

Academic Dissertation

**Transforming the International Food Supply –
Sustainable Practices in Small Intermediary
Businesses**

Submitted by

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Included Research Articles

This cumulative dissertation includes the following four research articles, which constitute the results section. The articles are the versions as published by the journals.

- Weber H, Poeggel K, Eakin H, Fischer D, Lang DJ, von Wehrden H, Wiek A. 2020. What are the ingredients for food systems change towards sustainability? — Insights from the literature. *Environmental Research Letters* 15(11):113001. <https://doi.org/10.1088/1748-9326/ab99fd>
- Weber H, Wiek A, Lang DJ. 2020. Sustainability entrepreneurship to address large distances in international food supply. *Business Strategy & Development* 3(3): 318-331. <https://doi.org/10.1002/bsd2.97>
- Weber H, Lang DJ, Wiek A. 2021. Connecting Consumers to Producers to Foster Sustainable Consumption in International Coffee Supply — A Marketing Intervention Study. *Journal of Marketing Management* 61(2):1-20. <https://doi.org/10.1080/0267257X.2021.1897650>
- Weber H, Wiek A. 2021. Cooperating with ‘Open Cards’ — The Role of Small Intermediary Businesses in Realizing Sustainable International Coffee Supply. *Frontiers in Sustainable Food Systems* 5, Article 663716:303. <https://doi.org/10.3389/fsufs.2021.663716>

Appendix (Workshop reports 1+2):

- Weber H, Wiek A. 2019. Sustainable International Coffee and Cacao Supply: Insights from a Stakeholder Roundtable Discussion. *Sustainable Food Economy Lab, School of Sustainability, Arizona State University, Tempe, AZ*. https://web.asu.edu/sites/default/files/slfee/files/sfe2019005_coffee_supply_roundtable_report.pdf
- Weber H, Wiek A. 2020. Sustainable Coffee Sourcing: A Workshop for Small Coffee Businesses in Arizona. *Sustainable Food Economy Lab, School of Sustainability, Arizona State University, Tempe, AZ*. https://web.asu.edu/sites/default/files/slfee/files/sfe2020001_coffee_sourcing_workshop_report.pdf

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List of Abbreviations

AFN	Alternative Food Networks
ASU	Arizona State University
AZ	Arizona, USA
GHG	Greenhouse gas emissions
I-CSA	International Community Supported Agriculture
PhD	Philosophiae Doctor
RQ	Research question

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Abstract

The global food system faces many complex challenges, and there is general agreement that a transformation is needed. While localizing food has been proposed as a means to this end, changing global food supply chains may also lead to sustainable food systems. Because most food systems today have an international dimension and are likely to remain connected, on one way or another, to other ones across the globe, it is necessary to find solutions to problems such as exploitation or environmental degradation. Current approaches such as Fairtrade certification often result, however, only in incremental change, and it is not clear how the current system could be transformed to make it sustainable.

Addressing this challenge and the related gap in the literature, this study examines the emerging practices of small intermediary food businesses, which act between agricultural producers and consumers, and may have the potential to advance sustainability in international food supply. Including a systematic review of the literature on food systems change (Study#1), this dissertation adopts a transformational sustainability research methodology, which is solution-oriented, aims to integrate system, target and transformation knowledge, and is characterized by a transdisciplinary research practice. It conceptualizes challenges of international food supply and empirically investigates entrepreneurial solution approaches to address these challenges (Study#2). Two transdisciplinary research projects with small coffee businesses located in Germany, Mexico, and the U.S. were conducted to examine how these approaches could be implemented (Study#3, Study#4, Workshop reports 1+2).

This study shows that challenges in international food supply chains can be conceptualized as negative effects of large geographical and relational distances. It also identifies five entrepreneurial solution approaches specified by twelve sustainability-oriented design principles to address these negative effects. Creating relational proximity between supply chain actors, that is, strong relationships based on knowledge and care, seems to be a key factor to advance sustainability in international food supply. The results also suggest that by building such strong relationships and changing the fundamental principles of international food trade (e.g. putting people before profits), small intermediary businesses could be important agents in food system transformations. The findings also highlight the importance of collaboration with peers in local networks, in which new sustainable business practices could be shared and disseminated. Transdisciplinary collaborations involving both researchers and small food businesses could result in innovative solutions and, ultimately, a transformation of food systems.

Although the small-sized businesses examined here are already highly committed to sustainability, this study has important implications for researchers and practitioners, including individual entrepreneurs, who aim to advance sustainability in international food supply.

Kurzfassung

Das globale Ernährungssystem steht vor komplexen Herausforderungen und es besteht allgemein Einigkeit darüber, dass eine Transformation erforderlich ist. Zu diesem Zweck wurde eine lokale Lebensmittelversorgung vorgeschlagen. Eine Änderung globaler Wertschöpfungsketten kann jedoch ebenfalls zu Nachhaltigkeit führen. Da die meisten Ernährungssysteme heutzutage eine internationale Dimension haben und wahrscheinlich auch weiterhin haben werden, ist es notwendig, Lösungen für damit einhergehende Probleme wie Ausbeutung oder Umweltzerstörung zu finden. Aktuelle Ansätze, wie die Fairtrade-Zertifizierung, führen jedoch häufig nur zu schrittweisen Veränderungen, und es bleibt unklar, wie das derzeitige System transformiert werden könnte, um es nachhaltig zu gestalten.

Die vorliegende Arbeit befasst sich mit dieser Herausforderung und der damit verbundenen Forschungslücke. Sie untersucht die aufkommenden Praktiken kleiner Unternehmen, die zwischen landwirtschaftlichen Erzeuger*innen und Verbraucher*innen agieren und möglicherweise die Nachhaltigkeit der internationalen Lebensmittelversorgung vorantreiben können. Die Arbeit enthält u.a. eine systematische Literaturanalyse zur Transformation von Ernährungssystemen (Studie#1) und basiert auf der Methodik der transformatorischen Nachhaltigkeitsforschung, die lösungsorientiert ist, System-, Ziel- und Transformationswissen integriert und durch eine transdisziplinäre Forschungspraxis gekennzeichnet ist. Die vorliegende Arbeit analysiert Herausforderungen der internationalen Lebensmittelversorgung und untersucht empirisch unternehmerische Lösungsansätze, um diese Herausforderungen zu bewältigen (Studie#2). In zwei transdisziplinären Forschungsprojekten mit kleinen Kaffeeunternehmen in Deutschland, Mexiko und den USA wurde untersucht, wie solche Ansätze praktisch umgesetzt werden können (Studie#3, Studie#4, Workshop-Berichte 1+2).

Die Arbeit zeigt, dass Herausforderungen in der internationalen Lebensmittelversorgung als negative Auswirkungen großer geografischer und zwischenmenschlicher Entfernungen verstanden werden können. Außerdem werden fünf unternehmerische Lösungsansätze identifiziert, um diese Auswirkungen zu minimieren. Die Schaffung zwischenmenschlicher Nähe zwischen Akteuren innerhalb der Wertschöpfungskette, d.h. enge Beziehungen auf der Grundlage von Wissen über- und Fürsorge füreinander, scheint ein Schlüsselfaktor für die Förderung von Nachhaltigkeit in der internationalen Lebensmittelversorgung zu sein. Die Ergebnisse deuten weiterhin darauf hin, dass durch den Aufbau solcher engen Beziehungen und den damit verbundenen Veränderungen grundlegender Prinzipien des internationalen Lebensmittelhandels (z.B. die Bedarfe der Menschen gegenüber der Profitmaximierung priorisieren) kleine Unternehmen wichtige Akteure bei der Transformation von Ernährungssystemen sein könnten. Die Ergebnisse unterstreichen auch die Bedeutung der Zusammenarbeit mit Gleichgesinnten in lokalen Netzwerken, in denen nachhaltige Geschäftspraktiken

ausgetauscht und so verbreitet werden könnten. Transdisziplinäre Forschung, an der sowohl Wissenschaftler*innen als auch kleine Unternehmen beteiligt sind, könnten zu innovativen Lösungen und letztlich zu einer Transformation des Ernährungssystems führen.

Obwohl sich die hier untersuchten kleinen Unternehmen bereits stark für Nachhaltigkeit einsetzen, generiert diese Arbeit wichtige Erkenntnisse für Wissenschaftler*innen und Praktiker*innen, einschließlich Einzelunternehmer*innen, die Nachhaltigkeit in der internationalen Lebensmittelversorgung vorantreiben wollen.

Resumen

El sistema alimentario mundial se enfrenta a varios desafíos complejos y hay un acuerdo general de que es necesario una transformación. Se ha propuesto como medio para este fin el suministro local de alimentos. Sin embargo, cambiar las cadenas de suministro globales también podría llevar a sistemas alimentario sostenibles. Debido a que la mayoría de los sistemas alimentarios actuales tienen una dimensión internacional y es probable que permanezcan conectados, de una forma u otra, con otros sistemas alimentarios en todo el mundo, es necesario encontrar soluciones a problemas como la explotación o la degradación ambiental. Sin embargo, los enfoques actuales, como la certificación Fairtrade, a menudo solo dan como resultado un cambio gradual, y no está claro cómo se podría transformar el sistema actual para hacerlo sostenible.

Al abordar este desafío y las lagunas existentes en materia de investigación, este estudio examina las prácticas emergentes de las pequeñas empresas alimentarias intermedias, que actúan entre productores agrícolas y consumidores, y que pueden tener el potencial de promover la sostenibilidad en el suministro internacional de alimentos. Esta tesis, que incluye una revisión sistemática de la literatura sobre la transformación de los sistemas alimentarios (Estudio#1), adopta una metodología de investigación de la sostenibilidad transformacional, que está orientada a encontrar soluciones, tiene como objetivo integrar conocimiento relacionado al sistema, al objetivo y a la transformación y se caracteriza por una práctica de investigación transdisciplinaria. Este estudio conceptualiza los desafíos del suministro internacional de alimentos e investiga empíricamente enfoques de soluciones empresariales para abordar estos desafíos (Estudio#2). Se llevaron a cabo dos proyectos de investigación transdisciplinarios con pequeñas empresas de café de Alemania, México y los EE.UU. para examinar cómo se podrían implementar estos enfoques (Estudio#3, Estudio#4, Informes de taller 1+2).

Esta tesis muestra que los desafíos en las cadenas de suministro de alimentos internacionales pueden entenderse como efectos negativos de largas distancias geográficas e interpersonales. También identifica cinco enfoques de soluciones empresariales especificados por doce principios de diseño orientados a la sostenibilidad para así minimizar estos efectos negativos. Crear proximidad interpersonal entre los actores de la cadena de suministro, es decir, relaciones sólidas basadas en el conocimiento y el cuidado, parece ser un factor clave para promover la sostenibilidad en el suministro internacional de alimentos. Los resultados también sugieren que al construir ese tipo de relaciones fuertes y así cambiar los principios fundamentales del comercio internacional (por ejemplo, anteponer las relaciones entre personas a las ganancias), las pequeñas empresas podrían ser actores clave en la transformación de los sistemas alimentarios. Los hallazgos también destacan la importancia de la colaboración con empresas similares en redes locales, en las que se

puedan compartir y difundir nuevas prácticas comerciales sostenibles. Las colaboraciones transdisciplinarias que involucren tanto a investigadores como a pequeñas empresas alimentarias, podrían dar como resultado soluciones innovadoras y, en última instancia, una transformación de los sistemas alimentarios.

Aunque las pequeñas empresas investigadas en esta tesis ya están muy comprometidas con la sostenibilidad, esta tesis tiene importantes hallazgos para los investigadores y profesionales, incluidos los empresarios individuales, que tienen como objetivo promover la sostenibilidad en el suministro internacional de alimentos.

1 Introduction

1.1 Research context: Sustainability transformations of food systems

Food systems are supposed to deliver sufficient nutritious food to the world's population to ensure a healthy life on a healthy planet. These systems have been described as heterogeneous and complex adaptive, and they interact with biogeophysical and human environments (Ericksen, 2008; Folke et al., 2016; Ingram, 2011). These systems are composed of food system activities (production, processing, distribution, consumption, waste disposal) that lead to food system outcomes including individual and community food security, social welfare, and environmental security (Eakin, Connors et al., 2017; Ericksen, 2008).

Our contemporary food systems face complex environmental, health, socio-cultural, and economic challenges (Pretty et al., 2011). Consequences of more than a century of intensified and industrialized agriculture and food production include land, soil, and water pollution (Ericksen, 2008), economic inequalities and injustices along global value chains (Clapp, 2015; Lebel et al., 2008), as well as increases in diet-related chronic diseases and obesity (Guyomard et al., 2012). Researchers have recognized the critical role of globalized food trade as a significant driver of these challenges (Krausmann & Langthaler, 2019; Wiedmann & Lenzen, 2018). Although global food trade is not the only driver for unsustainable food systems, there has been a debate surrounding how local or global a food system should be in order to be sustainable (Brunori et al., 2016; Oostindie et al., 2016; Schmitt et al., 2017).

A sustainable food system would fulfil certain criteria for socio-ecological integrity, human and social well-being, livelihood and economic opportunity, and social justice (Eakin, Connors et al., 2017; FAO, 2014; Gibson, 2006). To create such a system, it is necessary to consider the spatial scale, both local and global, but not to conceive of this in terms of *either or* and fall into what has been referred to as the “local trap,” that is, the tendency to assume that the local is desirable and to be preferred (Born & Purcell, 2016). Given the current status of our contemporary food systems, achieving sustainable food systems requires

“deep changes in social norms and values, institutions and behaviours, practices and technologies that together produce the functions (parameters and feedbacks), structure (design), and identity (intent) of food systems” (Weber, Poeggel et al., 2020, 2 drawing on Abson et al., 2017; Meadows, 1999).

In short, what is needed are sustainability transformations.

Sustainability transformations are desirable “radical, non-linear and structural change[s] in complex adaptive systems” (Hölscher et al., 2018, 1, drawing on Feola, 2015; Patterson et al., 2017), such as in food systems. The academic debate about whether this should be called transformations or transitions has developed in recent years in such a way that these

two concepts are now often understood to enrich and complement each other, and both strands in the literature have moved closer together (Geels, 2019; Hölscher et al., 2018; Järnberg et al., 2018; Loorbach et al., 2017). What used to be competing pathways could now become opportunities of co-learning (Luederitz, Abson et al., 2017). That said, in the case of food systems, there seems to be a tendency to prefer the term *transformation* when emphasizing the cultural dimension of food, its social outcomes, and meaning (Béné et al., 2019; Stajcic, 2013; Weber, Poeggel et al., 2020). This finding is supported by a critique of the multi-level perspective, a core concept of transition research (Geels & Kemp, 2000; Geels & Schot, 2007; Markard et al., 2012). Some argue that this perspective would not sufficiently address social aspects of systems change, for example inequality or poverty, or general sustainability outcomes (Feola, 2020; Geels, 2020). These aspects have been identified as crucial for sustainability transformations of food systems, compared for example to energy or mobility systems (Garnett, 2014; van Bers et al., 2016; Weber, Poeggel et al., 2020). It is important to note here, however, that transition research in general has moved beyond its original socio-technical approach and now also recognizes a socio-ecological perspective that acknowledges the role of civil society and grassroots initiatives as an integral part of transitions, and transformations respectively (Loorbach et al., 2017), as is the case for food system transformations (Eakin, Rueda et al., 2017; Weber, Poeggel et al., 2020).

To better understand the complexity of and advance sustainability transformations, scholars have developed several concepts. At different points in this study, I apply the following ones (Table 1):

- Three spheres of transformations by O'Brien and Sygna (2013)
- Leverage points for sustainability by Abson et al. (2017) building on Meadows (1999)
- Enabling approach to transformation by Scoones et al. (2020)

While 'sphere' is used to describe where change can happen, the term 'leverage point' indicates where to intervene to make change happen. In particular, the latter is a systemic approach to transformation, as it focuses on the interdependencies of system elements, drivers, and levels, and their outcomes (Scoones et al., 2020). Enabling approaches, in contrast, emphasize human agency as a central component contributing to transformations by "creating the social attributes – capacities – that empower individuals and communities to take action on their own behalf" (Scoones et al., 2020, p. 67).

What all three concepts have in common is that they emphasize the complementarity and interconnection of the different dimensions and approaches (Scoones et al., 2020), and in this sense, provide useful perspectives to understand the complexity of sustainability challenges in food systems and identify solutions and effective interventions (Fischer & Riechers, 2019; Pereira et al., 2020). For this study, they are particularly useful for discussing the potential of different solution approaches for international food supply in contributing to food systems change.

Table 1. Overview concepts for sustainability transformations applied in this study.

Dimension Concept	1	2	3	Application in this dissertation
Three spheres of transformation (O'Brien & Sygna, 2013)	Practical sphere (behavioral changes; social and technological innovations; institutional reforms)	Political sphere (enabling/disabling conditions; economic, political, legal, social, and cultural systems)	Personal sphere (individual and collective beliefs, values and worldviews)	<i>Used in Study#1 as an analytical framework to categorize actions that transform food systems</i>
Leverage points for sustainability (Abson et al., 2017; Meadows, 1999)	System parameters and feedbacks (modifiable, mechanistic characteristics and their interactions that drive dynamics)	System design (structure of information flows, rules, power, and self-organization)	System intent (norms, values, and goals of a system, and underpinning paradigms)	<i>Used in Study#2 to discuss sustainability-oriented design principles for international food supply</i>
Enabling approach to transformation (Scoones et al., 2020)	(strengthening human agency, values and capacities that are needed for collective action to identify pathways that lead to desired futures)			<i>Used in the overall study by choosing the transformational sustainability research methodology, and in the synthesis to discuss the role of small intermediary businesses in transformations</i>

1.2 Research motivation: Local or global food systems?

One approach which is widely discussed by researchers and practitioners seeking to transform food systems toward sustainability are local food systems, in which local alternative food initiatives and their community networks try to achieve systems change from the bottom up (Blay-Palmer et al., 2016; Kloppenburg et al., 2000; Kneafsey et al., 2008; La Trobe & Acott, 2011). Examples of such initiatives are collective food buying groups (Dedeurwaerdere et al., 2017), community supported agriculture (Hvitsand, 2016), or regional and local food hubs (Berti & Mulligan, 2016), to name a few. Another example for food system transformations are food policy councils, which are composed of a diversity of civil society actors with the objective of creating sustainable food systems through food democracy (Hassanein, 2003; Sieveking, 2019). All these initiatives form part of a whole research cluster on local alternative food movements, which has been identified in the literature review on food system transformations included in this dissertation (Weber, Poeggel et al., 2020). These movements aim at changing food

systems through “creating new spaces for consumers and producers and their communities to learn together” (Weber, Poeggel et al., 2020, p. 5). What they envision are “local, self-reliant and small-scale community systems that enable community well-being, healthy diets, and social justice as forms of food security and food sovereignty” (Weber, Poeggel et al., 2020, p. 8).

The previous paragraph sets out some of the reasons why local food systems can be an important component to transform the overall food system. However, the global dimension will not just disappear as global trade has played a significant role in human history (Pomeranz & Topik, 2017). In addition, there is contradictory evidence that local food supply chains are always “more” sustainable (Duell, 2013; Scharber & Dancs, 2016). For example, in terms of resource efficiency, in particular for water use, global supply chains seem to perform even better than local supply chains (Brunori et al., 2016; Dalin & Rodríguez-Iturbe, 2016).

In addition, considering the local scale alone might not work, local food systems often still have international dimensions. Prominent examples are coffee or cacao, which are globally consumed but only grow under specific climatic conditions, and of which no products with similar properties would be locally available, at least for some parts of the world. For example, a local bakery in Germany that processes mostly locally grown wheat or other grains as their main ingredient might still rely on cacao imports from Peru to make chocolate cookies. Another example could be a local coffee roaster in the U.S., who is strongly embedded in the local food economy but at the same times needs to source the main ingredients, green coffee beans, for example from Ethiopia. In the light of our globalized world, producing and consuming everything exclusively locally does not seem realistic, in particular as long as consumers still demand such products.

Another aspect is that countries depend on each other. Given the complexity of our global food systems, completely substituting an international food supply with local alternatives in one country can lead to tremendous damage in another country, for example, local coffee farmers suddenly losing their income source (Bellows & Hamm, 2001; Eakin, Rueda et al., 2017). Countries sometimes also depend on food imports to ensure food security (Tanumihardjo et al., 2020). To frame it the other way around, international food supply – when designed carefully – can also be an opportunity, and not necessarily a problem driver.

While localizing food has been proposed as one means to advance sustainable food systems (Kalfagianni & Skordili, 2019; La Trobe & Acott, 2011), changing or redesigning international food supply may also lead to that end. Acknowledging that we cannot disintegrate local systems from their international dimensions, it is necessary to find sustainability solutions to address the challenges of international food supply.

1.3 Research gap: Sustainability entrepreneurship for international food supply

International food supply faces particular challenges that reflect the general critique of the global market as a major driver for food system unsustainability. For example, mostly anonymous and disconnected markets (Kneafsey et al., 2008; Krausmann & Langthaler, 2019; Wiskerke, 2009) often go hand in hand with high livelihood risks, unfair payments, externalization of costs, and undignified working environments in food producing or processing regions (Clapp, 2015; Lebel et al., 2008). For example, in coffee supply, only a small percentage of the final price for roasted coffee remains in the countries of coffee growing and is paid to producers (Beshah et al., 2013; Jaffee, 2007, p. 46). These low incomes for coffee farmers are often connected to limited access to healthcare and education as well as lead to increased migration into cities (Samper & Quiñones-Ruiz, 2017). In addition, long-distance transportation can cause significant emissions and pollution (Hua et al., 2018; Prell, 2016). At the end, these complex and sometimes interlinked challenges can be subject to socio-economic inequalities and environmental degradation.

There have been some sustainability efforts in international food supply that aim to address these challenges, for example private certification schemes, such as Fairtrade, direct trade practices (Gerard et al., 2019; see Rathgens et al., 2020 for a review), voluntary corporate socially responsible business strategies, or quality supply chain management (e.g., Touzard et al., 2016). However, these have often focused on incremental improvements that have led to only modest advances toward sustainability (Folinas et al., 2014; Vanderhaegen et al., 2018; Winter et al., 2020) but did not fundamentally change the system (Zerbe, 2014).

There is an increasing body of literature on emergent sustainability innovations of food businesses around the world that aim at advancing sustainable food systems from local to global scales (e.g., Antoni-Komar et al., 2019; Kalfagianni, 2019), including sustainability entrepreneurship, which has been proposed to contribute to creating a sustainable future (Gibbs, 2009).

Sustainability entrepreneurship can be defined as a practice of “finding and implementing innovative solutions to address social, economic and ecological shortcomings” (Schaltegger et al., 2018, p. 5). Similar to sustainability entrepreneurship, *impact entrepreneurship* also seeks to improve the current situation but it emphasizes the impact over the innovative, new-venture creation aspect of entrepreneurship (Markman et al., 2019). Its main motivation is to develop “solutions that collectively address grand challenges to make the world better” (Markman et al., 2019, p. 372). Considering the research context of this dissertation, namely sustainability transformations of food systems, the concept of *transformational (sustainability) entrepreneurship* is also interesting to look at. It might go one step further than sustainability entrepreneurship as it addresses economic and social disparities in society by questioning and changing the

existing underlying economic system that has led to many of these inequalities (Newey, 2018; Ratten & Jones, 2018).

Drawing on these three stands of entrepreneurship, this study focuses on *entrepreneurial solution approaches* to address challenges in international food supply. Distinguishing this from other approaches, such as policy or technological approaches, this study focuses on the role of small business and individual entrepreneurs in developing sustainable business practices to address sustainability challenges in this particular field and transform the international food supply.

Small businesses can trigger innovation for sustainability transformation from the ground up. Small businesses might be more flexible and willing to experiment with promising solution options than for example big market incumbents, governmental or other institutional actors as they are less laden by existing organizational structures. Individual entrepreneurs and small businesses might hesitate less in taking risks when implementing new practices and dealing with uncertainties (Vasconcelos Gomes et al., 2018). “In actively pursuing a transformative role, businesses can simultaneously help shift the market they operate in as well as transform their own business” (Burch et al., 2016). Although the latter aspects, which refers to sustainable business models, might be a central component in businesses contribution to sustainability transformations, is beyond the scope of this study. Entrepreneurial solution approaches rather highlight their ingenuity as well as the small business owner’s and/or entrepreneur’s individual values, their intrinsic motivations and commitment toward sustainability, which has been found to be a crucial factor driving the sustainability actions of small businesses (Westman et al., 2019).

There is increasing evidence of the transformative potential of small businesses in the multilevel governance of climate change and advancing sustainability (Burch et al., 2013; Loorbach & Wijnsman, 2013; Ninomiya & Burch, 2018). However, in the context of food system transformations, the role of the private sector in general, and of small businesses in particular, is still under-researched. Further, most of the research on alternative trade arrangements for international food supply have focused mostly on producer and consumer studies (see Rathgens et al., 2020 for a review). Intermediary food businesses, which act between agricultural producers and consumers, are a rather under-researched supply chain actor and we do not sufficiently understand their role in providing solution options to advance sustainability in and finally transform the international food supply

This dissertation contributes to bridging this gap. Its aim is to gain insights on how entrepreneurial solution approaches, in particular by small intermediary businesses, can advance sustainability in international food supply. In addition, using a transformational research approach, this study aims at real-world changes through exemplary implementations of solution options by small intermediary food businesses to advance sustainability in international food supply. To meet this objective, the research design of this study focuses on the micro-level of small, mostly intermediary food businesses and

their international business practices, such as sourcing or exporting internationally. Adopting a holistic perspective on entrepreneurship and small businesses acknowledges their embeddedness in a local surrounding food system and their networks (Bernardi & Azucar, 2020; Burch et al., 2013; Westman et al., 2019); this dissertation also considers this meso-level of small businesses.

Enhancing our understanding of small (intermediary) businesses in the area of international food supply and their emerging sustainable business practices, may contribute to the development of new practices and general advances in sustainability in international food supply.

1.4 Research questions

Embedded in the research context of sustainability transformations of food systems, this study aims at bridging the gap of an insufficient understanding of the potential of sustainability entrepreneurship and the role of small intermediary businesses to advance sustainability in international food supply. Therefore, I ask the following general research question:

How can entrepreneurial solution approaches for international food supply contribute to sustainability transformations of food systems?

