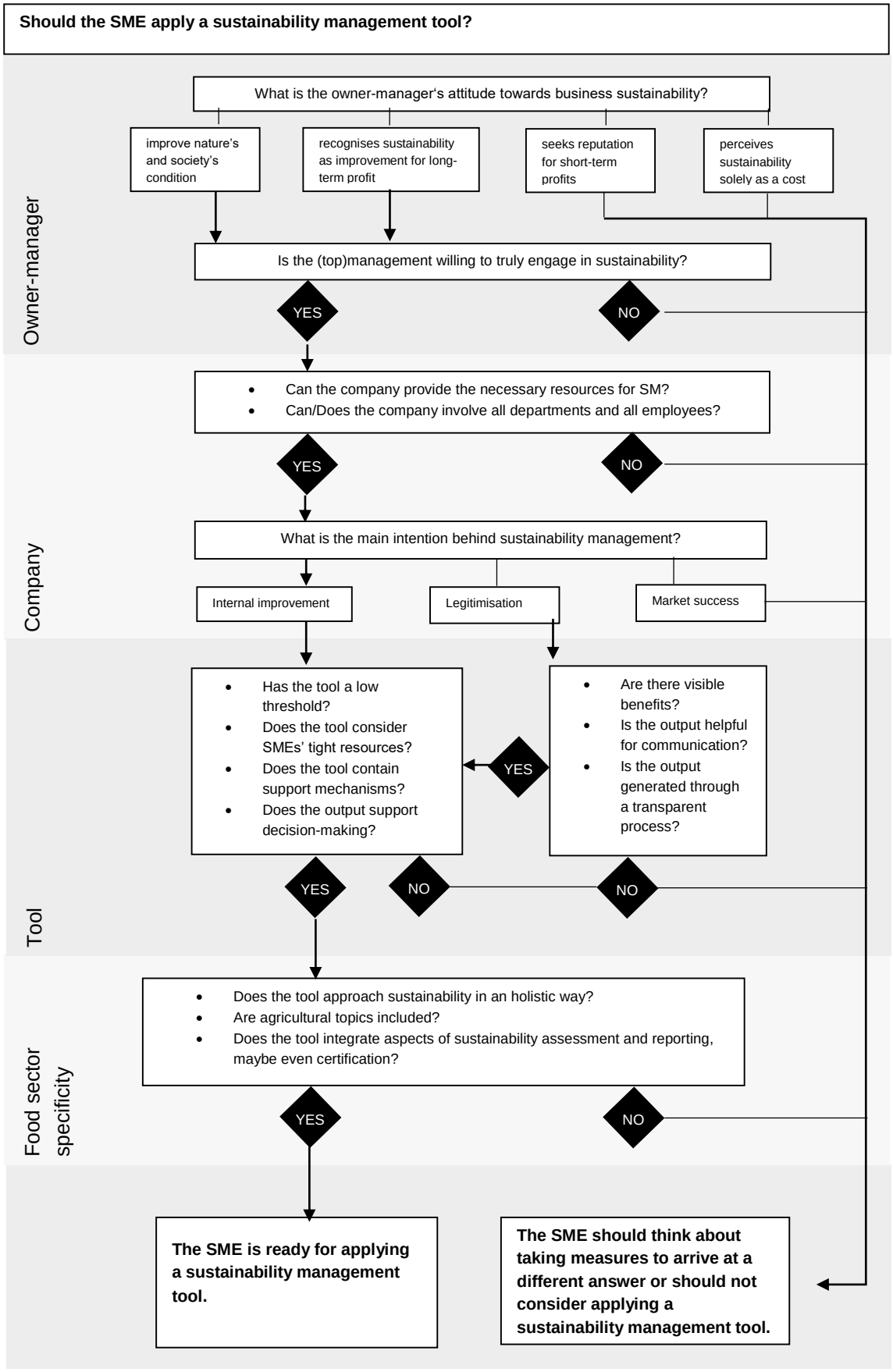

Figure 13: Decision tree for the application of a sustainability management tool in food manufacturing SMEs

5.4 Conclusion

By taking the results of the single studies into account and discussing them in an integrative manner, it becomes obvious, that a one-size-fit sustainability management tool for SMEs does not exist and is difficult or even impossible to develop. Firstly, this is due to inhomogeneity within the SME group regarding size, secondly, perceived benefits depend on the attitude of an SME and its owner-manager as well as the intention behind sustainability management. Thirdly, balancing the requirements of sustainability management and requirements of the food sector with SME characteristics is impeded by antagonisms. Food sector requirements call for a comprehensive tool or framework (holistic, connected to the supply chain, integrative, sector-specific) and sustainability management in itself is a complex area requiring thorough handling. In contrast, SME characteristics demand compact, simple, inexpensive, quick and supported sustainability management approaches. Despite these antagonisms, the answer cannot be to abandon food manufacturing SMEs, simply because the sheer number of SMEs bears a great potential for sustainable development. Thus, the aspects for sustainability management collected in this thesis are valuable on the journey to further investigate the engagement for and process of sustainability management both in food manufacturing SMEs and SMEs in general but also for practitioners and SMEs themselves to increase and improve sustainability management.

One strategy that helps to overcome or at least handle antagonisms in sustainability management of food manufacturing SMEs is transparent communication. As long as an SME discloses its journey of sustainable development in a transparent and credible manner, firstly, it can convey its efforts (even if only tentative and in the early stages) and convince customers, and, secondly, start an exchange about its disclosed expects, which in turn can lead to improvement for the SME itself.

Important components that could support application of sustainability management in food manufacturing SMEs are the establishment of networks and policy incentives such as a legislative framework. Furthermore, research on goal theory in connection with stakeholder theory could lead to new findings contributing to successful sustainability management in SMEs.

If a food manufacturing SME is about to engage in sustainability management, different levels should be considered in order to estimate whether and how it is best to engage: first, the owner-manager's attitude is critical, then the set-up of the company should be considered, thirdly, possible tools should be investigated regarding requirements and finally, if for a food manufacturing SME, food sector requirements should be checked. If critical aspects are observed within a level, this should be solved or worked on, before exploring the next level. One crucial aspect at the very beginning of that level-consideration is the following: As long as sustainability is only regarded from a business case angle, it is likely that SMEs fail to adapt sustainability management in a proper way. Business objectives need to be considered, however, a more intrinsic attitude or at least the understanding to see sustainability management as an investment rather than a short-term profit generator is preferable. Changing or nudging sustainability-averse or sustainability-sceptical attitude towards regarding sustainability as the matter for business and global survival can be achieved through

more education in all parts of society. If all kinds of different SME-stakeholders are more educated about sustainability issues and if they demand thorough assessment and disclosure of sustainability performance, it could create the business case for the reluctant attitude and motivate to engage in sustainability management.

In summary, implementing and conducting sustainability management in food manufacturing SMEs cannot simply be done on the side but requires thorough consideration on the part of practitioners, further investigation and development on the part of researchers and support on the part of policy makers. If approached in a transparent and differentiated manner, sustainability management can contribute to sustainable development in and of SMEs and therefore has a great potential to contribute to the sustainable transformation of the world's food systems.

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