I approached this question by formulating four specific research questions (RQs). First, to embed my research on international supply in the wider context of sustainability transformations of food systems, I first ask:

- RQ1: What does the literature say about food system transformations?

Second, to successfully and sustainably solve a problem or achieve a determined goal, such as sustainable international food supply, different types of knowledge are needed (Brandt et al., 2013; Hirsch Hadorn et al., 2006). They include (i) knowledge on the current situation or problem (system knowledge), (ii) on the desired outcome or envisioned state of a system (target knowledge), and (iii) knowledge on how to get to this envisioned state, that is asking for concrete actions that need to be taken (transformation knowledge). To facilitate the integration of these three types of knowledge, I ask the following three specific research questions accordingly:

- RQ2: What are current challenges of international food supply? (→ system knowledge)
- RQ3: What are entrepreneurial solution approaches to address these challenges? (→ target and transformation knowledge)
- RQ4: How can these solution approaches be implemented? (→ target and transformation knowledge)

The importance of transformation or instructional knowledge has gained attention during the last years (Fazey et al., 2018; Fazey et al., 2020; Wiek & Lang, 2016), because it can

inform actions and capacity building processes needed to contribute to creating transformational change toward sustainability (Caniglia et al., 2021; Scoones et al., 2020). Such action-oriented knowledge is grounded in the general idea of post-normal science (Ravetz & Funtowicz, 1999) and MODE-2 knowledge production (Nowotny et al., 2001), which questions the traditional order of scientists first producing knowledge, which is then applied in practice. Scientists and societal actors rather share responsibility in co-producing knowledge through transdisciplinary collaboration (Lang et al., 2012; Norström et al., 2020). Such transdisciplinary collaboration has the objective of producing socially robust knowledge (Gibbons, 1999; Scholz, 2011) that “stakeholders are able and willing to implement” (Wiek & Lang, 2016, p. 33).

If the results of this study point to the potential of entrepreneurial solution approaches in advancing sustainability in international food supply and in contributing to food system transformations, and if we agree that researchers should form part of this process, too, a follow-up question would be:

- What can transdisciplinary collaborations between research(ers) and small entrepreneurial food businesses look like and how can these collaborations contribute to sustainability transformations of food systems?

1.5 Dissertation structure

To address the research gap described above, I developed a unique research design. In Section 2, I discuss this research design in two steps. First, I introduce the transformational sustainability research methodology by Wiek and Lang (2016) applied in this study and discuss related assumptions. Second, I introduce the two transdisciplinary research projects conducted for the purpose of this study. They consisted of a collaboration with the small-sized entrepreneurial coffee businesses Teikei Coffee (in Germany), and Considerate Coffee Company and Catando Ando Coffee Roasters (in the U.S. and Mexico, respectively). In Section 3, I will give an overview how each of the studies (four research articles + two workshop reports) provides an answer to the four specific research questions. Section 4 is the results section of this dissertation and includes the four research articles. Three of these are the versions as published by the journals. In Section 5, I synthesize the findings in three steps. First, I focus on the research gap related to sustainability entrepreneurship and the role of small intermediary businesses for sustainable international food supply and then to the context of food system transformations. Second, I reflect on the methodology with a focus on the transdisciplinary and solution-orientated research practice in my work and describe limitations of this dissertation. Third, I discuss scientific and practical contributions of my work. In Section 6, the dissertation ends with a summary of the main findings and addresses possibilities for future research. The structure of this dissertation is presented in Figure 1.

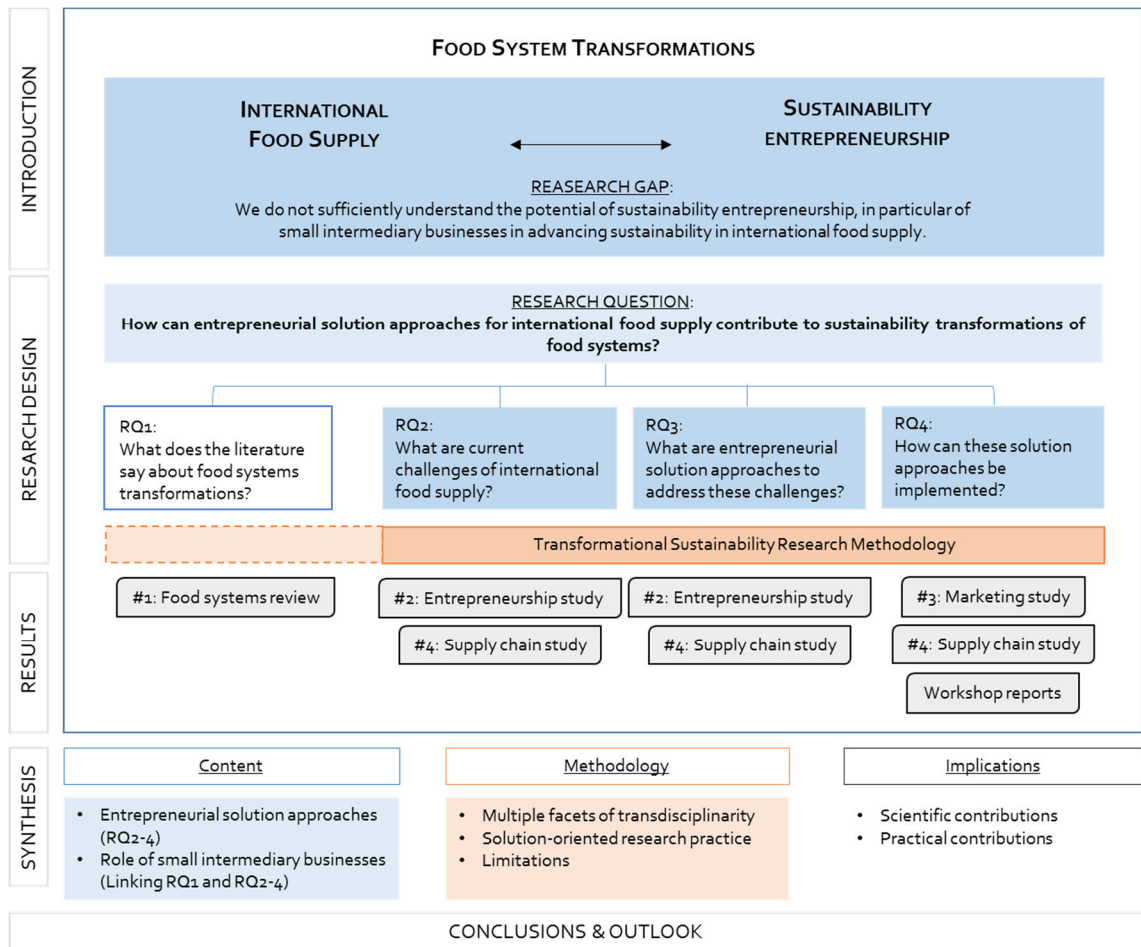


Figure 1. Structure of the dissertation (RQ: specific research questions; #1-4: included research articles).

2 Research Design

The aim of this section is to discuss the research design developed to address the research gap and research questions described above. In the first part (Section 2.1), I introduce the transformational sustainability research methodology adopted in this study and discuss related assumptions. In the second part (Section 2.2), I introduce the two transdisciplinary research projects included in this study.

2.1 Methodology

2.1.1 Transformational Sustainability Research

To answer the general and the specific research questions outlined above, I adopted the transformational sustainability research methodology (Wiek & Lang, 2016) because this methodology integrates both the generation of the three knowledge types and transdisciplinarity as a key research practice. The methodology informed the research process and study development as well as the methods selected for data collection and analysis.

Sustainability research in general addresses the complex problem of (un)sustainable development rooted in two major global trends: rapidly increasing human well-being and at the same time rapidly increasing environmental degradation with all its socio-economic consequences (Clark & Harley, 2020; Kates, 2011; Shrivastava et al., 2020). The *transformational* strand of sustainability research is strongly solution-orientated compared to the *analytical* strand (Wiek & Lang, 2016). While the analytical strand aims at providing evidence for the causes of a problem, the transformational strand focuses on providing evidence for sustainability solutions, that is envisioned states of a system, and on developing potential solution options for a given problem (Miller et al., 2014; Sarewitz et al., 2012). Being solution-oriented can help to determine the direction of and stirring the transformation toward sustainability (Göpel, 2016; Wiek et al., 2012). This idea is also reflected in the term *transformational* from a linguistics perspective (Box 1).

However, solution-orientated research does not exclude the importance of understanding the underlying problem. On the contrary, only by integrating system, target and transformation knowledge, can complex sustainability challenges be addressed. Transdisciplinary collaboration as the second key characteristic of this research methodology can furthermore support the social robustness and practical application or implementation of knowledge.

Box 1. Linguistics and different types of research linked to transformation

Approaching the term from a language perspective, *transformation-al* means “able to produce a big change or improvement in a situation” (Cambridge Dictionary, 2021a). The German equivalent would be ‘transformatorisch’. Hence, transformational research identifies solution options that – if applied – can lead to change [or improvement] (Wiek, 2015). This furthermore corresponds to the enabling approach for transformations (Scoones et al., 2020). *Transformati-ve* in contrast means “causes [or produces] a major change [or improvement] to something or someone” (Cambridge Dictionary, 2021b). The German equivalent would be ‘transformativ’. Transformative research hence provokes change and subsequently analyses the process to generate knowledge (Schneidewind et al., 2016; WGBU, 2011). This goes often hand in hand with the first. Transformation research, as a third “player” in here, analyzes change as such, change constitutes the research object, but the researcher does not necessarily intervene.

Over time, several approaches for integrating science and practice have been developed, for example, participatory action research, transition management, or transdisciplinary case studies, among others, each of them having a specific focus (Brinkmann et al., 2015). Central points that guided the transdisciplinary research practice of this study include:

- Both researchers and nonacademic stakeholders influence and take part in three phases of an ideal-typical transdisciplinary research process, starting with identifying the problem and formulating the research question, followed by generating new knowledge, and lastly reintegrating this knowledge into both scientific and societal practice (Lang et al., 2012).
- During the knowledge production phase, scientists select methods independently of disciplines but according to the asked questions and needs (Wehrden et al., 2017). This emphasizes interdisciplinary collaboration as an integral part of transdisciplinary research. Method selection can reflect the potential of varying degrees of stakeholder involvement in different stages of the transdisciplinary process (Schneider & Buser, 2018).
- Real-world experimentation can be a key method for transdisciplinary research. It aims at developing, testing, and implementing potential solution options. Experiments can help to produce evidence about how to foster change toward sustainability (Bergmann et al., 2021; Schöpke et al., 2018). However, they are unpredictable in its nature and researchers need to give up control. Such experiments can be pilot or demonstration projects, pioneer examples, niche experiments, or innovations (Caniglia et al., 2017; Luederitz, Schöpke et al., 2017; Schöpke et al., 2018).
- Transdisciplinary research does not only focus on the generated outputs but also sees benefits in non-tangible outcomes of the process itself, such as capacity building and mutual learning (Caniglia et al., 2021; Pereira et al., 2020; Scoones et al., 2020)

2.1.2 Assumptions

In this study, I adopted the philosophical perspective of pragmatism, which conceives knowledge-building as a social and reflexive process including active and experiential elements (e.g., Farjoun et al., 2015; Popa et al., 2015). Pragmatism acknowledges that the entire spectrum of philosophical approaches, from objectivist to subjectivist epistemology, and from realism to relativism ontology, should be used to answer a question and tackle the problem behind it (Farjoun et al., 2015; Legg & Hookway, 2020). From a pragmatist ontology perspective, “agency and societal structures co-constitute each other” (Caniglia et al., 2021, p. 95 drawing on Dewey, 1929). From a pragmatist epistemology perspective, acceptable knowledge is what helps to solve the problem.

In particular for transdisciplinary research, this means that criteria of scientific credibility and legitimacy are not context-independent but are jointly defined in a process of problem-solving by researchers and practitioners (Popa et al., 2015). In such processes, “participants are led to question and jointly reframe their values and understandings” (Popa et al., 2015, p. 48) – including the researcher. As a result, co-produced knowledge can reflect various value systems in an integrated way (Caniglia et al., 2021). Evidence-based and systematic approaches can guide researchers in such knowledge production processes (Wiek, 2015).

Adopting this perspective had several implications for this study. First, it influenced the entire research process of being open to what will emerge instead of being tied exclusively to pre-defined questions. Since from a pragmatist perspective, “methodological choices are not made in a hypothetical value-neutral and theory-neutral environment but are informed by a critical deliberative process based on evolving values and understandings” (Popa et al., 2015, p. 54), specific research questions sometimes rather evolved during the process based on evolving understandings of a certain problem, in this case the unsustainability of international food supply chains.

Second, it influenced the spectrum of research methods I used for data collection and analysis. I used a mixed-methods approach combining quantitative methods (e.g., hierarchical cluster analysis, intervention study) with qualitative methods (e.g., semi-structured interviews, text analysis, participatory vision- and strategy building workshops). For an overview of selected methods see Table 3 (Section 3, p. 21).

Third, it influenced the spectrum of roles taken by me as a researcher (Wittmayer & Schöpke, 2014), which differed during this study. They ranged from a reflective researcher, who analyzes from an outside perspective, to a process facilitator, to a change agent, who seeks to motivate and empower project partners. The role of a reflexive researcher was continuously present during this PhD project also because solution-oriented sustainability research is value-laden and has a clear normative orientation on intervention and change (e.g. aiming at social justice), which needs to be made explicit (e.g., Fazey et al., 2018; Horcea-Milcu et al., 2019; Knaggård et al., 2018; Nagatsu et al., 2020; van der Hel, 2018).

2.2 Transdisciplinary research projects

To explore sustainable solution options for international food supply, I carried out two transdisciplinary research projects (Table 2). The first project was conducted at Leuphana University in Lüneburg, Germany, in collaboration with the International Community-Supported Agriculture (I-CSA) Teikei Coffee from Hamburg, Germany. The second project was conducted during my research stay at Arizona State University (ASU) in Tempe, AZ, in collaboration with the small cold brewing coffee business Considerate Coffee Company from Phoenix, AZ, and the local coffee roaster Catando Ando Coffee Roasters from Xalapa, Mexico.

Both projects involved cases of small intermediary food businesses that (i) strive for sustainability and (ii) conduct international activities, such as sourcing and/or selling food products internationally. The two cases represent ideal cases that open a spectrum of sustainability solution options to address challenges of international coffee supply. Final case selection was based on a set of criteria including aligning the topic and research question, region, existing stakeholder contacts, existing evidence, available expertise, temporal resources (Schneider & Buser, 2018; Wiek, 2018), and interpersonal relationships.

Table 2. Overview of transdisciplinary research projects.

	Teikei Coffee	Considerate Coffee & Catando Ando
Business location	Hamburg, Germany	Phoenix, AZ Xalapa, Veracruz, Mexico
Business type	International Community-Supported Agriculture (I-CSA) for coffee	Cold brewing coffee business Local coffee roaster and café
Time period	Nov. 2017 – Sep. 2020 (34 months)	Sep. 2018 – Nov. 2019 (15 months)
Objective	Connecting (coffee) consumers to producers in I-CSA schemes	Developing and piloting a sustainable (coffee) supply and value chain
Transdisciplinary research activities	<ul style="list-style-type: none"> Scoping and trust building (creating a local consumer community in Lüneburg, Germany; developing a toolbox to amplify impact; formative evaluation of the collaboration) Co-designing and co-conducting a marketing intervention study 	<ul style="list-style-type: none"> Analyzing current supply chains Co-developing a vision and strategy of a joint sustainable supply chain Piloting the implementation of the strategy Conducting a training workshop with other coffee businesses to amplify impact
Scientific outputs	<ul style="list-style-type: none"> Study#3: Marketing study This dissertation (synthesis) 	<ul style="list-style-type: none"> Study#4: Supply chain study This dissertation (synthesis)
Societal/ Real-world outputs	<ul style="list-style-type: none"> Coffee consumer community in Lüneburg Preliminary toolbox Adopted marketing study results 	<ul style="list-style-type: none"> Workshop reports 1+2 (Appendix A1) Pilot for sustainable coffee supply and value chain Local coffee network in Arizona

2.2.1 *Teikei Coffee*

Case description: “Founded in 2016, Teikei Coffee applies the local concept of community supported agriculture (CSA) [(*German*: Solidarische Landwirtschaft)] to the international level and is one of a few international CSAs (Rommel, 2019; Weber, Wiek et al., 2020). The company facilitates a short supply chain from coffee farmers in Mexico, an exporter, a sailboat cargo shipping company to ensure environmental-friendly large distance transportation, to a roaster in Germany and in Switzerland, and final consumers in Germany and Switzerland. [Final consumers are individual households, often organized in local purchasing groups (*German*: Verbrauchsgemeinschaften).] Consumers can become members and pay up-front, (ideally) pre-financing the next year of coffee production and receive a share of the harvest in exchange. The intention is to equally distribute risks between producers and consumers (Bloemmen et al., 2015). All supply chain actors negotiate prices together to ensure meeting everyone’s needs. [...] In 2018, Teikei Coffee handled 11 tonnes of green coffee beans with two full-time employees and 15 volunteers” (Weber et al., 2021, p. 3). Teikei Coffee is a pioneering company that aims at building direct relationships from consumers to producers across large geographical and relational distances¹.

Transdisciplinary collaboration: The overall objective of the collaboration with Teikei Coffee was to look deeper into one of the previously identified entrepreneurial solution approaches for sustainable international food supply (Study#2, entrepreneurship study), namely the International Community-Supported Agriculture (I-CSA) (Rommel, 2019; Weber, Wiek et al., 2020). As is characteristic for transdisciplinary processes, more specific research questions emerged collaboratively during the process (Lang et al., 2012).

The collaboration with Teikei Coffee lasted almost three years, from November 2017 until September 2020. It started with a rather long pre-phase of scoping and trust building, which accounted for more than two thirds of the entire collaboration. This pre-phase was mostly driven by Teikei Coffee’s interest in establishing local coffee consumer communities in Germany. Informal conversations, weekly team meetings, a kick-off event, and follow-up meetings with the new established consumer community characterized the collaboration, which allowed me to get a deeper understanding and first-hands insights on the principles and practices of a coffee I-CSA, and even more important, to build a trustful relationship with the Teikei Coffee team. During the collaboration, I took personal reflection notes in an ethnographic research diary and meeting notes as well as collecting data during a formative evaluation with the Teikei Coffee team. Details on

¹ While geographical distance describes the physical distance between actors in a supply chain, relational distance describes the lack of strong relationships among those actors determined by knowledge and care about each other (Weber, Wiek et al. 2020).

the methods and results of this evaluation can be found in the Appendix (A3). General insights from this phase are included in reflections on the methodology (Section 5.2.1).

During this pre-phase, the question and need emerged regarding how to connect (Teikei) coffee consumers in Germany to (Teikei) coffee producers in Mexico, that is, creating relational proximity. After some refinements and narrowing-down to a question that also reflected a scientific interest, this initial question then turned into the design of an experiential marketing intervention study (Study#3). Together, we co-conducted this study at a sustainability fair in Germany (Figure 2), in which we tested the effectiveness of three experiential marketing interventions in connecting Teikei coffee consumers to Teikei Coffee producers and fostering sustainable consumption behavior. Details on the methods and results of this study are published in the marketing study (Study#3). After data analysis, the results and potential implications of the study were presented to the Teikei Coffee team.



Figure 2. Conducting the marketing intervention study together with Teikei Coffee at a sustainability fair in Hannover, Germany (2019/09/21).

2.2.2 Considerate Coffee & Catando Ando

Case description: “Considerate Coffee Company (Considerate Coffee) was a processing company for bottled cold-brew coffee in Phoenix, Arizona. Founded in 2017 and run by two co-owners, the company brewed Fairtrade certified coffee sourced from Ethiopia and roasted in Phoenix, and distributed the coffee drink mostly to restaurants and hotels” (Weber & Wiek, 2021, p. 2). Their supply chain structure was rather long and complex characterized by anonymity and disconnection. In 2018, they processed 544 kilograms roasted coffee to 8,706 liters cold-brew only using recycled material for their brewing equipment. From the coffee grounds, they produced coffee bio-char, a potential organic fertilizer. The company closed in 2020 due to private reasons. Catando Ando Coffee Roasters (Catando Ando) is a local coffee business with a roaster and coffee shop in Xalapa, Mexico. The business was founded in 2014 and is run by two co-owners and four employees. They roast green coffee sourced from local farmers and distribute it in Mexico. In 2018, they distributed around 1.5 tonnes of roasted coffee. Due to the short

supply chain structure, Catando Ando is in frequent direct exchange with coffee pickers, farmers, and a dry processor. As national prices do not often value the quality of their coffee, Catando Ando was looking for an export market in Taiwan. The transdisciplinary research team initiated a collaboration on a joint coffee supply chain between Considerate Coffee and Catando Ando, which became subject to the supply chain study (Study#4).

Transdisciplinary collaboration: The overall objective of the transdisciplinary collaboration with Considerate Coffee & Catando Ando was to explore the process of how small intermediary coffee businesses can induce sustainable practices across their supply and value chains, to what extent this is possible, and to determine the conditions that enable such efforts.

The study was mostly conducted at the School of Sustainability, ASU, in Tempe, AZ. From September 2018 until November 2019, we collaborated on co-designing and piloting a joint sustainable coffee supply between the two, hence, between a coffee importer and its customers in the U.S. and a coffee roaster and its suppliers in Mexico (Figure 3). Details on the methods and results are published in the supply chain study (Study#4).

To share and discuss and validate preliminary findings and start building a coffee network across Arizona, together we hosted a roundtable discussion with stakeholders from other coffee businesses and representatives from the city administration and from a local food economy network (Workshop report 1, Appendix A1.1). At the end of the collaboration, we organized a practical training workshop for small coffee businesses in the Phoenix area. With this workshop, we aimed at transferring the findings from our demonstration project of a sustainable coffee supply chain to other local coffee businesses and facilitated the adoption of sustainable sourcing practices (Workshop report 2, Appendix A1.2).



Figure 3. Vision building workshop with Considerate Coffee and Catando Ando at ASU in Tempe, AZ (2018/11/08).

3 Study Overview

In this section, I outline how the four research articles included in this dissertation (Study#1-4) contribute to the four specific research-questions (see Figure 1). At the end of this section, I provide a summary table of the four research articles including each study's main findings and scientific contributions, among others (Table 3).

To answer **RQ1** (*What does the literature say about food system transformations?*), hence, to explore the overall research context of this dissertation, together with my colleague and six other co-authors from different backgrounds, I did a systematic literature review (Study#1).

Study#1 (Food systems review)	<p>What are the ingredients for food systems change towards sustainability? — Insights from the literature</p> <p>H. Weber, K. Poeggel, H. Eakin, D. Fischer, D.J. Lang, H. von Wehrden, A. Wiek</p> <p><i>Environmental Research Letters</i> (2020) 15(11):113001</p>
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The objective of this review was to structure current literature that deals with food systems, transformations or transitions, and sustainability. A methodological approach of combining a hierarchical cluster analysis with a subsequent text analysis was developed to gain insights on the different conceptualizations of transformations and transitions that are discussed in the literature food systems change toward sustainability. The analysis identified the problems of contemporary food systems, the envisioned sustainable food systems, and proposed actions to get there. Parts of the results are included in the introduction section of this dissertation. The review also revealed several departure points for further research, including the need for conducting more empirical research in each of the identified clusters, to emphasize the socio-cultural dimension of food system transformations and the potential role of sustainable business innovations in contributing to them.

To answer **RQ2** (*What are current challenges of international food supply?*), in the entrepreneurship study (Study#2) co-authored with my two supervisors, I first reviewed the literature and identified several sustainability challenges that are related to international food supply and structured them according to two types of large distances, namely geographical and relational distances.

Study#2 (Entrepreneurship study)	<p>Sustainability entrepreneurship to address large distances in international food supply</p> <p>H. Weber, A. Wiek, D.J. Lang</p> <p><i>Business Strategy & Development</i> (2020) 3(3):318-331</p>
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Geographical distance is the physical distance between supply chain actors; relational distance describes the lack of strong relationships among those actors determined by knowledge and care about each other. For example, green-house gas emissions due to long-distance food transportation (→ geographical distance) contribute to climate change (Eyring et al., 2010). Anonymous markets (→ relational distance) often lead to unfair food prices that are unable to provide sufficient livelihoods to people along the supply chain (Swinnen & Maertens, 2007). The transdisciplinary supply chain study further below (Study#4) also contributes to answer RQ2 for particular challenges related to coffee supply and value chains of two small intermediary coffee businesses.

The entrepreneurship study (Study#2), therefore, is also a key piece in answering **RQ3** (*What are entrepreneurial solution approaches to address these challenges?*). To address RQ3, I reviewed the literature on, and examined empirical cases of, innovative practices of small entrepreneurial businesses, which either mitigate the negative effects of or directly overcome or reduce large distances. I summarized and discussed these practices as a set of twelve sustainability-oriented design principles, for example, “use renewable energy sources for long-distance transport” (p. 321) or “create community supported economy schemes” (p. 325). Second, I clustered these principles into five entrepreneurial solution approaches, which is another key finding of this study, and illustrated each approach and its hybrids with empirical cases from the real world. Empirical cases were described based on document reviews and semi-structured interviews with food entrepreneurs. By providing a concrete example of an envisioned sustainable coffee supply chain and illustrating how principles could be adapted to it, the supply chain study (Study#4) also contributes to answering RQ3. Furthermore, the findings of the entrepreneurship study (Study#2) informed the two subsequent studies (Study#3, Study#4) and the involved transdisciplinary collaborations with the small coffee businesses Teikei Coffee, Considerate Coffee Company, and Catando Ando Coffee Roasters.

Teikei Coffee is an example of an International Community-Supported Agriculture (I-CSA), one of the approaches identified in the entrepreneurship study (Study#2) that shows a high transformative potential. It aims at overcoming relational distance, that is creating relational proximity, through connecting spatially distant consumers and producers, among others (Rommel, 2019; Weber, Wiek et al., 2020). During the transdisciplinary work with Teikei Coffee, the question arose of how small intermediary businesses, like Teikei Coffee, could create such relational proximity, in particular how their coffee consumers in Germany can be connected to their coffee producers in Mexico. This question turned into the design of a marketing intervention study (Study#3).

Hence, the marketing study asks for direct implementations, thereby providing an answer to **RQ4** (*How can these solution approaches be implemented?*). The study examined the effects of three experiential marketing interventions for the coffee I-CSA Teikei Coffee on connecting coffee consumers to producers (operationalized as consumer’s perceived relational proximity) as well as their effect on fostering sustainable consumption behavior

(operationalized as consumers' willingness-to-pay, their attitude regarding sustainable consumption, their intention to become a paying member of the I-CSA, and their product evaluation).

Study#3 (Marketing study)	<p>Connecting Consumers to Producers to Foster Sustainable Consumption in International Coffee Supply — A Marketing Intervention Study</p> <p>H. Weber, D.D. Loschelder, D.J. Lang, A. Wiek</p> <p><i>Journal of Marketing Management</i> (2021) 61(2):1-20</p>
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Drawing on literature on sustainability marketing (Kemper & Ballantine, 2019), experiential marketing (Dettori, 2019; Schmitt, 1999), and coffee drinking experience (Eiseman & Jonsson, 2019) the three experiential marketing interventions included: listening to a presentation, watching a promotion video, and mindfully tasting a cup of coffee. Results and its implications can be found in section 4.3. (Study#3).

The transdisciplinary collaboration with Considerate Coffee and Catando Ando Coffee and the resulting supply chain study (Study#4) also provides an answer to RQ4. The objective of this qualitative case study was to provide transformation or instructional knowledge on how these businesses can adopt (some of) the previously identified principles (Study#2) to address the negative effects of large distances in their coffee supply chains.

Study#4 (Supply chain study)	<p>Cooperating with 'Open Cards' — The Role of Small Intermediary Businesses in Realizing Sustainable International Coffee Supply</p> <p>H. Weber, A. Wiek</p> <p><i>Frontiers in Sustainable Food Systems</i> (2021) 5, Article 663716:303.</p>
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Through field visits and stakeholder workshops, the project (i) assessed the sustainability challenges of the current supply and value chains (thereby also contributing to RQ2); (ii) developed a collaborative vision of a joint sustainable coffee supply chain (thereby also contributing to RQ3); (iii) build a strategy to achieve this vision (thereby contributing to RQ4), and (iv) piloted the implementation of the strategy. In the study, we first explored the extent to which small intermediary coffee businesses can induce sustainable practices across their supply and value chains, and second reviewed the conditions conducive to such efforts.

Two additional workshops related to this project aimed at transferring the findings from the specific case to a wider context. In the first workshop, a roundtable discussion, preliminary findings were presented and discussed with a broader audience, including other coffee businesses and representatives from the city administration and a local food economy network (Workshop report 1). The second workshop was a practical training for small coffee businesses on sustainable coffee sourcing practices (Workshop report 2).

The purpose of both workshops was threefold: first, to discuss and validate co-produced knowledge and facilitate its societal reintegration; second, to amplify the impact of sustainable business practices in international food supply through “transferring” (Lam et al., 2020) from one exemplary case to almost ten businesses, and third, to strengthen the local network of coffee businesses in Arizona.

Workshop report 1	Sustainable International Coffee and Cacao Supply: Insights from a Stakeholder Roundtable Discussion H. Weber, A. Wiek <i>Sustainable Food Economy Lab, School of Sustainability, Arizona State University, Tempe, AZ (available online).</i>
Workshop report 2	Sustainable Coffee Sourcing: A Workshop for Small Coffee Businesses in Arizona H. Weber, A. Wiek <i>Sustainable Food Economy Lab, School of Sustainability, Arizona State University, Tempe, AZ (available online).</i>

The transdisciplinary research process related to the supply chain study (Study#4) also revealed insights on the role of transdisciplinary research(ers) in contributing to transformations. To respond to the follow-up question posed earlier (***How can transdisciplinary collaborations between research(ers) and entrepreneurial food businesses look and how can these collaborations contribute to sustainability transformations of food systems?***), I reflect on my experiences with transdisciplinary collaborations with Teikei Coffee and Considerate Coffee & Catando Ando in the synthesis section of this dissertation (Section 5.2).

Table 3. Overview of the four included research articles (Study#1-4).

Short title	Food systems review (Study#1)	Entrepreneurship study (Study#2)	Marketing study (Study#3)	Supply chain study (Study#4)
Title	What are the ingredients for food systems change towards sustainability? — Insights from the literature	Sustainability entrepreneurship to address large distances in international food supply	Connecting Consumers to Producers to Foster Sustainable Consumption in International Coffee Supply — A Marketing Intervention Study	Cooperating with ‘Open Cards’ — The Role of Small Intermediary Businesses in Realizing Sustainable International Coffee Supply
Authors	H. Weber, K. Poeggel, H. Eakin, D. Fischer, D.J. Lang, H. von Wehrden, A. Wiek	H. Weber, A. Wiek, D.J. Lang	H. Weber, D.D. Loschelder, D.J. Lang, A. Wiek	H. Weber, A. Wiek
Status in Journal	<i>published in</i> Environmental Research Letters	<i>published in</i> Business Strategy and Development	<i>published in</i> Journal of Marketing Management	<i>Published in</i> Frontiers in Sustainable Food Systems
Research question	What are distinct clusters of research on deep change processes toward sustainability in food systems and how do they conceptualize these processes?	What are entrepreneurial approaches to address large distances in international food supply to foster sustainability?	What are experiential marketing tools to connect consumers with producers and thereby foster sustainable consumption behavior?	How can small-sized intermediary businesses realize sustainable coffee supply? What are enabling factors?
Addresses RQ(s)	1	2, 3	4	2, 3, 4
Research approach	Literature review	Conceptual and empirical work	Empirical work (quantitative case study)	Empirical work (qualitative case study)
Methods	Systematic literature review, hierarchical cluster analysis, text analysis	Literature and practice review, semi-structured interviews (n=8)	Intervention study (n=136), one-way ANOVA with four conditions	Site visits, interviews, participatory vision and strategy building workshops and data analysis, photo documentation, online-meetings, reflections

Key findings	<ul style="list-style-type: none"> • Five distinct approaches for transforming food systems toward sustainability, i.e., Alternative food movements, Sustainable diets, Sustainable agriculture, Healthy and diverse societies, and Food as commons. • Approaches include identified problems, vision of a sustainable food system, and proposed actions to transform food systems toward sustainability, spatial scale, and organizational level • Four cross-cutting key components for change: political action, close collaboration, education, deep value shift • Transformation covers food specifics (more than transition but does not exclude it) 	<ul style="list-style-type: none"> • Challenges in international food supply can be conceptualized as negative effects of large geographical and relational distances • Mitigating negative effects of or overcoming large distances revealed five entrepreneurial solution approaches (Reducing GHG Emission, Reducing Food Miles, Certification, Direct International Trade, International Community Supported Agriculture) • Twelve sustainability-oriented design principles specify approaches (see also Appendix A2) • Eight empirical cases illustrate approaches and its hybrid forms 	<ul style="list-style-type: none"> • Compared to reading a leaflet, experiential marketing interventions can, to a certain extent, connect consumers to producers (create relational proximity) and foster sustainable consumption behavior • Compared to reading a leaflet, affective experiences (watching a promotion video) creates relational proximity and cognitive experiences (listening to a team member presentation) increases consumers' willingness-to-pay • Relational proximity can be a mediator for sustainable consumption behavior 	<ul style="list-style-type: none"> • Deep insights into a specific case (problem analysis of, vision of, strategy, implementation of a sustainable coffee supply chain) • Five conditions to implement sustainable coffee supply: problem recognition, transparency, trust, solidarity, and economic resilience through collaboration (→cooperating with 'open cards')
Implications for this dissertation	<ul style="list-style-type: none"> • Defined key concepts for my research (see Section 1.1) • Identified further research needs (role of business innovation, lack of empirical studies) 	<ul style="list-style-type: none"> • Informed transdisciplinary work • Identified I-CSA as one promising approach to look deeper into (Study#3) • Provides general design principles to be adopted by businesses (Study#4) 	<ul style="list-style-type: none"> • Used one approach (I-CSA) and empirical example (Teikei Coffee) identified in Study#2 as a case for this marketing intervention study 	<ul style="list-style-type: none"> • Adopts sustainability principles identified in Study#2 to the specific case of two collaborating intermediary coffee businesses
Scientific contributions	<ul style="list-style-type: none"> • Structures existing literature • Solution-oriented review provides actions for change (<i>how</i> to transform) • Contributes to transformation/ transition discourse in food systems context 	<ul style="list-style-type: none"> • Contributes to theory and practice of sustainability entrepreneurship in the area of international food supply • Provides empirical evidence for options to realize sustainable international food supply 	<ul style="list-style-type: none"> • Provides empirical evidence for the role of experiential marketing in fostering sustainability • Contributes to understanding of relational proximity in the context of coffee supply 	<ul style="list-style-type: none"> • Complements conditions for sustainable coffee supply offered in the literature

4 Results

This section entails the four research articles as part of this cumulative dissertation. Three of them are the versions as published by the journals.

4.1 What are the ingredients for food systems change towards sustainability? – Insights from the literature

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Henrik von Wehrden, Arnim Wiek

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What are the ingredients for food systems change towards sustainability?—Insights from the literature

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Keywords: systematic literature review, mixed-method, transition, transformation

Supplementary material for this article is available [online](#)

Abstract

Many detrimental effects on the environment, economy, and society are associated with the structure and practices of food systems around the world. While there is increasing agreement on the need for substantive change in food systems towards sustainability, divergent perspectives exist on what the appropriate points of intervention and strategies to achieve such change are. Change in diets and nutrition, the importance of social food movements, and sustainable farming practices are all disparately featured in the literature; yet, there is little effort to compare and integrate these perspectives. This review offers a comprehensive overview of perspectives on food systems change towards sustainability. We discern where there is convergence and assess how the literature reflects emergent theory on sustainability transformation. We analyzed more than 200 peer-reviewed articles employing an approach that combines quantitative and qualitative analysis. First, we performed a semantic hierarchical cluster analysis of the full texts to identify thematic clusters representing different perspectives on sustainability transformations and transitions of food systems. Second, we conducted a qualitative text analysis for representative articles of each cluster to examine how deep changes in the food system are conceptualized. We identified five distinct approaches to food systems change that are currently discussed, i.e. *Alternative food movements*, *Sustainable diets*, *Sustainable agriculture*, *Healthy and diverse societies*, and *Food as commons*. Each approach provides a nuanced perspective on identified sustainability problems, envisioned sustainable food systems, and proposed actions to change food systems towards sustainability. The findings offer guidance for researchers and practitioners working on food systems change towards sustainability.

1. Introduction

Contemporary food systems, responsible for feeding the world's population, face major challenges that require profound structural changes to become sustainable. The global food system can be characterized as complex and heterogeneous, integrating social, environmental, economic, and technological processes from production to consumption and waste disposal (Ericksen 2008, Eakin *et al* 2017a). Over a century of intensification and industrialization of activities in the global food system have resulted in pollution of land, soil and water (Ericksen 2008), an increase of diet-related chronic diseases and obesity

(Guyomard *et al* 2012), as well as economic disparities and injustices across the value chain (Lebel *et al* 2008, Clapp 2015). Simultaneously, with global population growth and urbanization, dietary patterns are changing, and the demand for resource-intensive food is growing (Garnett 2014). 'Deep' or structural changes are needed to address these challenges and achieve food system sustainability (IASSTD 2009, Foley *et al* 2011, WBGU 2011, Eakin *et al* 2017b). According to Eakin *et al* (2017a p 759), a sustainable food system 'achieves and maintains food security under uncertain and dynamic social-ecological conditions, through respecting and supporting the context-specific cultural values and decision-processes that

give food social meaning, and the integrity of the social-ecological processes necessary for food provisioning today and for future generations.' While the need for deep changes in social values, resource use, production and consumption practices, as well as socio-economic relations is widely recognized, there is less agreement among scientists and practitioners on *how* such changes should be achieved.

We refer to deep or structural change as 'systemic societal change' (Meadows 1999, Abson *et al* 2017, Hölscher *et al* 2018) in social norms and values, institutions and behaviours, practices and technologies that together produce the functions (parameters and feedbacks), structure (design), and identity (intent) of food systems. Deep change is often coined as 'transformation' or 'transition', yet in many cases without a specific theory of change (Feola 2015, Rau *et al* 2018). In recent years, more pronounced conceptualizations have evolved (Hölscher *et al* 2018), relevant to deep change in food systems (Stirling 2011, Hinrichs 2014, Eakin *et al* 2017b). We use deep change as an umbrella term for transition/transformation.

Transitions are defined as long-term, significant changes of essential social-technical systems. They are often conceptualized from the multi-level perspective (Geels and Kemp 2000) and describe change as a process traversing governance levels, namely, niche (micro), regime (meso), and landscape (macro). Transitions start from niche innovations of products, technologies, infrastructures, or practices that, if successful, reach the regime level and replace or successfully compete with mainstream products, technologies, infrastructures, or practices (Geels and Schot 2007). Transition processes are often managed or governed according to a specific goal (Rotmans *et al* 2001). Transformations, on the other hand, describe significant changes of essential social-technical systems that disrupt the current state. Transformations to sustainability include substantive change in personal (beliefs, attitudes, values), practical (behaviors, technologies, institutional reforms) and political (system-level dynamics and structures) spheres of human interaction with the environment (O'Brien and Sygna 2013). Transformations are often based on social and technological innovation, consider different types of knowledge (Scoones *et al* 2018) and see a strong role for social movements (e.g. Slow Food) and civil society (e.g. food policy councils). Transformations are less *managed*, rather emerge and involve grassroots action or exogenous forcing (Stirling 2015). Both conceptualizations of deep change are relevant in advancing food systems sustainability.

This study draws on research on deep sustainability change processes (transitions or transformations) of e.g. energy and mobility systems (Markard *et al* 2012, El Bilali 2018) with research on sustainable food systems and practices, e.g. organic farming (Delonge *et al* 2016), agroecology (de Molina 2013), or local food systems (Connelly *et al* 2011).

The goal is to identify convergence in approaches towards food systems change, and to assess how the literature reflects emergent theory on sustainability transformation. We offer food systems researchers and practitioners a comprehensive view of perspectives on food systems change towards sustainability by analyzing, mapping, and synthesizing these diverse bodies of literature. The study addresses the following research questions:

- *What are distinct clusters of research on deep change processes (transitions/transformations) towards sustainability in food systems?*
- *How do the identified clusters conceptualize deep change processes towards sustainability in food systems?*

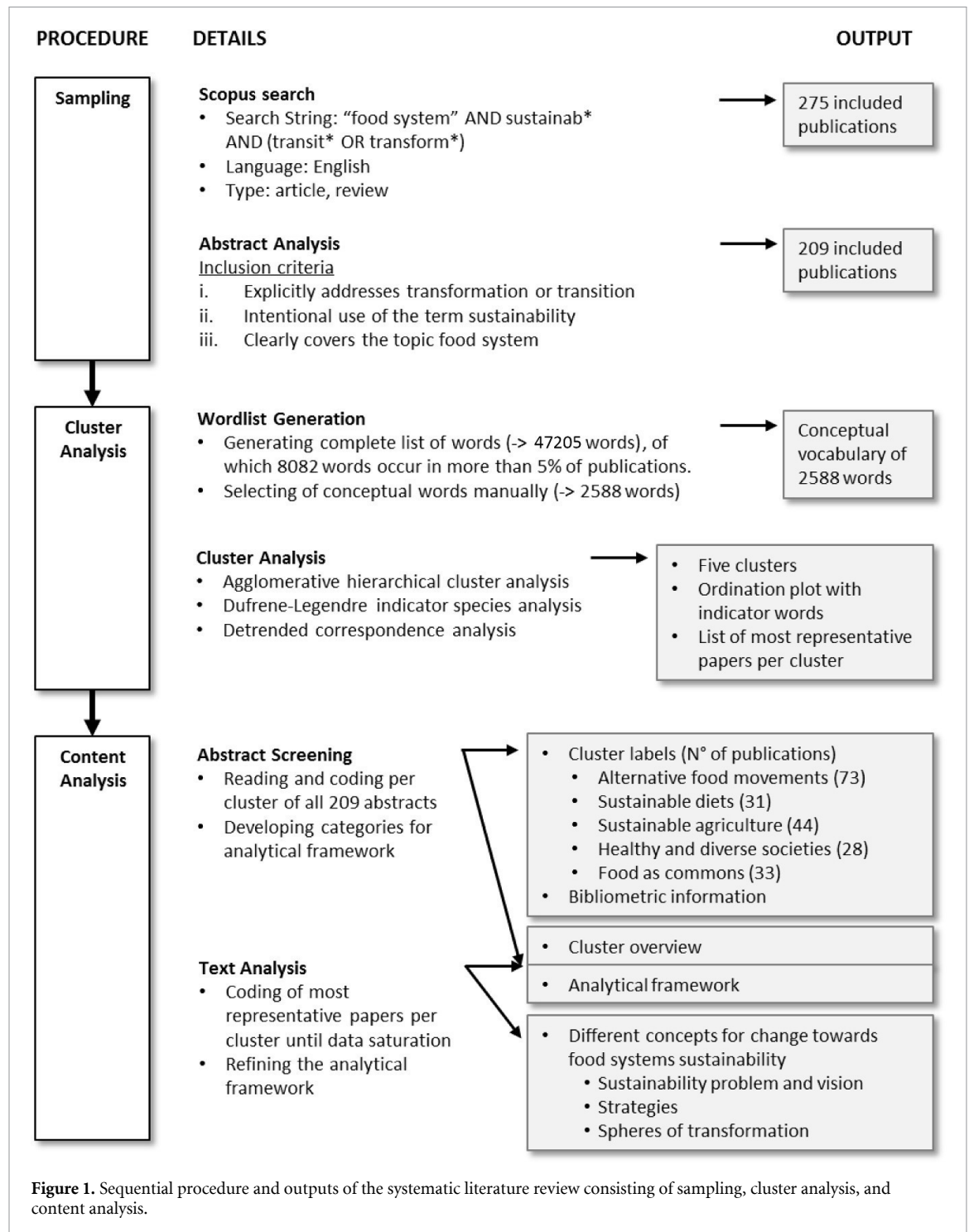
We analyzed 209 peer-reviewed articles using a two-step approach starting with a statistical semantic full-text analysis to group the literature into clusters. In a next step, we conducted a qualitative text analysis for representative articles of each cluster to examine how change processes towards sustainability in food systems are conceptualized. For this purpose, we developed an analytical framework (see section 3). Our findings offer an initial map to systematically navigate a vibrant interdisciplinary field, supporting researchers and practitioners in changing the current food systems towards sustainability and enable discussion, reflection and learning across different perspectives.

2. Research design

This study combines cluster analysis and content analysis of the existing literature (figure 1). We adopt procedures of systematic literature reviews (Luederitz *et al* 2016, Fischer *et al* 2017) and semantic full-text analyses to cluster the body of literature (Abson *et al* 2014, Ives *et al* 2017, Rathgens *et al* 2019).

2.1. Sampling

In a first step, we used the SCOPUS database to identify peer-reviewed articles on transformation or transition of food systems towards sustainability, including the nutrition transition as deep change process in the past (Popkin 2003). We applied the search string: 'food system' AND sustainab* AND (transit* OR transform*) including all articles with the search terms appearing in title, abstract, or keywords. The concept of a 'food system' is relatively new in the academic literature (Sobal *et al* 1998, Ericksen 2008); nevertheless, given our focus on system-wide and deep change, we concentrate on literature that explicitly adopts a system perspective rather than focusing narrowly on system components or disciplinary domains. We searched for articles in English, resulting in a sample of 275, published between 1981 and 2018. In the second step, we assessed each article for



relevance (based on the abstract) and only included articles that met all of the following criteria: (1) the article explicitly addresses ‘transformation’ or ‘transition’ as deep change in the context of food systems, or addresses the nutrition transition; (2) the article does not just mention sustainability but provides details, e.g. climate adaptation/mitigation, organic production, or agroecology; (3) the article focuses on food systems or its distinct features (Ericksen 2008) such as food system activities (production, consumption) and outcomes (food security, social welfare, environmental integrity), or diets.

2.2. Cluster analysis

With the reduced set of 209 publications (see supplementary material A1, available online at stacks.iop.org/ERL/15/113001/mmedia), we conducted a semantic full-text cluster analysis (Abson *et al* 2014), which groups publications into different clusters based on co-abundance of words. The rationale is that publications addressing a topic in similar ways would use similar vocabulary. Our analysis first lists the occurrence of all words in a publication (a). It then groups these publications into clusters based on co-abundance of conceptual

vocabulary (b, c). Finally, it identifies representative words (indicator words) for each cluster (d) and locates these words in a two-dimensional space (e). This yields our final word cloud (figure 4). Statistical analyses were carried out using R 3.5.2.

- (a) **Digitizing PDFs and metadata:** To digitize the publications, R imports the 209 PDF files to the working directory and creates a matrix (packages: 'snowballC', 'tm', function: 'readPDF') for further processing. The matrix consists of 209 rows that correspond to the number of articles and 20 columns. One column corresponds to the full text of the publication, the others are filled in a next step with general and bibliometric metadata of each publication (e.g. Title, Year, Journal, Citation per Year, DOI, etc) obtained from the SCOPUS database (code: 'scopus.R', available in SI).
- (b) **Wordlist generation:** To identify the list of conceptual vocabulary, we first generated a complete list of abundant words within the 209 analyzed publications (47 205 words), of which 8082 words appeared in more than 5% of the publications. Of these, we manually removed all abstract nouns, e.g. pronouns, articles, numbers, authors' and geographical names, compass directions, units for time, lengths, and mass, as well as individual words with no association to food systems or change processes, or words from which no clear meaning could be inferred. For example, 'collect' was retained for its description of a harvesting technique. In this way we retained a list of 'conceptual vocabulary' of 2588 words (see supplementary material A3(a)).
- (c) **Building clusters:** Based on the co-abundance of these words, we performed an agglomerative hierarchical cluster analysis using Ward's method (function: 'hclust', package: 'mclust'). This method clusters 'single elements (i.e. publications) into aggregates of two elements based on the minimum variance criterion. [in order to] minimize within-group variance and maximize dissimilarities between groups' (Abson *et al* 2014, p 31). In our case, within-group variance was low if a similar set of words was used in the articles. Similarly, the dissimilarities between groups were high when each community had a distinct set of vocabulary. Our analysis identified five distinct clusters, with an agglomerative coefficient of 0.83.
- (d) **Finding representative words for each cluster:** To identify words that characterize the differences between the clusters, we used a Dufrene Legend Indicator Species Analysis, which is commonly used in biology to determine habitats and compare them through representative species. The analysis yielded

representative words (indicator words), for each cluster (Abson *et al* 2014). The five most significant indicator words per cluster are shown in figure 4 and an extended list of 25 indicator words per cluster can be found in the supplementary material (A4). Based on the indicator words, we were able to identify a hierarchy of publications according to their representativeness of the cluster. The most representative articles most frequently include the most significant indicator words.

- (e) **Identifying the thematic landscape:** We used a detrended correspondence analysis to locate the indicator words according to their relative distance to each other (figure 4). Relative distances were calculated by R. In a final step, we inductively identified gradients' labels in the thematic landscape of publications. They derived from indicator words and were refined in the content analysis (table 2).

2.3. Content analysis

To establish a meaningful label and yield a general topical overview of each cluster, we first screened the abstracts of the 209 publications and composed headings for clusters. While screening the abstracts, we coded general information of each publication to provide an overview of the field (sections 4.1.1 and 4.1.2). General information included discipline, country of first author's affiliation, country of study, type of article (conceptual, empirical, review) and methods applied. We also coded which term was used to describe deep change (transition or transformation) and the underlying theory of change. The results of abstract screening informed the development of categories for our analytical framework (see section 3), in particular the three change characteristics. The framework was developed in an iterative process, starting from theoretical concepts and refining categories during data analysis.

We conducted qualitative analyses of full texts according to Kuckartz (2014) to gain a thorough understanding of the five obtained clusters (sections 4.1.2 and 4.2). We used the analytical framework as a coding scheme, which was further refined throughout the analysis. According to the hierarchy of publications identified with the Indicator Species Analysis (section 2.2, step d), we coded the full texts of the *representative* articles of each cluster (see supplementary material A2). We used data saturation as a criterion for determining the number of articles to be reviewed in full text (Fusch and Ness 2015, Saunders *et al* 2018). Data saturation is reached when no additional new information has been attained. Studying the representative articles until data saturation reduced the number of articles for in-depth review while providing sufficient information for thorough understanding. Two coders independently coded the selected article according to thematic categories and guiding

questions. The results were discussed to create a consensually coded (Schmidt 2004) overview of each cluster.

3. Analytical framework

We developed categories for the analytical framework both inductively and deductively in an iterative process (table 1). Inductive categories emerged from the cluster analysis (figure 4) and an initial familiarization with the literature through abstract screening. These categories include three characteristics of change: (1) the geographical scale where change happens; (2) the organizational level where change happens; (3) the adopted theory of change (El Bilali 2018). Change characteristics were also informed by other studies (Cash *et al* 2006, Eakin *et al* 2017a). Deductive categories were derived from theoretical concepts by Wiek and Lang (2016) and O'Brien and Sygna (2013), which were subsequently refined during the full-text analysis.

Wiek & Lang's (2016) theoretical framework served to answer the research question, *how do the identified clusters conceptualize deep change processes towards sustainability of food systems?* The framework offers analytical categories for all key elements of the change process. This allows for a systematic and transparent analysis of the respective article: what sustainability problem(s) in the current food system it addresses; what sustainable food system it envisions; and what actions it proposes to realize the change from the current problematic situation to the envisioned sustainable system (figure 2).

In order to categorize identified actions and explore the transformative potential of the approaches, we added the theoretical concept of three spheres of transformation by O'Brien and Sygna (2013). The three spheres of transformation are: the *practical* sphere includes changes of behavior, in policies, and technological solutions; the *political* sphere focuses on creating new institutional structures, which are in turn needed to support transformations in the practical sphere; and the *personal* sphere refers to changes of individual and collective beliefs, values, worldviews, and paradigms that shape society and its structures. According to O'Brien and Sygna (2013), the greatest potential for generating deep change lies in the interactions across the spheres. Therefore, we highlight such interactions.

4. Results

4.1. Clusters of research on food systems change towards sustainability

4.1.1. Bibliometric information.

The sample indicates that research on food system sustainability change is a relatively young field. The first articles are a critical analysis of the role of organic farms by David Vail in 1981 and a system analysis of

the world food system by Donella Meadows in 1985. Most articles have been published in the last four years (figure 3). This is due to the overall increase in research publications, the relatively recent conceptualization of 'food systems' as a unit of analysis (Sobal *et al* 1998, Ericksen 2008), and the fact that the concept of sustainability/sustainable development became more prominent in academia after the Brundtland report in 1987.

The abstract screening has shown that studies of our sample originate in diverse research fields, i.e. Geography, Sociology, Ecological Economics, Environmental Studies, Nutrition and Health, Agriculture, Law and Politics. Most research was conducted in North America and Europe. Of the few studies carried out in the Global South, researchers mostly came from the Global North. This is partly related to the selection of English language publications and international journals. Older articles revolve around classical sustainability concepts, such as the three pillars concept, while recent publications mostly use the Sustainable Development Goals.

4.1.2. Cluster overview

Within the research field of food systems change towards sustainability, we identified five clusters, which are represented by indicator words displayed in the thematic landscape of the sample (figure 4). We inductively identified the two labels 'local-global' and 'institutional-individual', which represent gradients within the thematic landscape of the sample. How clusters link to the gradients is described in table 2.

The cluster *Alternative food movements* includes a diversity of alternative food initiatives (indicator word: *movement*) and networks creating new *spaces* for consumers and producers and their communities (*citizen*) to learn together and for political action. The *Sustainable diets* cluster engages with the nutrition transition (*diseases, cancer, kcal*) aiming at sustainable diets and individuals' health. The *Sustainable agriculture* cluster focuses on sustainable farming practices (*input*), and food sovereignty via agroecology as practice and movement (*paradigm*). The cluster *Healthy and diverse societies* engages with healthy populations and rural developments globally in the context of the economy (*market, trend, work*), with an emphasis on the Global South. The cluster *Food as commons* focuses on North American food systems arguing for a shift in mindsets to acknowledge food as a collective good. Indicator words in this cluster especially underline the individual level of food system organization (*worker, owner, garden*). The distribution of clusters in figure 4 shows that *Sustainable diets* is detached from the others whereas the remaining four clusters overlap with each other, with the cluster *Alternative food movements* showing most overlaps.

From a methods perspective, in the cluster *Alternative food movements*, researchers mostly conducted case studies to understand different initiatives around

Table 1. Final analytical framework (category with guiding questions, examples, and respective theoretical concept) for content analysis.

Theoretical concept	Thematic category with guiding question	Examples	Results in
Change characteristics	Geographical Scale: Which geographical scale(s) of food systems are addressed? How do these scales interact with/effect each other?	<i>local, regional, national, global, urban, rural</i>	Cluster overview (section 4.1.2)
	Organizational Level: Which organizational level of food systems is addressed? How do these levels interact with/effect each other?	<i>institutional, community, individual</i>	
	Theory of Change: How do authors approach change? What theory of change do they refer to?	<i>jargon used, explicit understanding of transformation, multi-level-perspective, practice theory, technological innovation</i>	
	(P) Sustainability Problems: What major overall sustainability challenges are mentioned beyond the food system?	<i>pollution, climate change, social injustice, biodiversity loss, deforestation, overpopulation, urbanization</i>	
	(P) Food System Sustainability Problems: What challenges related to food systems are mentioned?	<i>health problems, degraded soils, power imbalance along food supply chains, waste, malnutrition, hunger</i>	
	(P,V) Sustainability Concept: What concept of sustainability do the authors adopt?	<i>three pillars concept, SDGs/MDGs, planetary boundaries, resilience</i>	
	(V) Sustainability Vision Outcomes: What are envisioned outcomes of sustainable food systems?	<i>community well-being, local and resilient food systems, healthy and diverse diets, food citizenship, food security, food sovereignty, empowered small-scale farmers</i>	
	(V) Sustainability Vision Activities: What are the envisioned activities of a sustainable food systems?	<i>localization, alternative production and consumption practices, participatory decision making, collaboration, agroecology, organic farming</i>	
	(S) Subject of Change: What is being changed?	<i>policy, diets, consumption and production practices, power structures</i>	
	(S) Change Agent(s): Who transforms the food system?	<i>policy makers, farmers, consumers, researchers, educators, social movements</i>	
Wiek and Lang (2016) (P) = Problem, (V) = Vision, (S) = Strategy	(S) Proposed Actions and Expected Results: What are the actions proposed to realize the change? What are the expected results from these actions?	<i>local practices shape global policies, global diet shift, policy and governance measures, creation of diverse networks, grassroots mobilization</i>	In-depth study of clusters (section 4.2.)
O'Brien and Sygna (2013)	Spheres of Transformation: In which sphere(s) does change happen?	<i>practical, political, personal sphere</i>	

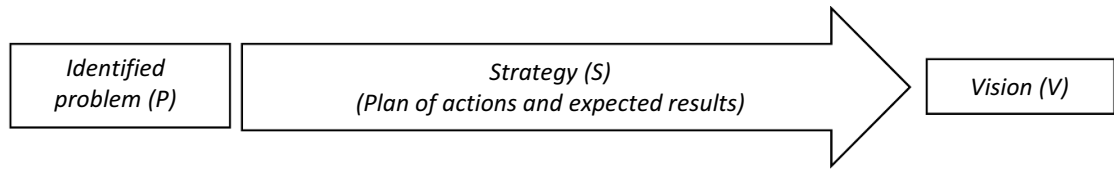


Figure 2. Theoretical framework for sustainability transformations (Wiek and Lang 2016).

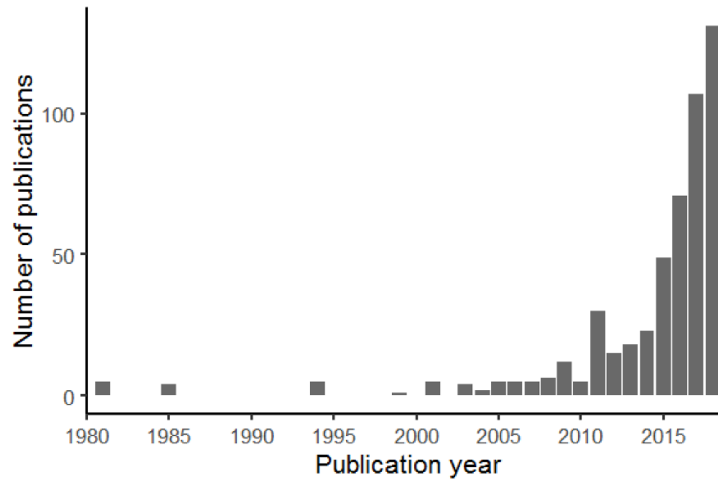


Figure 3. Number of SCOPUS registered publications on food systems, sustainability, and transformation/transition (n = 209) per cluster per year from 1980 to 2018.

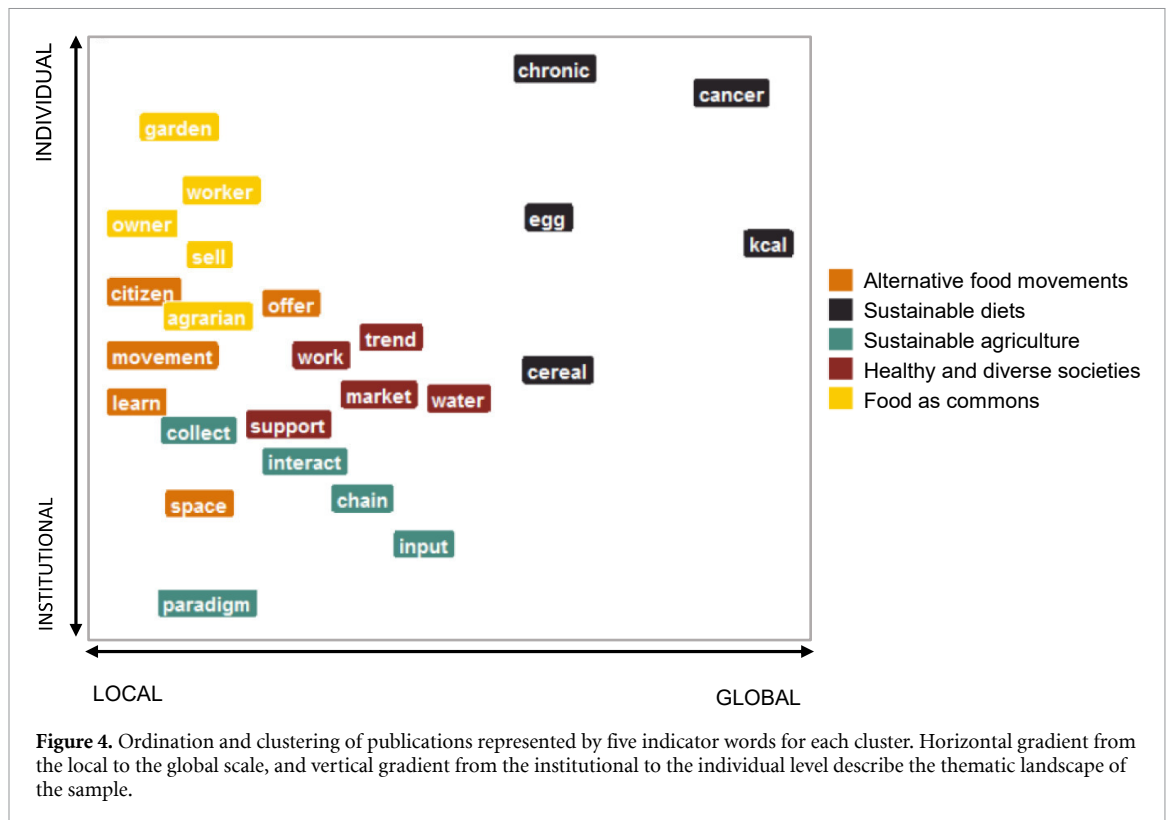
Table 2. Descriptions of each cluster according to the identified gradients.

Cluster	Local—Global	Individual—Institutional
Alternative food movements	Local: Global networks of local or regional initiatives to change the food system.	Community: Changing community initiatives and networks
Sustainable diets	Global: Transformational activities at global level to mainstream sustainable diets and integrate into policy.	Individual: Changing consumption patterns of individuals to achieve positive public health outcomes.
Sustainable agriculture	Local—Global: Locally developed sustainable practices that support agroecology movement and global application.	Institutional: Changing public education and policy programs
Healthy and diverse societies	Local (rural)—Global: Focusing on local and rural activities in the Global South in collaboration with international organizations to engage against negative effects of globalized food markets.	Community: Changing rural communities
Food as commons	Local: Mostly locally directed activities that increase democratic understanding of food.	Individual: Changing the meaning of food from a commodity to a common good, requiring a shift in mind-sets of individuals.

sustainable food systems. *Sustainable diets* primarily uses population level analyses, i.e. life cycle assessments (LCA) and modelling of future (diet) scenarios, whereas in *Sustainable agriculture*, researchers concentrate on framework development and transdisciplinary research, in particular at the farm and community level. *Healthy and diverse societies* includes both LCAs and conceptual works. Authors in *Food as commons* utilize reviews and case studies.

For all clusters, we found that researchers use the terms ‘transformation’ and ‘transition’ often

interchangeably to describe any kind of change process in food systems. We could identify patterns when the terms were used intentionally. When authors apply a theory of change for ‘transition’, they likely apply the multi-level perspective. This is the case for clusters *Alternative food movements* and *Sustainable agriculture*. In *Alternative food movements*, change is framed equally often as ‘transition’ or ‘transformation’. Authors in *Sustainable diets* refer more often to nutrition transition and tend to focus on technical innovations primarily using the term ‘transition’. In



the cluster *Healthy and diverse societies*, most authors provide no definition of change when they use both terms interchangeably. Authors in the cluster *Food as commons* tend to make more use of the term ‘transformation’ without referring to a specific theory. Beyond these observed tendencies, we could not identify a clear pattern regarding a specific application of transformation/transition.

4.2. Different concepts for deep change towards food systems sustainability

4.2.1. Alternative food movements

4.2.1.1. Sustainability problem and vision

The cluster *Alternative food movements* addresses unequal concentration of wealth and power in the dominant (global corporate) food regime and associated externalities, such as environmental problems and food insecurity as well as marginalized local food practices. The vision for sustainability highlights local, self-reliant and small-scale community food systems that enable community well-being, healthy diets, and social justice as forms of food security and food sovereignty. Equally important for sustainability are environmentally friendly practices, e.g. organic farming, and consumption practices that are environmentally conscious and collective, e.g. food co-ops.

4.2.1.2. Strategies

Grassroots organizations promote and engage consumers and small-scale producers in adopting non-conventional practices of producing and consuming food (e.g. Community Supported

Agriculture—CSAs, farmer markets, community gardens). Together with educational institutions, these organizations actively create networks, knowledge platforms, and educational offerings on alternative food practices and its critical reflection, as well as social exchange beyond food. They collaborate with primarily local public sector authorities to advocate and lobby for policy changes that support and foster local, self-reliant and small-scale community food systems. Strategies of this cluster are explicated as actions and expected results (table 3).

4.2.1.3. Spheres of transformation

- **Practical:** alternative consumption patterns, new food practices, and formation of networks
- **Political:** scale-appropriate and food-informed policies that empower citizen-consumers
- **Personal:** values of connection to nature, food, community, and solidarity
- **Interactions:** educational programs, collaboration between consumers and governments, food networks and platforms for knowledge sharing

4.2.2. Sustainable diets

4.2.2.1. Sustainability problem and vision

Nutrition transitions are the focus of this cluster. The authors problematize the global shift towards Westernized ways of eating, and the severe effects for public health and the environment, such as malnutrition and hunger, GHG emissions, land and air pollution and biodiversity loss. The general vision is to achieve sustainable diets, characterized by adequate nutrient

Table 3. Actions and expected results of cluster *Alternative food movements*.

Actions	Expected Results
Local communities and grassroots initiatives create niches and challenge the status quo (Brunori <i>et al</i> 2012, Blay-Palmer <i>et al</i> 2016) via e.g. pushing the boundaries of ‘grey areas’ of regulations (Laforge <i>et al</i> 2017)	Reflexivity and changed attitudes; lived alternative values and changed behaviors of consumers (Levkoe 2011, Brunori <i>et al</i> 2012, Blay-Palmer <i>et al</i> 2016, Laforge <i>et al</i> 2017)
Local communities and grassroots initiatives create alternative and diverse food networks and platforms for sharing knowledge and developing skills for alternative food practices (Brunori <i>et al</i> 2012, Blay-Palmer <i>et al</i> 2016, Laforge <i>et al</i> 2017)	Shared knowledge; consumer education; empowered consumers; strengthened communities (Brunori <i>et al</i> 2012, Blay-Palmer <i>et al</i> 2016) and collective subjectivities (Levkoe 2011)
Educational institutions enable students to reconnect to food (Rojas <i>et al</i> 2011), alternative food initiatives critically analyze their own practices (Levkoe 2011)	Reflexive, critical, and practical consumerism, food literacy; and food citizenship (Rojas <i>et al</i> 2011)
Citizen (consumers) collaborate with governments in new political spaces (Levkoe 2011, Brunori <i>et al</i> 2012, Laforge <i>et al</i> 2017)	New forms of governance with participatory decision-making processes (Levkoe 2011, Brunori <i>et al</i> 2012, Laforge <i>et al</i> 2017); scale-appropriate and food-informed policies, as well as funding opportunities (Blay-Palmer <i>et al</i> 2016)

intake, less resource consumption, and low waste; leading to food security, healthy individuals, and low environmental impacts of food systems (Food and Agriculture Organization 2012).

4.2.2.2. Strategies

In order to ensure food security, research identifies consumption patterns towards healthy, increasingly plant-based diets (Guyomard *et al* 2012). Research facilitates technological innovation, e.g. novel foods and practices for sustainable intensification, to advance sustainable food systems. Policy makers, consumers, researchers, and the food industry collaborate to create consistent policies addressing change in consumption for healthy diets. Policy makers develop a global agenda, such as the Sustainable Development Goals (SDGs), influencing national policies that address the universal problem of malnutrition, food insecurity and environmental externalities. Strategies in this cluster are explicated as actions and expected results (table 4).

4.2.2.3. Spheres of transformation

- **Practical:** emphasizing technological innovation and individual consumption choices; as well as creating policies to change consumption behavior

4.2.3. Sustainable agriculture

4.2.3.1. Sustainability problem and vision

The sustainability challenges addressed in this cluster are high-input farming and locked-in farming systems leading to food insecurity, malnutrition and environmental degradation. To address these socio-ecological externalities, this cluster envisions long-term food sovereignty through resilient and

diverse farming systems, e.g. agroecological practices, diversified farming, conservation agriculture, and smart agricultural technologies, as well as social mobilization addressing socio-political aspects of the food system. This approach results in an increase in (agro-)biodiversity, achieving socio-economic benefits for farmers and sustainable diets for consumers.

4.2.3.2. Strategies

Central actors are policy makers and institutions that create regulations to support the adoption of low-input agricultural practices drawing on local knowledge such as agroecology, biodiversity-based farming, smart agricultural technologies, crop diversification, and conservation agriculture. Researchers and farmers collaborate to provide evidence for agroecological practices, including the preservation of traditional knowledge, and to facilitate the institutionalization of agroecology. Social movements advocate for shifting power from the agro-industry to farmers, social movements and small-scale actors to facilitate more independent collaboration. Strategies of this cluster are explicated as actions and expected results (table 5).

4.2.3.3. Spheres of transformation

- **Practical:** creating networks for communication and collaborations; policies supporting agroecological and organic and diversified farming practices
- **Political:** mainstreaming such alternative farming practices, especially agroecology, in political programs, research agendas, and higher education through establishing new institutions
- **Interactions:** intensive collaboration between political actors, farmers, researchers and grassroots initiatives

Table 4. Actions and expected results of cluster *Sustainable diets*.

Actions	Expected Results
Researchers conduct (quantitative) studies on nutrition, dietary externalities, health and environmental effects, and potential of alternative diet scenarios, e.g. via LCA assessments (Guyomard <i>et al</i> 2012, Rööös <i>et al</i> 2017, Chaudhary <i>et al</i> 2018, Lindgren <i>et al</i> 2018)	Evidence for policy-makers as a condition/base to change policies (Guyomard <i>et al</i> 2012, Rööös <i>et al</i> 2017, Chaudhary <i>et al</i> 2018)
Researchers, farmers, and industry invest resources in new technologies and innovations around novel food and sustainable intensification (Rööös <i>et al</i> 2017, Lindgren <i>et al</i> 2018)	Improved farming techniques and more efficient infrastructures, as well as more sustainable food items (Lindgren <i>et al</i> 2018)
Policy makers engage the food industry, retailers and producers in policy development (Rööös <i>et al</i> 2017, Lindgren <i>et al</i> 2018)	Consistent policies along the entire supply chain, e.g. economic and fiscal incentives, subsidies, eco taxes, and eco-labelling facilitating sustainable diets (Guyomard <i>et al</i> 2012, Rööös <i>et al</i> 2017, Lindgren <i>et al</i> 2018)
Transnational food collaborations develop guidelines for promoting sustainable diets (Lindgren <i>et al</i> 2018)	Adapted national/local policies and programs (Lindgren <i>et al</i> 2018); consumer awareness for healthy and sustainable diet patterns, consumption choices and waste management (Guyomard <i>et al</i> 2012, Lindgren <i>et al</i> 2018)

Table 5. Actions and expected results of cluster *Sustainable agriculture*.

Actions	Expected Results
Networking and collaborating of all actors (NGOs, civil society, farmers, researchers, policy makers, etc) as social movement (Sanderson Bellamy and Ioris 2017, Migliorini <i>et al</i> 2018)	Changed power and governance structures in and infrastructure of food systems to overcome human-nature disconnectedness (Sanderson Bellamy and Ioris 2017, El Bilali 2018), preserved traditional knowledge.
Farmers experiment with agroecology and alternative agricultural practices based on traditional knowledge and technological innovations and share knowledge (Voisin <i>et al</i> 2014, Sanderson Bellamy and Ioris 2017, Therond <i>et al</i> 2017)	Actionable knowledge (Voisin <i>et al</i> 2014, Therond <i>et al</i> 2017) and evidence for the success of agroecological farming practices (El Bilali 2018)
Researching and teaching in close collaboration with farmers (Voisin <i>et al</i> 2014, Miles <i>et al</i> 2017, Migliorini <i>et al</i> 2018)	Improved understanding of agroecological and organic farming practices (Migliorini <i>et al</i> 2018); preserved traditional knowledge, mobilizing and training of actors (Voisin <i>et al</i> 2014) and technical innovation (Therond <i>et al</i> 2017)
Political institutions collaborate with researchers, farmers, and grassroots initiatives to create policy frameworks and new institutions based on evidence provided by researchers and others (Voisin <i>et al</i> 2014, Miles <i>et al</i> 2017, Sanderson Bellamy and Ioris 2017, Migliorini <i>et al</i> 2018)	Institutionalization of agroecology and diversified organic, efficient farming practices (Therond <i>et al</i> 2017), environmental regulations, adapted academic funding systems and research agendas (Miles <i>et al</i> 2017, Therond <i>et al</i> 2017)

4.2.4. Healthy and diverse societies

4.2.4.1. Sustainability problem and vision

Counteracting economic growth paradigms and the resulting nutrition transition, this cluster envisions a regenerative natural and socially just system, as well as reliable and nutritious food supplies leading to healthy population with diversified diets, especially acknowledging rural areas and socio-economic development in the Global South. Central in this cluster is the acknowledgement of cultural diversity as ‘a globe of villages’ (Dahlberg 1994, p 172) and achieving food sovereignty that is not solely based on a

Western perspective of sustainable food production. This would support and empower small- to medium-sized farms to define their own futures and to produce nutritious, biodiverse, and traditional food.

4.2.4.2. Strategies

Potential actions include the acknowledgement and sharing of indigenous knowledge and traditional farming practices, as well as innovation and the active involvement of peasants. Authors advocate for international negotiations to strengthen the influence of local and rural producers and authorities in

Table 6. Actions and expected results of cluster *Healthy and diverse societies*.

Actions	Expected Results
Policy makers acknowledge and promote traditional, indigenous, and local knowledge, as well as sustainable innovation in food systems (Ambalam 2014, van Vliet <i>et al</i> 2015, Rijsberman 2017)	Diversified farming practices as well as diverse and healthy diets (Ambalam 2014, van Vliet <i>et al</i> 2015, Hammond Wagner <i>et al</i> 2016), conserved indigenous and traditional food systems (Rijsberman 2017)
International trade negotiations include diverse stakeholder groups in policy making and prioritize local and rural agricultural practices (Ambalam 2014, Anderson 2015)	Empowered small-scale and mid-scale farmers including improved access to markets and democratic participation; rural livelihood opportunities and decentralized food systems (Ambalam 2014, Anderson 2015)
International policy makers prioritize health and diversity criteria and food sovereignty principles instead of criteria of economic growth (Dahlberg 1994, Ambalam 2014, Rijsberman 2017)	Regenerative and healthy food systems (Dahlberg 1994, van Vliet <i>et al</i> 2015, Rijsberman 2017)

Table 7. Actions and expected results of cluster *Food as commons*.

Actions	Expected Results
Different niche actors exemplarily live alternative food values and connect as social movements (Tai 2011, Lengnick <i>et al</i> 2015, Vivero-Pol 2017)	Organic, local and slow food; change of food meaning from commodity to commons, reconnection and well-being (Tai 2011, Vivero-Pol 2017)
(Local) authorities create (local) policy frames supporting the consumers and private sector to actively participate, e.g. in urban gardening (Shannon <i>et al</i> 2015, Ilieva 2017)	Direct democracy, collective, open and transparent decision-making and participatory and reflexive food governance, e.g. food policy councils (Ilieva 2017, Vivero-Pol 2017)
Public interventions/public institutions create targeted programs, such as incentives and taxes and employ staff (Shannon <i>et al</i> 2015, Ilieva 2017, Vivero-Pol 2017)	Sustainable diets, resilient urban food infrastructure and diversified and just food practices (Lengnick <i>et al</i> 2015, Shannon <i>et al</i> 2015, Ilieva 2017)
NGOs advocate for food literacy via communication and knowledge sharing (Jaffe and Gertler 2006, Tai 2011)	Awareness and informed consumers with respect to externalities of food and reskilled consumers to create food citizenship (Tai 2011, Shannon <i>et al</i> 2015)
Academia and strong democratic institutions vote/engage/communicate a new narrative of food as collective good (Ilieva 2017, Vivero-Pol 2017)	Wider awareness of food being a collective good and the importance of community (Vivero-Pol 2017)

face of increased urbanization and the concentration of power. Strategies of this cluster are explicated as actions and expected results (table 6).

4.2.4.3. Spheres of transformation

- **Personal:** focusing on a shift in worldviews creating systems that are not oriented on productivity but on health criteria

4.2.5. Food as commons

4.2.5.1. Sustainability problem and vision

Starting from the problem of commodification of food and industrialization of food systems, this cluster aims to change the underlying guiding market principles and policies. The goal is to steer food systems towards respecting food and health as basic human rights. It envisions food as a collective good embodying culture, human factors, sociality and health—instead of a being a commodity.

4.2.5.2. Strategies.

Actors in food niches and social movements advocate for alternative meaning of food with the potential to change the economic and market-based orientation in society. Local authorities, niche actors, and consumers collaborate in collective, reflexive and participatory decision-making for democratic governance of food systems. NGOs sue for legal measures (litigation) and promote education for food citizenship. Local authorities pass bills to change food programs and nutrition policies, with a potential for wider policy change. Academia, NGOs, and the media support the change process by creating the narrative of food as collective good. Strategies of this cluster are explicated as actions and expected results (table 7).

4.2.5.3. Spheres of transformation

- **Practical:** creating policies and targeted programs to support diversified and just food practices

- **Political:** enabling a power shift from industry and state to collective and participatory decision-making processes.
- **Personal:** aiming at a new value system in which food is acknowledged in its diversity of meanings rather than as commodity.
- **Interactions:** active participation in governance, democratic institution communicating and acting according to paradigm shift.

4.2.6. Synthesis

In summary, the five research clusters present distinct, yet complementary, concepts for transforming food systems towards sustainability with differences regarding identified sustainability problems, envisioned sustainable food systems, and proposed actions to transform food systems towards sustainability (table 8).

5. Discussion

We identified five research clusters that provide insights on how to change food systems towards sustainability. Our results are in line with the work of other scholars (Eakin *et al* 2017a, Béné *et al* 2019). While Eakin and colleagues (2017a) provide a deeper understanding of food systems and sustainability attributes, our work adds a transformation/transition perspective presenting a suite of actions and their expected results to advance change. The outlined approaches suggest key components for change:

- *Political action* to support inclusive and participatory governance structures that enable citizen-consumers, empower (small-scale) farmers and allow for an active role of grassroots movements.
- *Close collaboration* of stakeholders in food systems (consumers, farmers, politics, industry, NGOs, researchers) in new networks and platforms.
- *Education* to support consumers in adopting sustainable consumption behavior, to help farmers in adopting diversified farming practices, and to inform policy makers how to advance healthy diets.
- *A deep value shift* with regard to food and food systems informing actions.

The cluster *Food as commons* represents a North-American perspective emphasizing a paradigm shift in the personal sphere to value food instead of commodifying it, which might change the economic and market-based orientation in society. Many authors in the *Alternative food movements* cluster stem from European countries and seem to aim for a shift towards alternative networks and policies. These tendencies reflect Goodman's (2003) distinction between proposals from European food systems research (incremental improvements/policies)

vs. proposals from North American food systems research (opposition/grassroots movements).

The distinction of spheres by O'Brien and Sygna (2013) demarcates the focus of the transformation approach. According to these authors, a comprehensive approach to transformation emphasizes the interconnectedness of spheres represented here as interactions. *Alternative food movements* and *Food as commons* are the only clusters that comprehensively acknowledge change in all three spheres of transformation. They suggest actions intervening in values and knowledge, policies, and practices, and include elements that facilitate interconnection between these spheres. For example, in *Alternative food movements*, network building and dissemination of knowledge aims at empowering citizen-consumers to engage in participatory decision making (political sphere) and shape scale-appropriate and food-informed policies. This can in turn influence consumption patterns and farming practices (practical sphere). Educational actions enable students to reconnect to food (personal sphere) which may influence individual food practices and policies (practical sphere). In addition, this cluster overlaps with three other clusters (figure 4) indicating that alternative grassroots mobilization and network building are broadly seen as a relevant approach for deep change. At the same time, alternative mobilization alone might not comprehensively change food systems. For example 'thoughtful practice of pragmatic politics and the development of a strong food democracy will be key to transformation in the long run' (Hassanein 2003, p 78). In summary, all clusters offer promising strategies; thus, it might be meaningful to combine different approaches to systems change. We argue that interconnected spheres and their related actions could create synergies and accelerate progress towards sustainability.

Despite the identified tendencies regarding the use of the terms 'transformation' and 'transition' described in the end of section 4.1.2, authors do not use the terms consistently. A clear attribution of change process to the respective term is missing. This finding corresponds with the fact that the food systems literature has not consolidated on one theory of change or theoretical perspective (Foran *et al* 2014, van Bers *et al* 2019). Even though authors apply both terms, the described change processes in four of the five clusters show a strong consistency with our definition of transformation as encompassing both social and technological innovation and seeing a strong role for social movements and civil society (Stirling 2015, Scoones *et al* 2018). The term 'transition', describing a rather controlled change process with less emphasis on human agency, contestation, and deliberation (Stirling 2011), has been used in the *Sustainable diets*, the *Sustainable agriculture* and the *Alternative food movements* clusters (Hinrichs 2014). As these clusters address aspects of justice and power,

Table 8. Key components of the five concepts for changing food systems towards sustainability.

	<i>Cluster 1: Alternative food movements</i>	<i>Cluster 2: Sustainable diets</i>	<i>Cluster 3: Sustainable agriculture</i>	<i>Cluster 4: Healthy and diverse societies</i>	<i>Cluster 5: Food as commons</i>
<i>Food System Sustainability Problems</i>	Food insecurity, power imbalances, environmental problems	Nutrition transition, environmental and public health problems	Food insecurity, high-input oriented farming, socio-ecological problems, human nature disconnect	Detrimental effects of economic growth (and underlying paradigms), power concentration, nutrition transition, health problems	Commodification and industrialization of food, McDonaldization, health problems, alienation
<i>Sustainability Concept</i>	Social justice, community well-being, empowerment, environmental and social health	Millennium and Sustainable Development Goals (M/SDGs), planetary boundaries, human health	Resilience, community-based economic development, SDGs	SDGs, regeneration, health and diversity, social justice	Resilience, respecting human rights, SDGs
<i>Sustainability Vision Outcomes</i>	Empowered consumers, community well-being, adequate diets, and social justice (food security and food sovereignty)	Food security, healthy individuals, low environmental impact	Food sovereignty, food security, (agro-)biodiversity	Paradigms based on health and diversity, food sovereignty, food security, healthy populations, empowered farmers, socio-ecological well-being	Food sovereignty, food democracy, food security, human well-being, food as a collective good, food citizenship
<i>Sustainability Vision Activities</i>	Local, self-reliant, and small-scale community food systems: environmentally friendly, conscious, and collective food production and consumption practices (CSAs, farmer markets, community gardens), participatory decision making	Sustainable diets (adequate nutrient intake, low resource consumption, low waste)	Low-input and environmentally friendly farming systems: agroecologically practices, smart agricultural technologies; institutionalization of agroecology; community-based economic development	Small-scale diverse farming systems acknowledging traditional practices (focus on Global South)	Local participatory food governance: food policy councils, civic agriculture, just food practices, healthy diets, support mechanisms
<i>Subject of Change</i>	Values, knowledge, skills, decision making structures, policies, consumption and production practices	Diets, consumption patterns, policies	Power relations, research agenda, agricultural practices, policies	Paradigms, power relations, policies	Underlying guiding market principles, meaning of food, governance structures, practices
<i>Change Agents</i>	Grassroots organizations, local food initiatives, educational institutions, (government agencies)	Policy makers, consumers, researchers	Farmers, grassroots initiatives, researchers, policy makers	Global policy makers	Alternative food initiatives, NGOs, food policy councils, local authorities
<i>Proposed Actions</i>	Building awareness, networking, promoting, educating, advocating, lobbying	Researching, investing, engaging, developing	Sharing, collaborating, creating, experimenting, researching	Shifting paradigms, acknowledging, including, prioritizing	Voting, communicating, creating, connecting, participating, advocating

resistance and agency, transition as theory of change seems not entirely sufficient, which is also reflected in a ‘thin record of sustainability transitions research focused on food systems’ (Hinrichs 2014, p 147), (Markard *et al* 2012).

We think the reviewed literature articulates a fundamental critique of the status quo. The critique includes social aspects, e.g. human health (*Sustainable diets*), and social movements (*Alternative food movements*, *Sustainable agriculture*, and *Food as commons*) (Hinrichs 2014, El Bilali 2018) engaging questions of power and justice in food systems, and rejecting the current system driven by neo-liberal market economy and growth paradigms. Additionally, most clusters have different modes to engage with politics: either political frameworks need to be created (*Sustainable agriculture* and *Healthy and diverse societies*), policy makers are addressed as change agents (*Alternative food systems* and *Healthy and diverse societies*), or the acquired information is intended to serve as evidence for political decisions (*Sustainable diets* and *Sustainable agriculture*). Change towards sustainability in food systems deals with moral and political questions, such as, ‘What is a good life?’ (Garnett 2014). Therefore, the literature calls on policy makers to allow emerging processes of social mobilization (Hospes and Brons 2016, Eakin *et al* 2017b) and to recognize cultural aspects of food and its meaning for people’s identity (Stajcic 2013, Bauermeister 2015, Béné *et al* 2019, Dyen and Sirieix 2016). Moreover, food is inherently embodied (Sarmiento 2017), showing a strong biological connection to the consumer and the nature surrounding it (Hinrichs 2014). Therefore, actions towards sustainability seem to be motivated rather by moral and value-based reasons, even if accompanied by technological innovation as described in the *Sustainable agriculture* cluster. Consequently, change processes in food systems are conceptualized differently from sustainability transitions in other systems, e.g. the energy or mobility system (Garnett 2014, Hinrichs 2014, El Bilali 2018).

Despite the critique of current food systems and embedded economies, which are dominated by exploitative, growth-oriented and profit-maximizing practices, the analyzed literature is not connected to emergent sustainability innovations of food businesses around the world (Nabhan 2018, Antoni-Komar *et al* 2019, Weber *et al* in press). Consequently, none of the five clusters integrates insights from the fact that sustainability-oriented organizations (universities, clinics, etc), social enterprises, cooperative businesses, benefit corporations, local living economy advocates, and other economic actors are advancing change in food economies around the world beyond the conventional models of CSAs, farmers markets, and community gardens (Friedmann 2007, Lutz and Schachinger 2013, Lutz *et al* 2017, Antoni-Komar *et al* 2019). It would be beneficial to link this broader

spectrum of *food economies* with the perspective on sustainability transformations of *food systems*.

Our literature review displays several limitations. It only represents academic perspectives on food systems change and even more specifically only literature using the terms ‘transition’ or ‘transformation’ to conceptualize change. Including further literature and especially experiential knowledge from practitioners and the broader public might enrich the understanding of change processes towards sustainability. In addition, cluster analysis does not allow for detailed investigation of concepts, such as food systems or sustainability but has its strength in portraying the lowest common denominator of these concepts. In addition, analyzing a set of the most representative publications per clusters led to a representative summary of clusters (section 4.2). This implies that it is rather more likely that a publication of a determined cluster addresses the discussed issues, e.g. seeing only policy makers as change agents and less likely that there is a publication included in that clusters that addresses other aspects, e.g. farmers as change agents, too. However, that publication would have been listed at the end of the ‘hierarchy’ of represented publications identified by the statistical indicator Species Analysis (see section 2.2). Overall, our results are based on the assumption that scholars articulate similar concepts through similar terms. Although the approach has been applied successfully (Abson *et al* 2014), exceptions of this supposition are not considered. As we included publications of English language only, the study is strongly shaped by a Western research perspective.

6. Conclusions

This systematic literature review focuses on the emerging research field on deep change towards sustainable food systems and identifies five research perspectives, namely, *Alternative food movements*, *Sustainable diets*, *Sustainable agriculture*, *Healthy and diverse societies*, and *Food as commons*. For each approach, our analysis indicates actions and actors to advance sustainable food systems. We also identify four key crosscutting components for change relevant to all clusters: political action, close collaboration between stakeholders, education, and a deep value shift.

Our analysis reveals that the concepts of transformation vs transition are used differently and inconsistently when theorizing change in food systems. Further, the analyzed literature reflects a call for deep change in values, consumption and production practices, as well as politics allowing for deliberation and grassroots mobilization. This resonates with transformation literature but does not exclude transition approaches.

We identify departure points for researchers from developing countries to recognize traditional and indigenous knowledge, and overcome the Western bias. In addition, future studies ought to address emergent sustainability business innovations and its potential role in contributing to change of food systems, as well as the socio-cultural dimension for food systems transformation. Future research should also conduct empirical evaluative studies in all five clusters in order to create actionable knowledge and allow for evidence-informed interventions. Deep change of food systems towards sustainability is an ongoing learning process drawing on a broad spectrum of expertise and wisdom. Thus, studies and projects to advance interconnectedness of actions and strategies of food systems transformations can facilitate change processes. Work on different change approaches and conceptualizations to further consolidate and refine the field's engagement with change will be meaningful.

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Data availability statement

The data that support the findings of this study are openly available at <https://doi.org/10.5281/zenodo.3859418>.

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4.2 Sustainability entrepreneurship to address large distances in international food supply

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RESEARCH ARTICLE

Sustainability entrepreneurship to address large distances in international food supply

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Abstract

International food supply is often associated with negative externalities including injustices across the economic value chain favoring trade over production and processing, significant transport-related greenhouse gas emissions, and poor working conditions in the regions where food is being produced or processed. Relevant proxies for this situation seem to be *large distances*, specifically, large *geographical* and *relational* distances. Sustainability entrepreneurship demonstrates innovative practices to address large distances in international food supply. We describe five entrepreneurial solution approaches and illustrate them with empirical cases to facilitate learning across cases and support wider adoption of these practices. Our study provides food scholars, entrepreneurs, and businesses with evidence and insights on how to foster sustainable food supply through overcoming large distances.

KEYWORDS

innovation, international community-supported agriculture, proximity, relationships, solidarity, sustainability transformations

1 | INTRODUCTION

Large distances in international food supply can be associated with substantial negative externalities. Large *geographical* distance between producers, processors, retailers, and consumers requires, for instance, long transportation, causing significant emissions and pollution (Hua, Cheng, & Hwang, 2018; Prell, 2016). It also hinders people involved in the food supply chain to connect with each other (Fonte 2008), which makes it difficult to build relationships and trust (Kneafsey et al., 2008; Wadsworth, 2001). Current global food supply is mostly characterized by anonymity and disconnection (Wiskerke, 2009). This large *relational* distance often correlates with high livelihood risks, unfair wages, externalization of costs, and poor working conditions in the regions where food is being produced (Clapp, 2015; Lebel et al., 2008).

From a local food economy perspective, short food supply chains (SFSCs) is one promising approach that aims at overcoming large

distances and contributing to sustainable development (Galli & Brunori, 2013; Kalfagianni, & Skordili, S. (Eds.), 2019; Renting, Marsden, & Banks, 2003). Sustainability efforts in international food supply so far have mostly focused on incrementally improving existing systems with modest progress towards sustainability (Folinas, Aidonis, Malindretos, Voulgarakis, & Triantafyllou, 2014). Eakin, Rueda, and Mahanti (2017) analyzed changes in telecoupled food systems in Mexico and Columbia. Focused on food system governance, their study showed that acknowledging distal interactions and feedbacks, for example, political and social relations of involved actors as well as resource flows, can offer opportunities to change governance structures and create positive impacts on food and livelihood security. Other studies have indicated that consumers are getting increasingly interested in learning about the origins of the food they eat and to connect to the people who produce and process it (Dowler, Kneafsey, Cox, & Holloway, 2009).

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However, little attention has been paid, so far, to emerging *entrepreneurs* and their *solution approaches* that aim at overcoming large geographical and relational distances to advance sustainability of food supplies. The present study addresses this void by asking the question: *What are entrepreneurial solution approaches to overcome large geographical and relational distances in international food supply to foster sustainability?* We describe five approaches and illustrate them with empirical cases, using a convenience sample with most enterprises located in Germany. Our study provides scholars, entrepreneurs, and businesses with evidence and insights on how to foster sustainable food supply through overcoming large distances.

2 | LARGE DISTANCES AND SUSTAINABILITY CHALLENGES

We reviewed the literature to identify several sustainability challenges of international food supply. Large distances cause and/or drive some of these challenges, in particular, large geographical and relational distances (Eakin et al., 2017; Princen, 1997).

Geographical distance is the physical distance between actors in the supply chain, in particular, between food producers and consumers. The term does *not* refer to the number of participants in the supply chain, which is often labeled as “supply chain length.” From a sustainability perspective, negative effects of *large geographical distances* in food supply include:

- Greenhouse gas (GHG) and other harmful emissions due to long-distance food transportation. For example, about 80% of all traded goods by volume are transported in container ships (UNCTAD, 2018), the majority still using heavy fuel oil causing emissions of CO₂, SO₂, NO_x, and particulate matter (Hua et al., 2018). These negatively affects human health and contribute to climate change (Eyring et al., 2010).
- No/low awareness of negative environmental and social impacts due to geographical disconnection between food consumers and the regions of food production and processing (Luna, 2008; Princen, 2002).

Relational distance is the lack of strong relationships among supply chain actors. Strength of relationships is here determined by knowledge and care about each other (Kneafsey et al., 2008). From a sustainability perspective, the negative effects of *large relational distances* in food supply include:

- Injustices in the food value chain, with most value generated in the countries of consumption, leading among other things to unfair food prices that provide insufficient livelihoods to people along the supply chain (Kalfagianni, 2019; Swinnen & Maertens, 2007).
- Unequal distribution of risks, with most risk resting with food producers (Isakson 2014).

- Undemocratic governance and power relations with food producers having no/little opportunity to participate in decision making and governance (Hendrickson, Wilkinson, Heffernan, & Gronski, 2008).

Mitigating the above-mentioned negative effects by overcoming large distances can, if designed carefully, foster sustainability. SFSCs are one promising approach that involves both domains of distance (Kalfagianni & Skordili, 2019; Renting et al., 2003). They are characterized by geographical proximity (local); by a small number of intermediaries involved; and by authenticity and trust mediated through personal interactions (relational proximity). There is evidence about SFSCs' potential to foster sustainability (Galli & Brunori, 2013), for example, through rural development and economic regeneration (Renting et al., 2003) or social changes towards healthier eating habits (Kneafsey et al., 2008). Recently, SFSCs have been discussed in international food supply activities (Kalfagianni, 2019). However, the link between environmental effects of SFSCs is controversial (Born & Purcell, 2016; Brunori et al., 2016). Thus, it is important to consider the specific conditions under which reducing large distances can contribute to sustainability.

In the next section, we use sustainability literature to formulate principles for reducing large distances (or promoting SFSCs). We also use the *Framework for Strategic Sustainable Development* (Broman & Robèrt, 2017) to discuss potential adverse effects of SFSCs. Specifically, we review if any of the practices of reducing large distances increases *concentrations of substances extracted from the Earth's crust*, for example, fossil carbon, *concentrations of substances produced by society*, for example, NO_x, or *degradation by physical means*; as well as if they contribute to structural obstacles to *health, influence, competence, impartiality, or meaning making*. Furthermore, we additionally reflected on the principle of intragenerational justice for principles where this is of relevance (see, e.g., Gibson, 2006).

3 | APPROACHES TO ADDRESS LARGE DISTANCES

Innovative practices in sustainability entrepreneurship address sustainability challenges of international food supply by mitigating negative effects of and overcoming large distances. We reviewed literature on and empirical cases of these practices. We clustered them into five entrepreneurial solution approaches and specified each of them through a set of sustainability-oriented design principles (P1–P12; Figure 1).

The approaches represent practices of entrepreneurs which are “less oriented towards management systems or technical procedures, and focus more on the personal initiative and skills of the entrepreneurial person or team to realize [...] market success and societal change with environmental or societal innovations” (Schaltegger & Wagner, 2011, p. 226). We define sustainability entrepreneurship as a practice of “finding and implementing innovative solutions to

	Approaches that address large <i>geographical</i> distance	Approaches that address large <i>relational</i> distance	
Approaches that <i>mitigate negative effects</i> of large distances	Reducing GHG Emission P1, P2, P3 	Certification P6 	
Approaches that <i>overcome</i> large distances	Reducing Food Miles P4, P5 	Direct International Trade P7, P8, P9, P10 Food enterprise ↔ Producer AND Food enterprise ↔ Consumer	International Community-Supported Agriculture P11, P12 Food enterprise ↔ Producer AND Food enterprise ↔ Consumer AND Consumer ↔ Producer

FIGURE 1 Entrepreneurial solution approaches to overcome large distances in international food supply with corresponding sustainability principles

address social, economic and ecological shortcomings” (Schaltegger, Beckmann, & Hockerts, 2018, p. 5) and “to realize [...] market success and societal change” (Schaltegger & Wagner, 2011, p. 226).

The set of design principles is the result of an iterative process between reviewing conceptual literature and analyzing empirical cases, mostly from Germany. Two approaches address large geographical distances (yellow), and three approaches address large relational distances (blue).

3.1 | Reducing GHG emissions

This approach mitigates negative effects of large *geographical* distances, that is, it reduces GHG emissions through using renewable energy sources for long-distance transport and/or offsetting emissions, and/or displays information about geographically distal regions (to influence consumer choices).

The corresponding principles are summarized in Table 1.

3.2 | Reducing food miles

This approach contributes to overcoming large *geographical* distances by substituting an internationally sourced food product with a locally produced one or by securing a supplier in closer geographical proximity. The guiding principle is to source most ingredients and food items locally.

The corresponding sustainability principles are summarized in Table 2.

3.3 | Certification of international food products

This approach addresses large *relational* distances by using certification, for example, provided by the Fairtrade Labelling Organization, to mitigating adverse effects, such as low prices and poor working conditions. Food enterprises that source food products internationally “out-source” the relationship building with food producers to certification agencies (Figure 2). Food enterprises are not in direct contact with food producers and do not necessarily know where the premium price is invested.

The corresponding sustainability principle is summarized in Table 3.

3.4 | Direct international trade

This approach addresses large *relational* distances by creating caring relationships between supply chain actors, for example, through adding value in the country of origin, directly sourcing from producers with as little intermediaries as possible, negotiating and paying fair prices *on the basis of needs*, and/or supporting local social-ecological projects. Caring relationships entail getting to know the partners, communicating regularly with them, appreciating their products and services, looking out for each other, and recognizing each other's needs. This approach builds relationships between the food enterprise and food producers as well as between the food enterprise and food consumers (Figure 3). Compared with the previous approach, here, food producers and food enterprise can jointly identify and select investments.

TABLE 1 Sustainability-oriented design principles underpinning the approach “reducing GHG emissions”

	Design principle (P)	Description and sustainability justification	References	
Reducing GHG emissions	P1—Use renewable energy sources for long-distance transport	<p>Using renewable energy sources instead of fossil fuel for long-distance transportation, such as sailboats for over-sea transport, electric trucks using solar or wind power, or trains. For short-distance transports, bikes can also be an option.</p> <p>Substituting fossil-fuel-based transportation through renewable energy sources, reduces CO₂ emissions and other harmful substances, and contributes to healthier ecosystems and people's health.</p> <p>Provision of renewable energy, including material sourcing, for example, for solar cells, should not systematically deplete natural resource stocks and/or increase GHG emissions beyond critical thresholds. Provision of biofuels should not systematically compete with food production.</p>	Accorsi, Cholette, Manzini, Pini, & Penazzi, 2016; Teeter & Cleary, 2014	
	P2—Offset GHG emissions	<p>Offset remaining CO₂ emissions caused by transportation and energy imports through different measures, for example, supporting reforestation projects.</p> <p>Offsetting GHG emissions can have a positive effect on climate change, even if it does not mitigate emissions completely (contributing to resource maintenance and efficiency).</p> <p>Offsetting should not systematically increase the absolute amount of GHG emissions (rebound effect) beyond critical thresholds.</p>		Accorsi et al., 2016; Kilian & Jiménez, 2012
	P3—Display information about geographically distal regions	<p>Display information about environmental, cultural, and socioeconomic conditions of the region of production and/or processing site, for example, on product packaging and/or through other (social) marketing channels.</p> <p>Displaying and sharing information helps to raise awareness of consumers about the geographically distal region of production and processing, including its environmental, cultural, and socioeconomic conditions. It also raises awareness regarding negative or positive impacts in the region. The intention is to inform consumer choices towards sustainability and thereby reducing GHG emissions.</p> <p>Information provision needs to be ethical (no “greenwashing”). Modified product packaging and other marketing should not contribute to systematic depletion of natural resources, for example, use of nonrecycled paper or plastic, and/or increase GHG emissions beyond critical thresholds.</p>		Aprile, Caputo, & Nayga, 2012; Leire & Thidell, 2005

TABLE 2 Sustainability-oriented design principles underpinning the approach “reducing food miles”

	Design principle	Description and sustainability justification	References
Reducing food miles	P4—Substitute internationally sourced food products	Substitute usually internationally imported food products by producing a different food product with similar properties (e.g., having similar nutrition properties, e.g., line and chia seeds, or fulfilling similar consumer needs, e.g., beet sugar instead of sugar cane). These food products can be produced either locally or by partners located in countries that are as close as possible to each other. Substituting reduces long transportation and with that SO ₂ , NO _x , and CO ₂ emissions. It also fosters the local food economy and provides livelihood opportunities for farmers in the region. Supply of substitute products should not degrade the environment (e.g., through conventional farming) or tolerate poor working conditions (e.g., unfair payment).	Awater-Esper, 2018; Gómez-Luciano, Rondón Domínguez, González-Andrés, & Urbano López De Meneses, 2018
	P5—Select food providers located closer	Reduce food miles along the entire supply chain through selecting partners located in countries that are as close as possible to each other. The most radical way would be to produce internationally imported food products locally by, for example, using sustainable food producing architecture or appropriate varieties. Apart from lowering air pollutants (e.g., SO ₂ and NO _x) and CO ₂ emissions due to less transportation, reducing food miles also makes it easier to connect with other supply chain actors (condition for overcoming large relational distance). Selection criteria should also include sustainable farming practices and good/fair working conditions. Local food providers should not systematically deplete natural resources, for example, through heating/cooling with non-renewable energy sources, and/or contribute to increasing GHG emissions beyond critical thresholds.	Fiedler & Jeschaunig, 2018; Gómez-Luciano et al., 2018

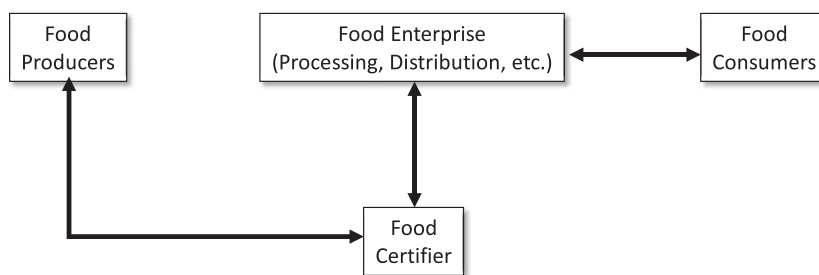


FIGURE 2 Relationships in the food supply chain that relies on certification

The corresponding sustainability principles are summarized in Table 4.

3.5 | International community-supported agriculture

This approach goes beyond establishing the previous relationships by also building direct relationships between food producers and

food consumers (Figure 4), for example, through creating community-supported economy schemes or participatory governance structures (Rommel, 2019). Caring relationships also include knowledge transfer and capacity building, as consumers can learn about production methods and producers about consumer preferences and lifestyles. This approach calls for direct contact between all involved actors (including consumers).

The corresponding sustainability principles are summarized in Table 5.

TABLE 3 Sustainability-oriented design principles underpinning the approach “certification of international food products”

	Design principle	Description and sustainability justification	References
Certification of international food products	P6—Pay standard Fairtrade prices	<p>Pay farmers or “fair traders” a price according to standards of the Fairtrade Labelling Organization (FLO), which is the minimum price plus a premium calculated by a standardized procedure based on a system-wide consultation process and considering the economic situation of the country and product category (FLO, 2019). Prices are usually higher than what farmers would receive on average without the certification and which are more stable against price volatilities. FLO principles also include non-monetary aspects, for example, ensuring no child and forced labor and investments in socio-economic community development.</p> <p>Fairtrade prices ensure stability against price volatility and provide producers and processors with more livelihood opportunities. In some cases, fair trade activities also contributed to an increased adaptation of ecological farming practices.</p> <p>If the Fairtrade price does not meet people's needs, the enterprise should adopt a standard that does.</p>	Becchetti & Costantino, 2008; Dragusanu & Nunn, 2018

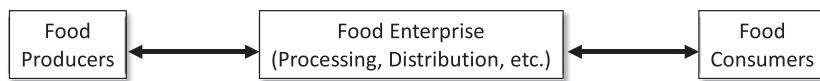


FIGURE 3 Relationships in the food supply chain that relies on direct international trade

4 | CASE STUDIES ILLUSTRATING THE ENTREPRENEURIAL SOLUTION APPROACHES

The following case studies illustrate the presented approaches. Most cases fulfill the majority of principles associated with the respective approach. For a clear distinction between approaches, we focus on one or more businesses practices of an enterprise instead of presenting a comprehensive description of the enterprise. Background information (location, founding year, etc.) for each case is compiled in Table 6.

The illustrative cases were selected on the basis of the following criteria: the cases are (a) related to international food supply, such as sourcing ingredients or selling food products internationally; (b) being driven by a pioneering entrepreneur (or team); (c) committed to and demonstrating sustainability practices, and (d) conducive to illustrate the respective entrepreneurial approach. For pragmatic reasons, our convenience sample of cases focuses on practices, products, or services of small-to-medium-sized food enterprises (<250 employees), mostly based in Germany. However, this does not mean that larger enterprises in other countries cannot adopt these approaches, as discussed in Section 5.

Data were collected through document reviews and semistructured interviews with representatives of the respective food enterprises (one per case), except for Grenada Chocolate Company (no interview). We analyzed the transcripts of the interviews with a directed content analysis approach building categories before and during data analysis (Hsieh & Shannon, 2005) using the software MaxQDA. The empirical data helped us to adjust and refine the entrepreneurial approaches derived from the literature.

4.1 | Illustrative cases for “reducing GHG emissions”

4.1.1 | Sailed and cycled coffee—Slokoffie and Grenada Chocolate Company

Slokoffie uses cargo sailboats and bicycles for transporting their food ingredients and products (Principle 1). In 2016, Slokoffie had purchased 20 t of green coffee from a farmer cooperative in Honduras, which was then transported via a cargo sailboat to Bremen, Germany. From the harbor, cargo bicycles delivered the green coffee to a warehouse. Over 3 years until today, Slokoffie sold green and roasted coffee of this carriage to small shops, directly to consumers, as well as to two regional bio-certified wholesalers. Slokoffie's mission includes promoting low-emission transport of high-quality food products. This includes deliveries to roasters by cargo bicycles. “We worked with 70 volunteers [...] to unload the ship, load the coffee to cargo bikes, and deliver it to the coffee shop” (personal communication, June 12, 2019). Consumers also support low-emission delivery practice. For example, in June 2019, two consumers transported 100 kg of coffee over 700 km from Bremen to Freiburg by bicycle, which was considered a climate action demonstration (personal communication, June 12, 2019). For the next year, Slokoffie currently explores new partnerships with coffee producers in Central America to continue the business.

A similar example comes from Grenada Chocolate Company with deliveries via sailboat from the Caribbean to Europe, using solar and wind power to cool the chocolate bars during the passage (Ceranic, Montiel, & Cook, 2013; Grenada Chocolate Company, 2019).

TABLE 4 Sustainability-oriented design principles underpinning the approach “direct international trade”

	Design principle	Description and sustainability justification	References
Direct international trade	P7—Add value in the country of origin	<p>Shift value-added production steps from importing countries to the country of origin, for example, producing chocolate bars in local factories and exporting the bars instead of the cocoa beans.</p> <p>Adding value in the country of origin provides more livelihood opportunities for supply chain actors in need and contributes to the local economy. It also offers economic perspectives for the next generation, for example, engaging in technical processes and business administration, in addition to farming activities.</p> <p>Value-adding production steps in the country of origin should not systematically deplete natural resources, for example, through heating/cooling with non-renewable energy sources, and/or contribute to increasing GHG emissions beyond critical thresholds. The added value should be distributed equally across the value chain (intra-generational justice).</p>	Ceranic et al., 2013
	P8—Shorten supply chain	<p>Reduce number of intermediaries, for example, additional importers, exporters, or trade associations, especially those who do not add value to the product. This reduces costs, facilitates transparency, and allows for closer relationship building across the entire supply chain.</p> <p>Short supply chains offer more benefits to the real contributors, facilitates access to high-quality food, and could even allow all supply chain partners to participate in decision making.</p> <p>Money that is saved through reducing intermediaries should be distributed equally across the entire value chain (intra-generational justice).</p>	Gómez-Luciano et al., 2018; Kalfagianni, 2019
	P9—Pay prices on the basis of socioeconomic needs	<p>Pay every person working in the supply chain, including temporary field workers (e.g., coffee pickers), a price that recognizes contributions and socio-economic needs. This also requires helping to monetize the needs.</p> <p>Paying fair prices along the entire supply chain contributes to justice between individuals and countries. It allows for building sufficient livelihoods, instead of gradients from minimum to maximum gains. If farming is economically beneficial, the young generation is more likely to continue this line of work. Calculating prices based on needs accounts for changes and disturbances, for example, economic crises on the national level. A sustainable supply chain adapts prices to the new conditions.</p> <p>The socio-economic needs should be granted to <i>all</i> beneficiaries (e.g., farmers and coffee pickers) in an equal way (intra-generational justice).</p>	Jaffee, 2007; Rommel, 2019
	P10—Support socioecological projects in the region of origin	<p>Invest a ratio of profits in social and/or ecological projects in the region of origin or of consumption. Direct contact allows for making the impact of invested money tangible and transparent for all actors.</p> <p>This is an opportunity for an enterprise to “give back” to the community to which it belongs. In addition, ecological projects can contribute to social-ecological system integrity, intra-generational and inter-generational justice.</p> <p>Social-ecological projects should be based on broad stakeholder engagement and buy-in. Furthermore, they should be in compliance with a broad set of sustainability principles (vs. maximizing a single benefit).</p>	Faltin, 2011

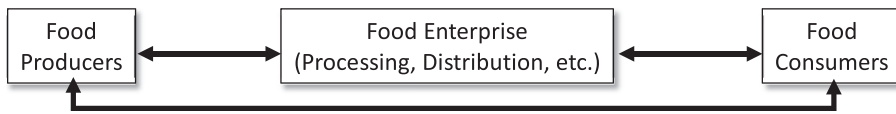


FIGURE 4 Relationships in the food supply chain that relies on international community-supported agriculture

TABLE 5 Sustainability-oriented design principles underpinning the approach “international community-supported agriculture”

	Design principle	Description and sustainability justification	References
International community-supported agriculture	P11—Create community-supported economy schemes	Co-finance agricultural production, that is, share benefits and risks among producers and consumers, through pre-financing the next year of production, instead of paying for the final product. Creating community-supported economy schemes contributes to a solidary relationship between consumers and producers. Sharing risks through up-front payments protect producers from price fluctuations. Negotiation among consumers ensures that everyone can participate, despite different financial means. Rights and responsibilities need to be negotiated with equal influence for everyone involved and be then equally shared so that trust is not being eroded.	Bloemmen, Bobulescu, Le, & Vitari, 2015; Rommel, 2019
	P12—Create participatory governance schemes	Take decisions collaboratively with involvement from all actors (including consumers). This includes decisions on the production, type, and quantity of goods to be produced and the purpose of reinvesting or distributing profits. Collaborative decision making facilitates trust building and agency in moving towards sustainable patterns of production and consumption, for example, healthy diets and environment-friendly agricultural practices. Decision-making processes should guarantee that everyone's voice is heard and accounted for and that no one is subject to discrimination.	Hvitsand, 2016; Rommel, 2019

4.1.2 | Growing cocoa and fruit trees—Original Beans

Original Beans is a chocolate company that offsets all GHG emissions caused by cocoa production and processing including transport (Principle 2). For each chocolate bar (70 g), Original Beans plants one cocoa tree in degraded areas of cocoa production countries, in particular, in the regions where they source cocoa beans from. They also offer GHG offsetting certificates to third parties, through old-growth forest protection in Ecuador and Peru. Original Beans' mission includes giving back to regions from where they received ingredients. On the package of the bar, the consumer can find a tracking code that provides access to information about the area where the cocoa is being sourced from (and the tree has been planted), highlighting socio-cultural aspects and ecological features (Principle 3). “We tell stories using drawings [...], referring to an animal or a human [...] to provide access to the place” (personal communication, June 5, 2019). In 2018, Original Beans protected 1.5 million trees on 17,000 ha,

offsetting 8,055 t of CO₂. A footprint analysis shows that Original Beans' chocolate bars are “climate positive” (Original Beans, 2019). Planted trees include fruit trees for famers' personal use.

4.2 | Illustrative case for “reducing food miles”

4.2.1 | Sugar cane substitution and quinoa made in Germany—Bohlsener Mühle

In the past, the Bohlsener Mühle had sourced tons of sugar from international suppliers for their pastry products. In 2007, they started to replace sugar cane imported from Brazil with beet sugar from Germany, which reduced food miles (Principle 4). The Bohlsener Mühle also collaborates with local farmers on cultivating quinoa in northern Germany, a product that is mostly produced in and sourced from South America (Bolivia, Peru; Principle 5). The cultivation of quinoa is also a collaborative strategy to deal with changing climate conditions.


TABLE 6 Background information of illustrative cases

Name	Location	Year	Product(s)	Workforce	Countries of raw material	Countries of processing	Countries of consumption	Distribution channels	Product volume (2018)
Bohlsener Mühle	Bohlsen, Germany	1979	Quinoa	240	Germany	Germany	Germany	Retailer (supermarkets)	25 t
Fairafric	Munich, Germany	2015	Chocolate bars	7	Ghana	Ghana	Germany, Europe	Retailers (One-World shops, packaging-free stores, supermarkets), online shop	2.5 t
Grenada Chocolate Company	Grenada, West Indies	1999	Chocolate bars	NA	Grenada	Grenada	USA, Canada, Europe	Retailers, online shop	NA
Slokkoffie	Bremen, Germany	2016	Coffee	5 (all volunteers)	Honduras	Germany	Germany	Online shop	6 t
Considerate Coffee Company & Catando	Phoenix, AZ, USA, and Xalapa, Mexico	2017	Cold-brew coffee	2 and 7	Mexico	Mexico (roasting): USA (cold brewing)	USA	Wholesale to restaurants and hotels	0.3 t
Ando Coffee Roasters									
Projektwerkstatt Teekampagne	Potsdam, Germany	1985	Tea	20	India	India (tea processing)	Germany	Online shop	420 t
Teikei Coffee	Hamburg, Germany	2016	Coffee	20 (2 paid +18 volunteers)	Mexico	Germany, Switzerland	Germany, Switzerland	Online shop, packaging-free stores, consumer communities	11 t
Original Beans	Amsterdam, Netherlands	2008	Chocolate	30	South America, Africa	Switzerland	Europe, worldwide	Online shop, retailer, chefs	300 t (raw cocoa)
Platanenblatt	Wangen im Allgäu, Germany	2012	Olive oil	3 (all volunteers)	Greece	Greece	Germany	Online shop, pick-up days	6 t (2017)

A farmer with limited access to irrigation works with the Bohlsener Mühle to grow quinoa, a stress-resistant plant that can deal with dry and wet periods. The annual volume of quinoa grown in northern Germany has increased from 2 t in 2015 to 25 t in 2018. The Bohlsener Mühle aims at compiling and revitalizing knowledge about rare grain varieties such as quinoa, chickpeas, or flax in Germany—all products usually imported from other continents (personal communication, August 30, 2018). The Bohlsener Mühle motivates and supports farmers to experiment with these varieties and ultimately develops new product lines that benefit both the enterprise and the farmers, while reducing food miles.

4.3 | Illustrative cases for “certification of international food products”

4.3.1 | Sourcing certified ingredients—Bohlsener Mühle and Fairafric

For smaller amounts of imported ingredients, for example, chocolate or dried raspberries, the Bohlsener Mühle purchases organic and fair-trade products from certified wholesalers (Principle 6) that guarantee certain standards are being met in the country of origin. “As a consumer, [...] you are unwilling to pay for us to go there, monitor the conditions, and so on. We have to outsource this, so that it can be financed. We can only do this via certificates and supply chain management. [For companies], who source 20 tons of freeze-dried raspberries a year, it is worthwhile to go there. For the 100 kg we need [...], they check for us what it is like there.” (personal communication, August 30, 2018).

Another example is Fairafric, a company that sells chocolate bars produced and packaged in Ghana—from cultivating cocoa beans to processing the chocolate bars. They purchase additional ingredients such as sugar (from Mozambique) or milk powder (from Germany) as certified products instead of establishing relationships to the primary producers due to limited time and financial resources. “We cannot work as closely together [with sugar producers] as we do with the cocoa farmers. [But] we at least have the minimum standard there” (personal communication, March 8, 2019).

4.4 | Illustrative cases for “direct international trade”

4.4.1 | Strong commitments to small producers abroad—Projektwerkstatt Teekampagne

Projektwerkstatt Teekampagne in Germany focuses on black and green Assam and Darjeeling tea with most of the processing and packaging happening in the country of origin (Principle 7), that is, India. Teekampagne sells its products directly to the consumers, skipping cost-intensive wholesalers or storing companies that do not add value to the product (Principle 8). In addition, the short supply chain facilitates direct contact, trust building, and commitment to the producers.

This results in Teekampagne's paying higher-than-market prices to the producers, allowing them to operate at a profit base and covering their needs and not merely covering their expenses (Principle 9). The tea producers create high-quality products, compared with other available products. Strong relationships also allow in times of crisis to find robust and fair solutions. For example, in 2014, a high anthraquinone contamination was found in the Teekampagne teas, which was resolved by changing the energy source for tea processing (personal communication, February 22, 2019). Already back in 1992, Teekampagne started a local social-ecological project in India (Principle 10), encompassing, for example, reforestation campaigns, nature clubs in schools, waste management, and beekeeping projects (personal communication, February 22, 2019). Teekampagne relies on word-of-mouth promotion rather than conventional marketing. Customers trust the enterprise and its direct relationships with the producers.

4.4.2 | Knowing and meeting the needs—Original Beans and Bohlsener Mühle

Original Beans works with so-called “Bean Teams” composed of about 10 people working in regions where cocoa beans are cultivated. They live in the communities with the farmers for some time, train them in agroforestry practices, and support switching to organic production. By living and working together, they get to know and build trust (personal communication, June 5, 2019). This is also possible because of the short supply chain (Principle 8). The Bean Team is also in charge of establishing an infrastructure in remote areas needed for cocoa bean supply. Original Beans pays significantly higher prices than the Fairtrade prices (Principle 9), which allows farmers, for example, to send not only their sons but also their daughters to school or to buy and cultivate a sufficient amount of land.

The Bohlsener Mühle offers a similar example within a regional context by negotiating risks and benefits with the farmers to determine truly fair prices (Principle 9): “We have developed a fair pricing model with our farmers, where we see that we can really pay fair prices, no matter what the market is currently like” (personal communication, August 30, 2018).

4.5 | Illustrative case for “international community-supported agriculture”

4.5.1 | Extended local community-supported agriculture—Platanenblatt

Platanenblatt distributes olive oil from Lesbos, Greece, to customers in Germany, adopting a community-supported agriculture scheme (Principle 11). Consumers pay for harvest shares upfront, irrespective of global market fluctuations and on the basis of the farmer's needs to cultivate the olive grove. Platanenblatt reinvests 10% of each share in social projects (Principle 10), for example, refugee support or schools. Each year, Platanenblatt, in collaboration with the olive farmer,

proposes projects for reinvestment to the consumer community, who democratically select one or more (Principle 12). In 2018, due to the warm winter, the harvest was very low. But there was still olive oil left from the previous year, yet of poorer (but still good) quality. Due to trust built over several years, the majority of the 600 Platanenblatt members agreed to receive last year's oil at the same or higher price to compensate for the loss in 2018 (personal communication, May 29, 2019). A couple from Germany with family in Lesbos is a key facilitator of this solidarity economy scheme. They regularly visit the farmer to help with the harvest. On so-called annual "pick-up days," before distributing the olive oil, the couple gives a talk about the past year at the olive grove and in the region and shares personal impressions and first-hand insights (personal communication, May 29, 2019). They also invite and host members to come to the olive grove and get to know the farmer and the olive grove (10 members have visited). These members then share their impressions during the next pick-up days, and so on.

4.6 | Illustrative cases for combining approaches

In the following, we present food enterprises that have adopted two or more of the entrepreneurial approaches described and illustrated above, addressing both large geographical and relational distances in international food supply.

Fairafric combines three approaches, namely, "reducing food miles," "direct international trade," and "international community-supported agriculture." Fairafric sources ingredients locally—not only cocoa, but also sugar, which is sourced from Mozambique instead of from India (Principle 5). Its product is chocolate, produced, processed, and packaged in Ghana, hence adding value in the country of origin (Principle 7). Fairafric keeps the supply chain short (Principle 8) and has deep relationships with the founder of the farmer cooperative and some producers as well as the workers in the chocolate factory. They openly communicate about problems (e.g., bio-certification) and collaborate on solutions. Fairafric pays to farmers the highest premium registered in Ghana and to employees in the chocolate factory a starting salary of \$225 per month, plus benefits such as health insurance and pensions, compared with the minimum wage of \$55 (Principle 9). In addition, Fairafric supports farmers in becoming shareholders of the enterprise (personal communication, March 8, 2019; Principle 12).

Teikei Coffee adopts three approaches, namely, "reducing GHG emissions," "direct international trade," and "international community-supported agriculture." Teikei Coffee collaborates with a cargo sail company bringing green coffee beans from Mexico to Europe, with final destinations in Germany and Switzerland (Principle 1), acting in solidarity with nature and people all over the world suffering from negative climate change effects. Through their marketing channels (websites, ship unloading, coffee shop, and local consumer communities), they inform about the region of production, the workforce, and how Teikei Coffee creates sustainable livelihoods (Principle 3). Teikei Coffee facilitates a short supply chain (Principle 8) among coffee producers and a processing company in Mexico, a sailboat cargo shipping

company, roasters in Germany and Switzerland, and consumers located in different cities in Germany and Switzerland. It uses a community-supported agriculture scheme, that is, consumers ideally pre-finance the next year of coffee production and receive a share of the harvest in exchange (Principle 11). Teikei Coffee facilitates relationships between all actors involved in the supply chain as well as between producers and consumers. Participants know and care about each other's needs. "I [as a consumer] can relate to the people who cultivate [the coffee] or who are part of the supply chain" (personal communication, February 28, 2019). Prices are negotiated to meet everyone's needs (Principle 9). Virtual communication and face-to-face meetings between the team in Europe and the team in Mexico helps building trust. Both teams respect and advance Teikei Coffee's mission and values. "We trust [our partners in Mexico]. [...] They know our values and we trust that our collaboration is based on these values" (personal communication, February 28, 2019). Teikei Coffee also aims at educating consumer and other societal actors on sustainable and community-supported economies.

Considerate Coffee Company and Catando Ando Coffee Roasters adopt three approaches, namely, "reducing GHG emissions," "reducing food miles," and "direct international trade." Considerate Coffee Company is a cold-brew coffee company in Phoenix, Arizona that imports roasted coffee beans from Catando Ando Coffee Roasters in Mexico instead of buying coffee beans from Ethiopia (Principle 4). They initiated a bio-char initiative in Phoenix and invest in reforestation projects in Mexico, where coffee is produced, to offset GHG emission caused by transportation from Mexico to Arizona (Principle 2). Considerate Coffee Company has detailed insights and knowledge about the region and situation of coffee farmers, pickers, and their roasters, which they convey to their customers, whereas Catando Ando informs coffee producers and pickers in Mexico where their coffee is distributed to and who will consume it (Principle 3). They strive to develop a short supply chain (Principle 8), assuming the roles of importers and exporters in the future. On this base, Considerate Coffee Company and Catando Ando Coffee Roasters established a transparent and fair value chain that reflects the real needs of all people involved in the supply chain, including the coffee pickers (personal communication, February 27, 2019; Principle 9).

5 | DISCUSSION

Large geographical and relational distances in international food supply contribute to unsustainable development worldwide (Eakin et al., 2017; Princen, 1997, 2002). Different entrepreneurial solution approaches have been pioneered to address large distances and foster sustainability.

What do these approaches offer? Eakin et al. (2017) describe social, institutional, and physical distances in food systems and explore *governance* arrangements that address such distances and the sustainability issues associated with them. Similarly, there are government and nongovernmental organization (NGO) initiatives that address unsustainability in food systems globally (Ilieva, 2017;

Martínez-Torres & Rosset, 2010). We add an entrepreneurial perspective to these approaches, structuring approaches and presenting illustrative cases that solve “societal and environmental problems through the realization of a successful business” (Schaltegger & Wagner, 2011, p. 224). Entrepreneurial approaches seem to offer space for experimentation, especially in small-to-medium-sized enterprises with flexible and effective (“short”) decision structures. However, enterprises have to adhere to rules, such as international trade arrangements. Thus, combination and alignment of different approaches (entrepreneurial, governmental, and NGOs) is needed to achieve transforming food systems towards sustainability. Also, *consumer-based* approaches gain momentum in contributing to these transformations. Kneafsey et al. (2008) and Albrecht and Smithers (2018) explore the benefits of reconnecting producers and consumers in local food systems. Our study adds additional empirical evidence to this conversation from an international perspective, with cases of enterprises that serve as “bridge-builders” by overcoming large relational distances.

What is the transformational potential of the presented approaches? Zerbe (2014) argues that *transformational approaches* need to be “oppositional” rather than “alternative.” We argue for a complementary set of approaches that are transformational *in conjunction*. Actively creating relational proximity and overcoming individualism to re-embedding food production and consumption into broader social relationships (Zerbe, 2014) addresses problems more fundamentally than launching socioecological projects. Referring to the concept of leverage points for system change (Abson et al., 2017; Meadows, 1997), the presented approaches and cases tackle different leverage points, from shallow to deep. For example, the “reducing GHG emissions” approach focuses on parameters, that is, carbon stocks and flows, whereas the “international community-supported agriculture” approach tackles fundamental paradigms, that is, neoliberalism and exploitation, driving the problem. Food enterprises need to adopt and combine different approaches or, in other words, utilize the entire spectrum of leverage points—shallow ones for the early on-set and deep ones for the long-term success of transformation processes.

Under which circumstances can international food supply be considered sustainable, and what are acceptable trade-offs? Although close geographical and relational proximity seems to be a reasonably good *proxy* for sustainability, there are other relevant aspects to be considered when adopting a *comprehensive* sustainability perspective. First, there are more specific principles that are not captured the presented set because they are not directly linked to overcoming large distances. Such principles would address, for instance, production methods (monoculture vs. integrated farming systems), resource use, packaging waste, recycling rates, and more (Velten, Leventon, Jager, & Newig, 2015). Second, trade-offs are not sufficiently captured here. For example, overcoming large geographical distances by substituting international food products, for example, sugar cane, might deprive smallholders of their livelihood because they depend on export and import markets (Holt & Watson, 2008)—which seems problematic with respect to the history and present state of exploitation, power imbalances, and lack of responsibility (Clapp, 2015; Hendrickson et al., 2008). Although close proximity captures in a pragmatic way

important facets of sustainability, it should be embedded in a comprehensive sustainability perspective on a case-by-case base to ensure that no critical aspect is overlooked. In summary, reducing large distances contributes to sustainable development *if* a comprehensive set of sustainability principles (see, e.g., Broman & Robèrt, 2017 or Gibson, 2006) is respected.

We presented a *convenience sample* of cases, which provide empirical support for the proposed framework. Yet, the sample is limited in geographical focus (most cases are from Germany and other central European countries) and size of enterprises (small-to-medium-sized enterprises). Also, a good share of enterprises uses volunteers and/or has only been established recently—thus, the economic viability, a key component of sustainability, is still to be demonstrated. Finally, some cases illustrate the respective approach well; others do so only to a certain extent. The proposed set of approaches and principles needs further empirical substantiation.

For (large-scale) sustainability transformation, that is, to increase the impact of sustainability initiatives, (bounded) scaling or amplification processes are necessary (Lam et al., 2019). Broadening the impact of the presented practices, for example, sailboat transportation, would need to go hand in hand with reduced consumption and sufficiency (Young & Tilley, 2006) as well as technological development, for example, cargo sailboats with higher volume and additional solar power for maneuvering or cooling systems. Businesses, which are based on trustful relationships among the actors involved, need to be scaled carefully and limited to a certain number of involved people in order to maintain high levels of trust (Ostrom, 2009). Transferring practices (solutions), rather than scaling them, might be a viable option, too (Forrest, Stein, & Wiek, 2019). Finally, policies and regulations that support sustainable practices and restrict unsustainable practices would need to be passed to further foster the food economy transformation towards sustainability.

6 | CONCLUSIONS

We presented a set entrepreneurial approaches and illustrative cases for addressing large geographical and relational distances in international food supply. The presented framework structures the approaches and cases according to two domains of distance (geographical and relational) and is specified by pragmatic sustainability principles to foster adoption. The study contributes to the concept and practice of sustainability entrepreneurship in the area of food systems. Future research ought to include broadening the spectrum of empirical cases to substantiate the framework and real-world applicability; investigating success factors and barriers for adoption to support enterprises in joining the sustainability transformation; assessing the transformative potential of approaches and cases to better coordinate efforts across enterprises; and exploring how to best combine entrepreneurial approaches with governmental and NGO efforts to transform food systems towards sustainability. Although entrepreneurial approaches to overcome large distances are one among other endeavors to foster sustainability in food systems worldwide, they

seem to have significant potential to foster change because of their openness for experimentation and scaling.

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4.3 Connecting Consumers to Producers to Foster Sustainable Consumption in International Coffee Supply – A Marketing Intervention Study

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Connecting consumers to producers to foster sustainable consumption in international coffee supply – a marketing intervention study

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ABSTRACT

Creating connections between consumers and producers (relational proximity) seems a promising approach to foster sustainable consumption behaviour in international food supply. In this intervention study, we tested three experiential marketing interventions to connect consumers to producers of an international community-supported agriculture (CSA) partnership for coffee (*Teikei Coffee*). Consumers ($N = 136$), recruited at a fair for sustainable products and lifestyles in Germany, (a) watched a promotional video about the coffee CSA, (b) attended a presentation of the coffee CSA, or (c) participated in a mindful tasting experience of the CSA coffee. Findings indicate that experiential marketing tools, to varying degrees, indeed create connections from consumers to producers, thereby fostering sustainable consumption behaviour. The findings can inform international food supply marketing efforts aimed at stimulating sustainable consumption.

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Introduction

International food supply often creates negative externalities, such as unequal distribution of risks and benefits among supply chain actors (Mcmichael, 2013), ecological damage caused by industrial agriculture (Weis, 2010), or high greenhouse gas (GHG) emissions due to long distance transportation (Prell, 2016). Large geographical distances between production and consumption, as well as large relational distances between producers and consumers contribute to this lack of sustainability (Princen, 1997; Weber et al., 2020). Clapp (2015) highlights different negative effects of distances in global food supply, for instance, distances obscure exploitative features of the production process as well as the full social and ecological costs of a product. Consequently, consumers are often not aware of the negative impacts their consumption may cause (Princen, 2002). Yet, even if they become aware of negative impacts, consumers often do not change their

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behaviour due to the aforementioned large geographical and relational distances (Clapp, 2015; Iles, 2005).

Connecting consumers to producers, referred to as creating 'relational proximity', has become an objective of food initiatives and businesses to foster sustainability in international food supply (Weber et al., 2020). Providing (environmental) product information to consumers can enhance sustainable consumption behaviour (Leire & Thidell, 2005), and marketing might become 'a means to enable sustainable consumption' (Kemper et al., 2019, p. 1). Kemper and Ballantine (2019) distinguish between auxiliary, reformative, and transformative sustainability marketing. Auxiliary marketing promotes sustainable products, reformative marketing promotes sustainable behaviour, whereas transformative marketing promotes sustainable changes of current institutions and norms. Yet, information and knowledge alone do not suffice to change behaviour (O'Brien, 2013; O'Rourke & Ringer, 2016). Emotions and experiences are important drivers of sustainable behaviour (Ives et al., 2018; Villarino & Font, 2015) and influence consumer choices (Holbrook & Hirschman, 1982). Thus, marketing that connects consumers through experience to a brand (Brakus et al., 2009; Schmitt, 1999) or places (Iaia et al., 2016), i.e. *experiential* marketing, offers a promising approach to foster sustainable consumption behaviour (Dettori, 2019; Eiseman & Jonsson, 2019).

However, there is little empirical evidence of if and how experiential marketing tools can connect consumers with producers and thereby foster sustainable consumption behaviour. To address this question, we empirically examine the effectiveness of three experiential marketing tools, compared to a conservative control condition, using the international community-supported agriculture (CSA) partnership *Teikei Coffee* that offers coffee produced by farmers in Mexico to consumers in Germany and Switzerland as a case study.

Coffee consumers ($N = 136$), recruited at a fair for sustainable products, services, and lifestyles, were randomly assigned to (a) watch a promotional video about the CSA, (b) attend a presentation of a CSA team member, or (c) participate in an audio-guided mindful coffee tasting. A control group received a leaflet with written information about the *Teikei Coffee* CSA – contrary to a typical control group without treatment – to examine if the experiential marketing tools outperform the traditional text-based marketing tool. We examined the effects of these marketing interventions on five dependent variables: consumers' perceived relational proximity (consumer-to-producer connection), intention to become a paying member of the CSA, attitude regarding sustainable consumption, willingness-to-pay, and product evaluation. Before data collection and analysis, we pre-registered the study design (hypotheses, data analysis) on the *Open Science Framework* (OSF)¹ platform for transparency and quality of data collection and analysis.

Random participant assignment allows for causal inferences based on the experimental approach (i.e. internal validity), while applied real-world context maximises the study's external validity. We provide empirical evidence for the potential of experiential marketing for fostering sustainability as conceptualised by Dettori (2019), Eiseman and Jonsson (2019), and others. The study findings can support sustainable food businesses in adopting measures that connect geographically-distant consumers to producers while marketing their products to foster sustainable consumption.

Case description

Founded in 2016, *Teikei Coffee* applies the local concept of community-supported agriculture (CSA) to the international level and is one of a few international CSAs (Rommel, 2019; Weber et al., 2020). The company facilitates a short supply chain from coffee farmers in Mexico, a sailboat cargo shipping company, two roasters in Germany and Switzerland, to consumers in Germany and Switzerland. Consumers can become members and pay up-front, pre-financing the next year of coffee production in return for a share of the harvest. The intention is to equally distribute risks between producers and consumers (Bloemmen et al., 2015). All supply chain actors negotiate prices together to ensure they meet everyone's needs. Virtual communication and face-to-face meetings between the team in Europe and the team in Mexico builds trust. In 2018, *Teikei Coffee* handled 11 tonnes of green coffee beans with two full-time employees and 15 volunteers. *Teikei Coffee* is one of the pioneering companies that aims to build direct relationships from consumers to producers across large geographical and relational distances (Weber et al., 2020).

Theoretical background and hypotheses

Consumer-producer connection and sustainable consumption

International food businesses use different marketing tools when attempting to connect supply chain actors to foster sustainability. Because of the large geographical distance between consumers and producers and other constraints, most marketing tools create only *indirect* (not personal) connections. In addition, most connections are *unidirectional*, connecting consumers to producers, and rarely the other way around (reciprocity). Established consumer-producer connection (relational proximity) can be defined as consumers' possessing knowledge and/or caring about the producers (Kneafsey et al., 2008). Such relational proximity is assumed to contribute to sustainable consumption behaviour.

Sustainable consumption behaviour is defined as 'individual acts of satisfying needs [...] by acquiring, using and disposing goods and services that do not compromise the ecological and socioeconomic conditions of all people (currently living or in the future) to satisfy their own needs' (Geiger et al., 2018, p. 20). We focus here on purchasing behaviour because this is a key means through which consumers create impact (Grunert, 2011). Food purchasing choices can consider ecological aspects such as organic production or low GHG emission transport and socio-economic aspects such as fair payment or CSA principles related to the product. In this study, we focus on four proxies for sustainable consumption behaviour, including consumers' product evaluation (Saari et al., 2018), their attitude towards sustainable consumption (Verma, 2014), intention for long-term commitment (here, CSA membership) (Hayden & Buck, 2012), and their willingness-to-pay for sustainable or socially responsible products (Tully & Winer, 2014). CSA schemes align with transformative sustainability marketing as they offer significant changes in economic interactions and exchange.

Experiential marketing interventions

Connecting consumers to producers to foster sustainable consumption behaviour can be facilitated through experiencing each other's work and life situations (Dowler et al., 2009;

Kneafsey et al., 2008; Thompson & Coskuner-Balli, 2007). As mentioned above, we focus here on indirect and unidirectional connections facilitated through experiential marketing tools (Dettori, 2019; Schmitt, 1999). Experiential marketing is based on the assumption that consumers' choices are not only guided by rationality and information but involve 'a steady flow of fantasies, feelings, and fun' (Holbrook & Hirschman, 1982, p. 132). Experiential marketing allows consumers to sense, feel, think, act, and/or relate to the marketed product, service, or company (Schmitt, 1999). Eiseman and Jonsson (2019) propose the coffee drinking experience as a lever for engagement with sustainability, in particular climate change. In this study, we examine three experiential marketing tools, targeting (a) *affective* (feel), (b) *cognitive* (think), and (c) *sensory* (sense) experiences, regarding their potential for connecting consumers with producers and outperforming traditional marketing tools (i.e. control condition with leaflet information).

A – Watching a promotional video about the CSA product and company (affective)

We selected a promotional video to facilitate an affective consumer experience. Emotional videos have been used successfully to create empathy (Cargile, 2016), which can influence pro-social behaviour (Eisenberg, 2007). A video allows consumers to virtually travel to geographically distant places and people – through dynamic pictures, emotional music, and verbatim quotes of people.

B – Attending a presentation of a CSA team member (cognitive)

For the cognitive experience, we selected an in-person presentation by a CSA team member that seeks to create a direct relationship with the consumer. Relationships rely on trust, anchored in reputation, reciprocity, and repetition (Ostrom, 2003). It is important that the team member possesses reputation and credibility through direct contact with the producers (here coffee farmers). By sharing this first-hand experience, the presenter partially represents the producers, and builds an indirect personal relationship between the producers and the consumers in the audience. In addition, the presenter creates an interactive setting, in which consumers are encouraged to ask questions in order to gain a comprehensive understanding of the CSA model and its principles.

C – Participating in an audio-guided mindful product tasting (sensory)

For the sensory experience, we developed an audio-guided mindful coffee tasting experience (see Kabat-Zinn, 2005). Sensory marketing engages the consumers' senses with the objective to 'affect [...] their perception, judgment and behavior' (Krishna, 2012, p. 333). For coffee drinking experiences, Bhumiratana et al. (2014) have compiled 44 terms that express a wide range of emotions. Mindfulness is 'awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience' (Kabat-Zinn, 2003, p. 145). The mindful raisin-eating exercise has, for instance, been found to lead to higher enjoyment of food (Hong et al., 2014). Other studies indicate that mindful activities in general can influence sustainable consumption behaviour (see Fischer et al., 2017 for a review; Wamsler et al., 2018).

D – Control condition: reading a leaflet with information about the CSA

Providing relevant product information (e.g. sustainability performance) can foster sustainable purchasing behaviour, in particular, if consumers are already committed to

sustainability (O'Rourke & Ringer, 2016). Traditional marketing widely uses websites, newsletters, leaflets, and other text-based communication tools. Hence, consumers in our control group received detailed information about the CSA project through a leaflet. Compared to no information at all, this control condition allows us to examine whether, to what extent, and why our experiential marketing tools outperform traditional marketing approaches.

Hypotheses

The first hypothesis of this study explores the link between experiential marketing and relational proximity between consumers and producers:

H1: The three experiential marketing tools (A, B, C) increase the level of perceived relational proximity from the coffee consumers to Teikei Coffee and its team (H1a) and to the coffee producers (H1b) more than the control intervention.

Studies have shown that experiential marketing positively correlates with consumers being satisfied with the product or service (You-Ming, 2010). To promote sustainable consumption for the mass market, marketing scholars suggest to focus on product-specific features, such as the coffee's taste, and to *not* primarily promote its sustainability performance (Saari et al., 2018). Therefore, we hypothesise:

H2: The three experiential marketing interventions (A, B, C) have a greater positive effect on consumers' evaluation of the coffee than the control intervention.

Studies have shown that feelings and beliefs about the environment determine attitudes more so than knowledge (Pooley & O'Connor, 2000) and that experiential marketing in particular can have a positive effect on consumers' attitude towards the marketed product or service (Balakumar & Swarnalatha, 2015). Taking into account that the three interventions market distinct aspects of sustainable consumption directly related to *Teikei Coffee*, we hypothesise:

H3: The three experiential marketing interventions (A, B, C) have a greater positive effect on consumers' attitude regarding sustainable consumption than the control intervention.

Studies have shown that if consumers feel emotionally connected to a product or a company, it increases their product or brand loyalty (Brakus et al., 2009; Debucquet et al., 2020). Therefore, we hypothesise:

H4: The experiential marketing interventions A and B attract consumers to become a member of the Teikei Coffee CSA more than the control intervention.

Finally, studies have shown that if consumers know more about a product or a company, it increases their willingness-to-pay (WTP) (Dwivedi et al., 2018). The product itself might not be the decisive factor; it could also be the company's mission. Other

studies have shown, however, that product tasting alone might not influence consumers' WTP (Torquati et al., 2018). Therefore, we hypothesise:

H5: The three experiential marketing interventions (A, B, C) have a greater positive effect on consumers' WTP for Teikei coffee (higher price) than the control intervention (H5a), with interventions A and B having a stronger positive effect than intervention C (H5b).

Methods and procedure

Study setting, recruitment, participants, sample size

Data were collected at the 'Heldenmarkt' in Hannover, Germany on September 14–15, 2019 – an annual national consumer fair for sustainable products, services, and lifestyles, which attracted around 2,000 visitors in 2019 (HAZ, 2019). Study participants were recruited on both days between 10am and 6pm when passing by the *Teikei Coffee* exhibition booth. Requirements for participation were being at least 18 years of age and drinking coffee. Participation was incentivised by entering a lottery to win one of five packages of *Teikei* coffee (250g, €9.50). Participants were randomly assigned to one of the three experimental interventions or the control condition using the random numbers function in Microsoft Excel. After the respective intervention or reading the CSA leaflet (control group), participants completed a questionnaire.

A total of 136 fair visitors across all four experimental groups ($n = 34$ per condition), participated in the study. The minimum target sample size with sufficient power was $N = 96$ participants overall ($n = 24$ per condition). We conducted an a-priori sample size analysis in G*Power (Faul et al., 2007), which yielded these target numbers for a one-way ANOVA with four conditions, a type-1 error level of $\alpha = .05$, a minimal test power of $1 - \beta = .90$ and a theoretically-assumed effect of $f = 0.4$. To further increase statistical power and to be able to detect potentially smaller effect sizes, we pre-registered a-priori to recruit additional participants beyond this minimum. We did not analyse any data before data collection was completed (Simmons et al., 2011, 2018). As pre-registered, six participants had to be excluded because their scores exceeded the pre-defined exclusion criterion: $> \pm 2.5$ standard deviations (*SD*) from the cell mean (see OSF pre-registration).

Independent variable: experiential marketing interventions

The video intervention (A) featured a promotional video (2:50 min) of *Teikei Coffee* with short statements by the founder, team members and coffee farmers, as well as short film sequences from all supply chain phases. The video included direct, verbatim quotes, emotional music, and close-ups of team members' faces. It conveyed *Teikei Coffee's* mission, supply chain activities, international business partners, involved people (with names and faces), and sustainability features.

The presentation intervention (B) featured a talk (ca. 20 min) given by a team member of *Teikei Coffee*, who had spent three months in Mexico with the coffee farmers and had sailed back with the ship delivering coffee to Germany. Printed pictures (A4) of coffee

farmers and places supported and visualised the presentation. The member presented the general model of coffee CSAs in detail, for example, explaining the price model and benefits of up-front payments, as well as the specific *Teikei Coffee* CSA partnership, using personal stories, impressions, and experiences. Between 4 and 5 participants attended each presentation and were allowed to ask questions at the end.

The mindful coffee tasting intervention (C) used an audio file (5:30 min) to guide participants in experiencing a cup of *Teikei* coffee in a mindful way, from smelling, touching, and hearing, to tasting it. Participants received the hot-brewed coffee as they usually drink it (with/without milk and/or sugar). The mindful tasting exercise did not include any information about *Teikei Coffee* as a CSA company.

The control intervention featured a leaflet with detailed information about *Teikei Coffee*, its CSA concept, supply chain activities, international business partners, and sustainability aspects. Contrary to a typical control group without treatment, we opted for a conservative test, in which the control group received written information about the CSA, in order to examine if the experiential marketing tools outperform the traditional text-based marketing tool.

Table 1 summarises key features of the four interventions.

Dependent variables

The dependent variables were measured with a questionnaire that participants completed subsequent to the intervention. In line with the core focus of this research, we first explored participants' perceived connection (*relational proximity*) to (a) *Teikei Coffee* and its team ('I feel close to/identify with/feel connected to the project *Teikei Coffee*') and (b) to the *Teikei* coffee farmers ('I feel close to/identify with/feel connected to the coffee farmers'), also using the inclusion of other in self scale (Aron et al., 1992; detailed on OSF).

We next assessed participants' sustainable consumption behaviour by exploring their (1) *evaluation* of the product *Teikei* coffee ('I like the *Teikei* coffee'; 1 = *not at all*; 7 = *very much*) and (2) their *attitude* regarding sustainable consumption (e.g. 'It is important to me that my food is transported with as little CO₂ emissions as possible'; five items, $\alpha = .79$). We also assessed (3) participants' *intention* to become a paying member of the *Teikei Coffee* CSA ('I can imagine becoming a member of a *Teikei Coffee* consumer community and with that receiving the coffee delivery about 4 times a year'; 1 = *not at all*; 7 = *very much*), and (4) their *willingness to pay* for the *Teikei* coffee ('How much would you pay for 500g *Teikei Coffee*?'; in €).

Finally, the survey asked for participants' age, gender, highest educational degree, political orientation, net monetary income per month, previous knowledge about CSA principles and the coffee business *Teikei Coffee*, as well as their subjective importance of sustainable consumption.

Figure 1 visualises the hypothesised interrelations between independent and dependent variables.

Table 1. Key features of the four marketing interventions used in this study.

	Video (A)		Presentation (B)		Coffee Tasting (C)		Leaflet (Control)
Type of experience	Affective (feel)	Cognitive (think)			Sensory (sense)		Cognitive (think)
Marketing medium	Video	Verbal presentation (CSA team member)			Food product (cup of coffee)		Text
Type of communication	One-way	Two-way (interactive)			One-way		One-way
Contact	No personal contact	Indirect personal contact			No personal contact		No personal contact
Marketing focus	CSA/Company	CSA/Company			Product (coffee)		CSA/Company
Marketing content	<i>Teikei Coffee</i> concept, supply chain activities, partners, sustainability aspects, involved people (names & faces)	<i>Teikei Coffee</i> concept, supply chain activities, partners, sustainability aspects, involved people (names & faces), CSA principles; personal experiences			Different ways of sensing coffee		<i>Teikei Coffee</i> concept, supply chain activities, partners, sustainability aspects
Marketing material and technology	Tablet with video file and headphones	Team member, printed pictures of the CSA			Tablet with audio file and headphones, cup of coffee		Printed leaflet with text

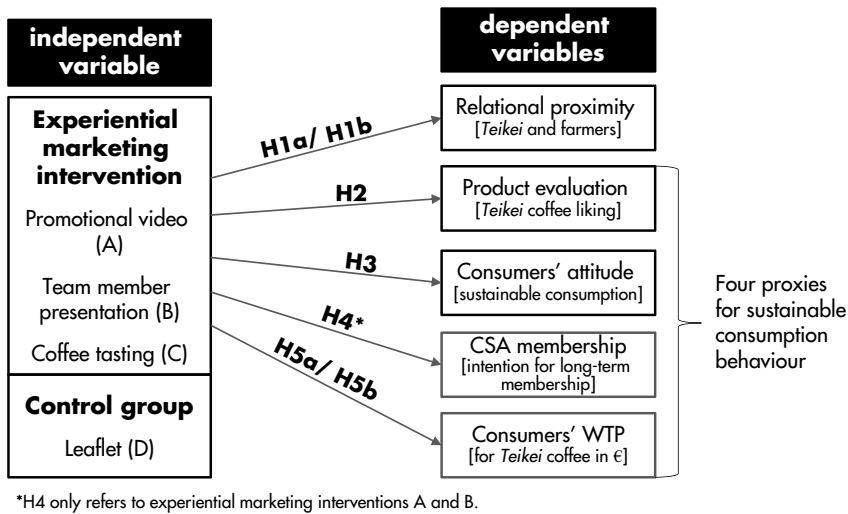


Figure 1. Hypotheses regarding interrelations between independent and dependent variables.

Data analysis & results

Relational proximity

In a first step, we compared all interventions against the control intervention with a one-way ANOVA. In line with hypothesis H1, we found significant and large main effects of the experiential marketing interventions on (H1a) consumers' perceived relational proximity towards *Teikei Coffee* and its team, $F(3, 126) = 8.27, p < .001, \eta_p^2 = .17$, and (H1b) towards the coffee farmers, $F(3, 126) = 8.05, p < .001, \eta_p^2 = .16$ (Figure 2).

In a second step, we separately compared the three intervention conditions against the control group (i.e., planned contrast analyses) to explore how each intervention impacted relational proximity. As Figure 2(a) illustrates, the promotional video *increased* consumers' perceived relational proximity to *Teikei Coffee* and its team significantly more than the control intervention, $t(126) = 2.81, p = .006$. The same was true for customers' relational proximity towards the coffee farmers, $t(126) = 2.66, p = .009$ (Figure 2(b)). The team member presentation, $t(126) = 0.12, p = .905$ (for *Teikei Coffee*) and $t(126) = 0.37, p = .714$ (for farmers), and the mindful coffee tasting, $t(126) = -2.20, p = .029$ (for *Teikei Coffee* and its team) and $t(126) = -2.26, p = .025$ (for farmers), both did not increase consumers' perceived relational proximity. In fact, the mindful coffee tasting exercise, which did not feature any information about the CSA project or *Teikei*, caused a significantly *lower* perceived relational proximity to *Teikei Coffee* and its team as well as towards the coffee farmers than the control condition. In all, H1a and H1b were partly confirmed.

Product evaluation

In line with H2, there was a significant and large main effect of the experiential marketing interventions on consumers' evaluation of the *Teikei* coffee, $F(3, 68) = 5.73, p < .001, \eta_p^2 = .20$. Planned contrast analyses showed that the coffee tasting had a significantly greater positive

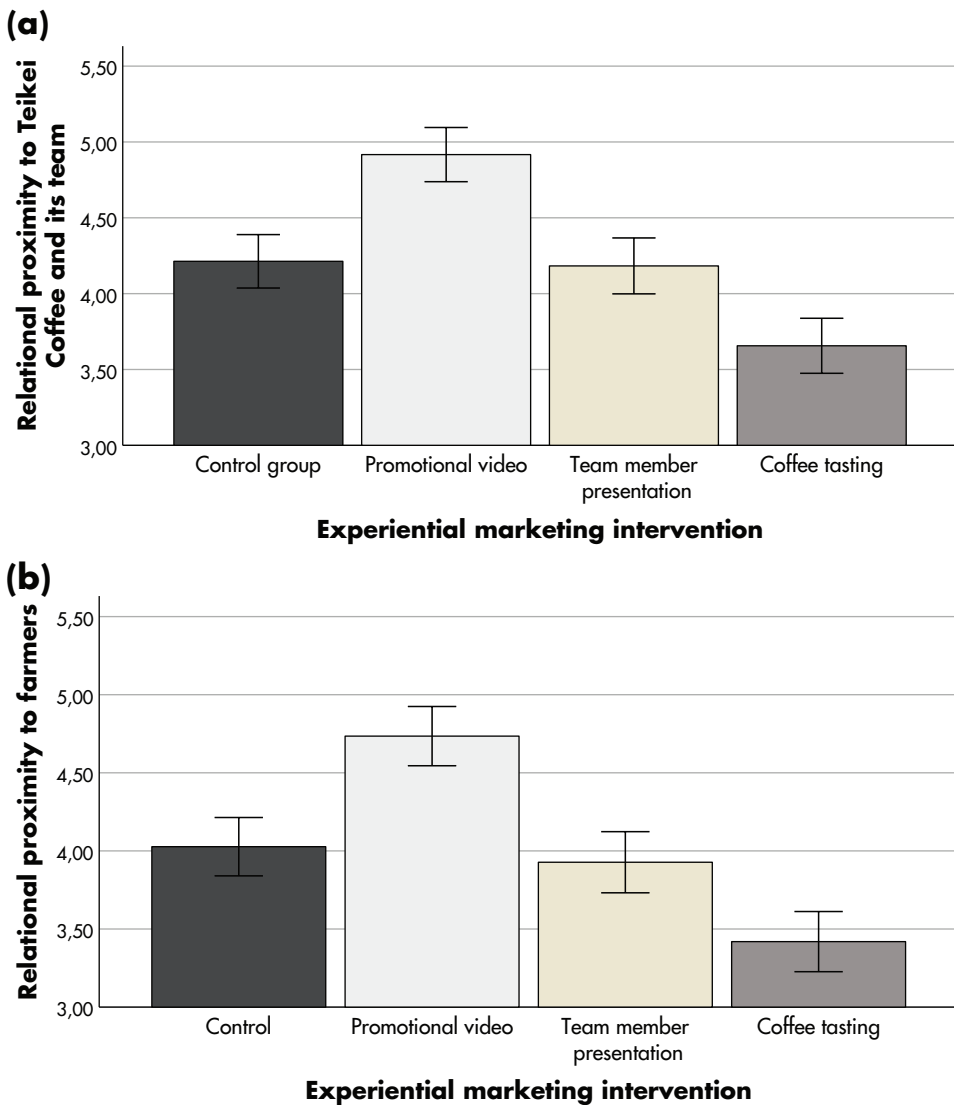


Figure 2. Consumers' perceived relational proximity towards *Teikei Coffee* and its team (a) and towards the coffee farmers (b), as a function of experiential marketing interventions. Error bars reflect ± 1 SEM.

effect on consumers' evaluation of *Teikei* coffee than the control intervention, $t(68) = 3.92$, $p < .001$ (Figure 3). The promotional video had a marginally greater effect, $t(68) = 1.94$, $p = .056$, while the effect of the team member presentation did not differ significantly from the control condition, $t(68) = 1.25$, $p = .215$. Thus, hypothesis H2 was also partly confirmed.

Attitude towards sustainable consumption

The experiential marketing interventions did not have a greater positive effect on consumers' attitude towards sustainable consumption than the control intervention (ANOVA main effect: $F[3, 125] = 0.96$, $p = .414$, $\eta_p^2 = .022$). All participants reported a markedly

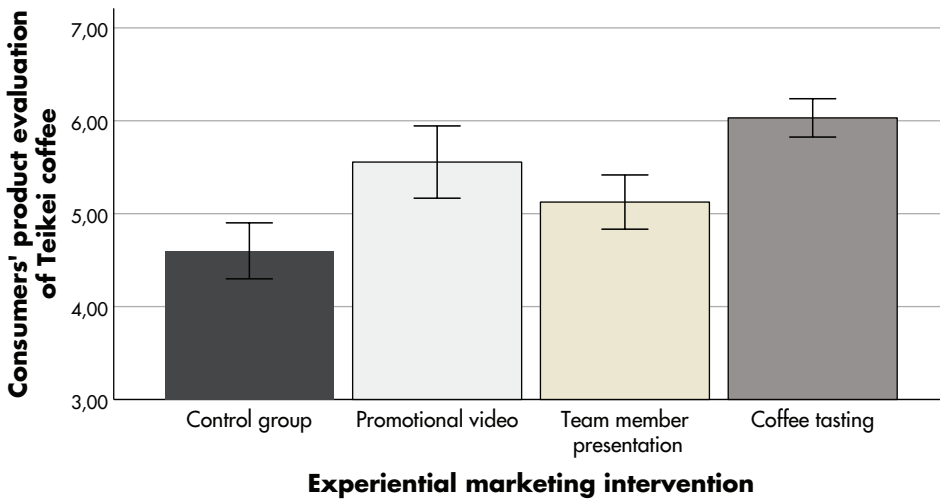


Figure 3. Consumers' evaluation of *Teikei* coffee as a function of the experiential marketing interventions. Error bars reflect ± 1 SEM.

positive attitude towards sustainable consumption ($M = 5.78$, $SD = 0.74$), which differed significantly from the scale mean, $t(134) = 27.64$, $p < .001$. This may not be too surprising as participants were recruited at a sustainability fair. Hypothesis H3 was not confirmed.

Membership in CSA

In line with H4, both the team member presentation and the promotional video intervention were more likely to motivate consumers to become a paying member of the *Teikei Coffee* CSA than the control intervention, yet with marginal significance, $t(117) = 1.48$, $p = .071$ (Figure 4). This positive effect on membership intentions was particularly strong for the promotion video, $t(110) = 1.62$, $p = .055$, (ANOVA main effect: $F[3, 117] = 1.13$, $p = .340$, $\eta_p^2 = .028$).

Willingness-to-pay (WTP)

Planned contrast analyses revealed that all three experiential marketing interventions jointly increased consumers' willingness-to-pay for *Teikei* coffee (higher prices) more than the control intervention, $t(126) = 2.80$, $p = .006$ (see Figure 5; ANOVA main effect: $F[3, 110] = 7.54$, $p < .001$, $\eta_p^2 = .17$). Examining the interventions separately revealed that only the team member presentation had a significantly greater effect than reading a leaflet in the control condition, $t(110) = 4.52$, $p < .001$. Thus, hypothesis H5a was confirmed but H5b was not.

Mediation analyses

We subsequently conducted mediation analyses (5,000 bootstrapping iterations, process macro; Hayes, 2013, model 4) for indirect effects to examine *why* the experiential

marketing interventions yielded positive effects on (a) consumers' willingness-to-pay for *Teikei* coffee and (b) their higher intention to become a paying *Teikei Coffee* CSA member. As multiple, competing mediators, we processed consumers' perceived relational proximity (averaged for both connections), their product evaluation, and attitudes towards sustainable consumption. We conducted separate mediation analyses per intervention comparing the respective intervention with the control condition (coded: $-1 = \text{control}$, $+1 = \text{intervention}$).

First, the promotional video created relational proximity in consumers, which led to a higher willingness-to-pay for *Teikei* coffee (indirect effect: $b = 0.78$, $SE = 0.303$, BC $CI_{95\%}$ $[+0.246; +1.43]$; zero is *not* included in the CI; see [Figure 6\(a\)](#)). The elevated relational proximity also accounted for the increased intention of becoming a paying *Teikei Coffee* CSA member (indirect effect: $b = 0.106$, $SE = 0.042$, BC $CI_{95\%}$ $[+0.040; +0.203]$; [Figure 6\(b\)](#)).

The mindful coffee tasting exercise led consumers to like *Teikei* coffee better ($b = 0.77$, $p < .001$). However, this elevated liking did not translate into significant (indirect) effects for consumers' WTP for *Teikei* coffee ($b = 0.45$, $SE = 0.65$, BC $CI_{95\%}$ $[-2.23; +0.25]$; zero was included in the CI), nor for consumers' intention to become a CSA member ($b = 0.16$, $SE = 0.21$, BC $CI_{95\%}$ $[-0.343; +0.546]$; zero included). For the other two mediators, the BC CIs also included zero and hence did not show significant indirect effects either.

The team member presentation led consumers to have more positive attitudes towards sustainable consumption ($b = 0.24$, $p = 0.044$). However, this did not translate into significant (indirect) effects for consumers' WTP ($b = -0.25$, $SE = 0.66$, BC $CI_{95\%}$ $[-1.91; +0.72]$; zero included), nor their CSA membership intentions ($b = -0.11$, $SE = 0.17$, BC $CI_{95\%}$ $[-0.577; +0.049]$; zero included). For the other two mediators, the BC CIs also included zero and hence did not show significant indirect effects.

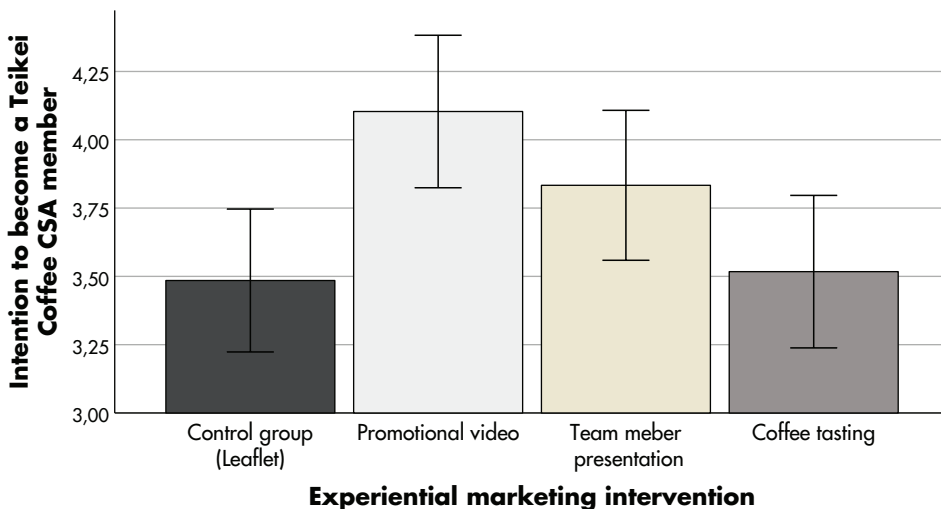


Figure 4. Consumers' intention to become a *Teikei Coffee* CSA member, as a function of the experiential marketing interventions. Error bars reflect ± 1 SEM.

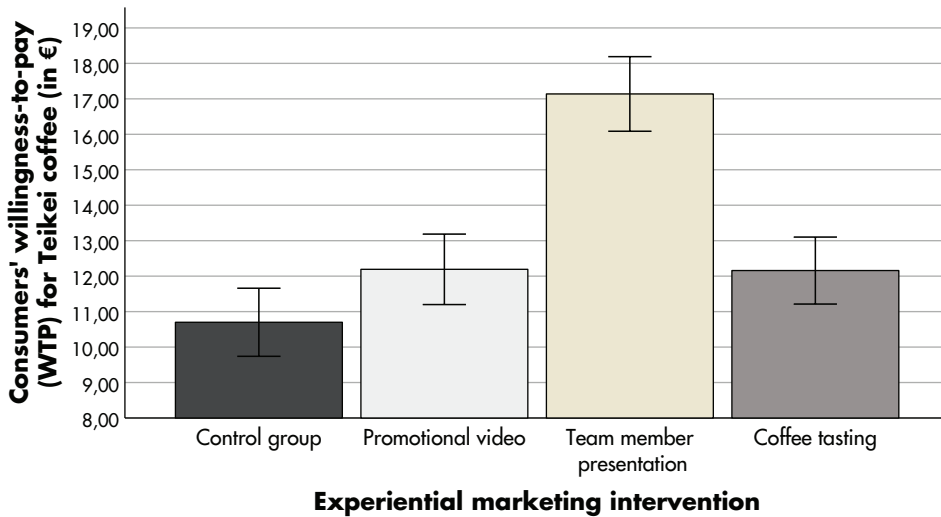


Figure 5. Consumers' willingness-to-pay (WTP) for *Teikei* coffee as a function of the experiential marketing interventions. Error bars reflect ± 1 SEM.

Discussion

This study asks if and how experiential marketing tools can connect consumers to producers (relational proximity) and foster sustainable consumption behaviour, as conceptualised in the literature. Our findings support this assumption, in general. All experiential marketing tools created *relational proximity* as they connected consumers to *Teikei Coffee* and its team, which is in line with literature on experiential marketing effects (Brakus et al., 2009). The promotional video (affective intervention) had the strongest positive effect on relational proximity, which is in line with literature on the effects of emotional videos (Cargile, 2016). Our results revealed significant effects not only on relational proximity but also on proxies for sustainable consumption behaviour. This supports Dettori's (2019) proposal to connect experiential with sustainability marketing fostering sustainable consumption behaviour.

The *product evaluation* was mainly influenced by the mindful coffee tasting (sensory intervention). This aligns with earlier findings that the coffee drinking experience comes with emotional stimuli (Bhumiratana et al., 2014). There are also environmental factors that influence coffee tasting (Spence & Carvalho, 2020), which play a lesser role when watching a video or listening to a presentation. This provides additional evidence that experiential marketing fosters product liking and consumers' satisfaction (You-Ming, 2010), in particular. This underlines the importance of marketing product specifics (Saari et al., 2018), e.g. the 'better' taste as a result of 'sustainable' production practices.

It is somewhat surprising that the experiential marketing tools tested in this study did not show any significant effect on participants' *attitude regarding sustainable consumption*, one pre-condition for sustainable consumption behaviour (Ajzen, 2015; Verma, 2014). This finding does not support the suggestion to use the coffee drinking experience 'as a method for changing attitudes' (Eiseman & Jonsson, 2019, p. 571). However, this lack

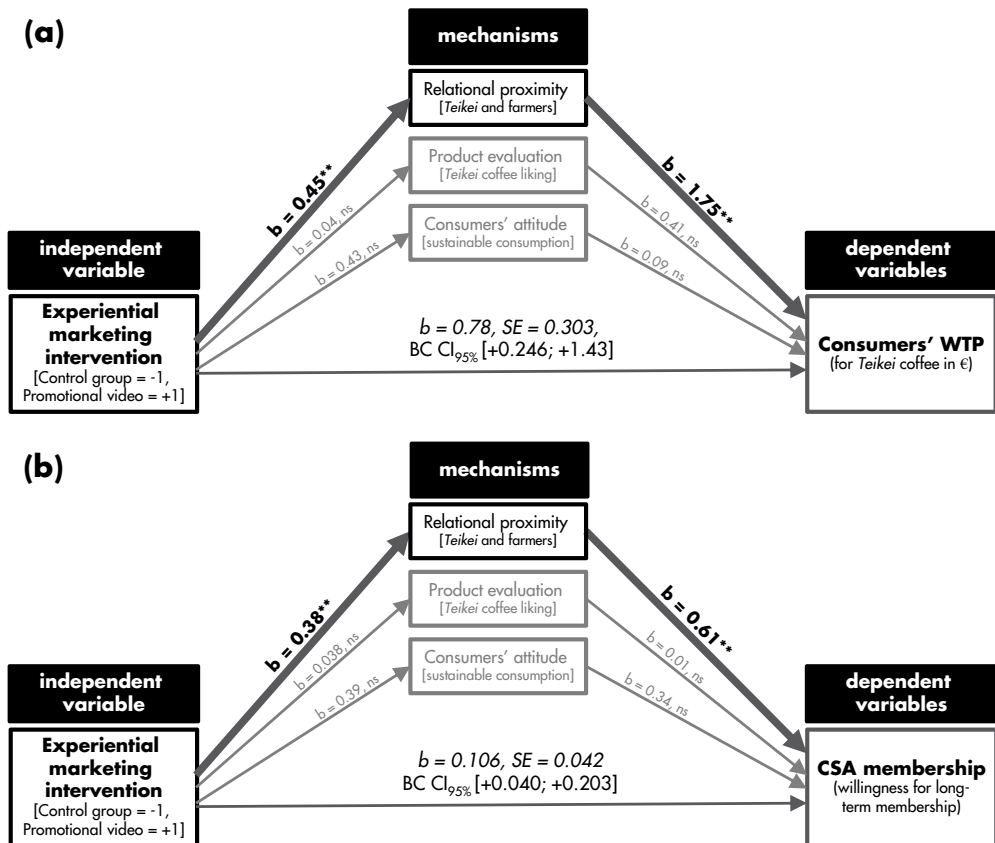


Figure 6. Mediation analyses for consumers' willingness-to-pay (WTP) for *Teikei* coffee (a) and their intention to become a paying CSA member (b).

Both bias-corrected confidence intervals (BC CI95%) for the mediator relational proximity do not include zero and hence corroborate the assumption that higher relational proximity accounted for the beneficial marketing effects on higher WTP and stronger membership intentions. The other two mediators 'product evaluation' and 'attitude towards sustainable consumption' (in grey) were not significant.

of effect may be simply due to the fact that study participants were recruited at a sustainability fair and already reported very positive attitudes towards sustainable consumption.

For consumers' *willingness-to-pay* (WTP) a higher price, only the team member presentation (cognitive intervention) had a significantly greater effect than reading a leaflet. In this intervention, consumers had the chance to comprehensively understand the financing concept and price model of a CSA and the case of *Teikei Coffee*. That a deeper understanding of a sustainable company's products and mission increases consumers' WTP aligns with calls for more transparency in international food supply (Kalfagianni & Skordili, 2019) and the shift from passive to reflexive consumer (Beckett & Nayak, 2008).

Consumer's *intention to become a member of the CSA* was influenced most strongly by the promotional video and was strongly affected by the team member's presentation.

More obvious behavioural effects could have been elicited by asking for actual subscriptions after the event, but was refrained from due to privacy concerns and data confidentiality. Future research may want to examine such effects.

The mediation analysis showed that the promotional video's positive effect on perceived relational proximity translated into long-term commitment (intention to become a paying CSA member) *and* increased WTP. In other words, relational proximity is indeed a driver for sustainable consumption behaviour. The video's strong effects confirm the assumption that experiences in general, and emotions in particular, are important facilitators for sustainability outcomes (Villarino & Font, 2015) and pro-social behaviour (Eisenberg, 2007) and that marketing can facilitate this (White et al., 2019).

These findings have practical implications for food entrepreneurs and businesses that intend to pay and ask fair (higher) prices based on producers' needs (Antoni-Komar et al., 2019), to share production risks with consumers (Bloemmen et al., 2015) and foster sustainability in international food supply (Weber et al., 2020). Considering the relatively low cost of these marketing tools, they seem to be viable and effective options for food businesses with a comparably small marketing budget.

The present study is not without limitations. First, as mentioned above, this study was conducted at a sustainability fair with participants leaning towards sustainable consumption behaviour and included a limited number of consumers in the experiment (although a power analysis indicates sufficient test power and an adequate sample size for the assumed effect size). Nonetheless, a similar study with a more diverse consumer pool and an even larger sample could further confirm the findings for broader generalisability. Second, it is likely that the effects of the team member presentation are to some degree dependent on the presenter (sympathy factor or lack thereof) and might vary for presentations by different team members. Again, a study that would test for this condition might allow for further generalisation of the findings. Future research may also attempt to more directly measure consumers' understanding of CSAs and their associated costs to examine whether this elevated knowledge mediates the aforementioned direct effects on sustainable consumption behaviour (WTP and intention membership). Third, this study is limited to indirect and unidirectional connections from consumers to producers. Experiential marketing tools that allow for creating direct and bi-directional connections, for instance, through video calls, might outperform the tools examined here and would be interesting follow-up research. Finally, our study focused on the effects of experiential marketing tools on *consumers*. The same tools might have positive effects on *production* practices, too, as has been shown in other studies for CSA projects and their impact on sustainable farming practices and human health (Bloemmen et al., 2015; Hvitsand, 2016). Such broader studies on the effectiveness of experiential marketing tools on production practices could help to accelerate transformations towards sustainable consumption *and* production behaviour.

This study can contribute to emphasising sustainability as 'a serious agenda in the market' (Yngfalk, 2019, p. 1563). Insights on practical applications of (transformative) sustainability marketing (Kemper & Ballantine, 2019) may counteract prominent marketing practices often resulting in subverting sustainability (Yngfalk, 2019). This may not only shape transformations towards sustainable consumption but also change underlying worldviews (Kemper et al., 2019).

Conclusions

This experimental intervention study indicates that experiential marketing tools can promote connections from consumers to producers (relational proximity) and thereby foster sustainable consumption behaviour. Compared to traditional text-based marketing tools (leaflet), affective experience (promotional video) showed the greatest potential to increase perceived relational proximity, which, in turn, led to a higher long-term commitment of consumers and a higher willingness-to-pay. The cognitive experience (team member presentation) directly increases consumers' willingness-to-pay, which suggests that this dependent variable is also influenced by a better understanding and stronger approval for why the price should be higher. The sensory experience of mindfully tasting coffee caused consumers to appreciate the product significantly more, but did not foster sustainable consumption behaviour in terms of a higher willingness-to-pay or intention to become a CSA member. This study provides empirical evidence for the potential of experiential marketing for fostering sustainability as conceptualised in the literature. It indicates the effectiveness of experiential marketing tools available to food entrepreneurs and businesses seeking to foster sustainability in international food supply.

Further research could look more closely into experiential marketing interventions to identify specific characteristics of each tool (music used in the video, presentation style etc.) that are the main trigger for the measured effect. It would also be interesting to measure the duration of the relational proximity, its strength, and if it affected other consumer decisions. Future research could also test the actual behaviour and not only the intention (i.e. purchase behaviour instead of self-reported WTP, CSA subscriptions instead of intention to become a CSA member). Lastly, a study could expand the scope and explore the effects of the interventions on other products, e.g. chocolate or olive oil.

Note

1. www.osf.io/4mpws

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Disclosure statement

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4.4 Cooperating with ‘Open Cards’ – The Role of Small Intermediary Businesses in Realizing Sustainable International Coffee Supply

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Cooperating With “Open Cards” – The Role of Small Intermediary Businesses in Realizing Sustainable International Coffee Supply

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Despite improvements, international food supply in general and coffee supply in particular continue to cause significant greenhouse gas emissions, economic inequities, and negative impacts on human well-being. There is agreement that dominant economic paradigms need to change to comply with the sustainability principles of environmental integrity, economic resilience, and social equity. However, so far, little empirical evidence has been generated to what extent and under which conditions sustainable international coffee supply could be realized through small intermediary businesses such as roasteries, breweries, and/or retailers. This case study reports on a collaborative project between a small coffee brewery and its customers in the U.S. and a small coffee roastery and its suppliers in Mexico that demonstrates how sustainable coffee supply could look like and explores under which conditions it can be realized. A research team facilitated the cooperation using a transdisciplinary research approach, including field visits and stakeholder workshops. The project (i) assessed the sustainability challenges of the current supply and value chains; (ii) developed a vision of a joint sustainable coffee supply chain; (iii) build a strategy to achieve this vision, and (iv) piloted the implementation of the strategy. We discuss the project results against the conditions for sustainable international coffee supply offered in the literature (why they were fulfilled, or not). Overall, the study suggests that small intermediary coffee businesses might have the potential to infuse sustainability across their supply chain if cooperating with “open cards.” The findings confirm some and add some conditions, including economic resilience through cooperation, problem recognition, transparency, trust, and solidarity across the supply chain. The study concludes with reflections on study limitations and future research needs.

Keywords: global food supply, value chains, small businesses, fair prices, transformation, transdisciplinarity

INTRODUCTION

Globally, 60 million people are involved in the annual production of 8.5 million tons of green coffee (Eakin et al., 2017), with the large majority being exported to the U.S. and Europe (International Coffee Organization, 2019). While coffee sales amount to tens of billions of dollars (e.g., 19 billion USD in 2017; United Nations Statistical Division, 2020), there are significant imbalances in the financial flows, e.g., only a small percentage of the purchase price for green coffee remains in the countries of production (Jaffee, 2007; Beshah et al., 2013). Low incomes for coffee farmers are often linked to low access to health services and schools as well as to migration to cities (Samper and Quiñones-Ruiz, 2017). Economic constraints also drive coffee rust epidemics (Villarreyana et al., 2020), a major economic and ecological challenge for coffee production, in particular in South America (Avelino et al., 2015). In addition, intensification of coffee production contributes to biodiversity loss due to deforestation (Philpott et al., 2008), as well as climate change due to greenhouse gas emissions (van Rikxoort et al., 2014).

Over the past decade, the coffee sector has seen the rise of voluntary sustainability standards, e.g., Fairtrade, 4C, UTZ, or Rainforest Alliance, among others (Pierrot et al., 2010). Some of these practices offer incremental improvements to the sustainability performance of coffee production (Zerbe, 2014; Winter et al., 2020). However, while about 25% of coffee traded globally is certified in one way or the other (Lernoud et al., 2018), this often does not improve smallholder farmers' livelihoods (Chiputwa et al., 2015), but rather benefits roasters or retailers (Valkila et al., 2010; Kolk, 2013; Dragusanu and Nunn, 2018). While there is evidence that some certificates perform well under specific circumstances (e.g., Parrish et al., 2005), there are often trade-offs between economic and environmental outcomes (Vanderhaegen et al., 2018). In short, certifications do not result in the "fundamental transformation of the global food system" (Zerbe, 2014) necessary to align with the sustainability principles of environmental integrity, economic resilience, and social equity (FAO, 2014; Levy et al., 2016).

Approaches that pursue sustainable coffee supply, other than certifications, are alternative trade arrangements (Rathgens et al., 2020), e.g., direct trade of coffee and relationship coffee models (Jaffe and Bacon, 2008; Edelman et al., 2020). Key players in these arrangements are intermediary coffee businesses between producers and consumers, i.e., roasteries, breweries, and retailers. Direct trade of coffee relies on a connection between a coffee producer on the one hand, and a roaster, brewer, and/or a retailer, on the other, who "seek to build a sustainable, long-term and mutually beneficial relationship to grow, process and market outstanding coffee" (Borrella et al., 2015, p. 34). This study intentionally focused on small intermediary businesses as an under-researched supply-chain actor group as studies on alternative trade arrangements in international food supply mostly focus on producers or consumers (Rathgens et al., 2020). While alternative trade arrangements might infuse sustainable practices across the coffee supply chain, they mostly focus on the pursuit of economic fairness and resilience (Gerard et al., 2019).

Conditions that enable alternative trade arrangements include, among others, direct contacts, trust, transparency, accountability, and commitment (Gerard et al., 2019; Edelman et al., 2020; Weber et al., 2020), all indicative of cooperating with "open cards" as a summative condition to advance sustainability across the supply chain.

Against this background, two objectives were derived:

- First, to explore the *extent* to which small intermediary coffee businesses can induce sustainable practices across their supply and value chains.
- And second, to explore the *conditions* conducive to such efforts.

These objectives were pursued through a study on a transdisciplinary project between a research team and two small intermediary coffee businesses, a brewery from the U.S. and a roastery from Mexico. The project (i) assessed the sustainability challenges of the current supply and value chains; (ii) developed a vision of a joint sustainable coffee supply chain; (iii) built a strategy to achieve this vision, and (iv) piloted the implementation of the strategy. We discuss the project results against the conditions for sustainable international coffee supply offered in the literature (why they were fulfilled, or not). Thereby, we explore the extent to which small intermediary coffee businesses, through cooperation, can induce sustainable practices across their supply and value chains.

While limited in generalizability due to the case-study nature, the results from this study could inform intermediary coffee businesses and policy makers interested in advancing sustainable international coffee supply. We would also hope that this study stimulates more research and theory building on the role of small intermediary businesses in creating sustainable supply chains. The project finally could inform researchers how to conduct transdisciplinary research to advance positive change in international food supply.

RESEARCH DESIGN

The project was conducted between September 2018 and November 2019 as a transdisciplinary collaboration between the *Sustainable Food Economy Lab* at Arizona State University and two coffee businesses, *Considerate Coffee Company* and *Catando Ando Coffee Roasters*. Considerate Coffee was a processing company for bottled cold-brew coffee in Phoenix, Arizona. Founded in 2017 and run by two co-owners, the company brewed coffee sourced from Ethiopia and roasted in Phoenix and distributed the bottled coffee drink mostly to restaurants and hotels. The company closed in 2020 due to private reasons. Catando Ando is a local coffee business with a roaster and coffee shop in Xalapa, Veracruz, Mexico. Founded in 2014 and run by two co-owners and four employees, the company roasts green coffee sourced from local farmers and distributes it in Mexico.

The selection of suitable project partners was informed by previous research on sustainable practices of intermediary

businesses in international food supply (Weber et al., 2020). For this case study, the researchers were looking for businesses that were (i) small intermediary businesses in international food supply; (ii) committed to sustainable business practices and models; and (iii) interested in piloting some of the practices not adopted yet. The researchers conducted semi-structured interviews with eight potential businesses – and eventually selected Considerate Coffee and Catando Ando. Both businesses were active as intermediary businesses, showed high commitment to sustainability, and were willing to experiment with new sustainable practices. In addition, we considered (iv) spatial proximity (Phoenix and Mexico) for feasible site visits and direct exchange; (v) existing contacts (to both businesses) for productive collaboration; and (vi) available expertise (coffee trade expertise) for accelerated project results. The main motivations of the businesses for participating in this collaboration was to advance sustainability and transparency across the supply and value chains; to broaden market access and livelihood opportunities for coffee farmers; and to cooperate with like-minded people and to learn from each other. The businesses did not receive any compensation for the collaboration. The project team consisted of the two co-owners and one employee from Catando Ando, the two co-owners of Considerate Coffee, and two researchers from the Sustainable Food Economy Lab (the authors).

The research team used an established transdisciplinary approach that guides researchers and practitioners in developing evidence-based solutions to sustainability problems (Lang et al., 2012; Wiek and Lang, 2016). The researchers developed relationships to both businesses through conversations and by personally visiting the businesses in Phoenix and in Xalapa. They then established the contact between the two businesses and facilitated the collaborative process, described below. Similar to participatory action research projects with smallholder farmers in coffee supply chains (e.g., Jaffe and Bacon, 2008; Méndez et al., 2017) the researchers and the coffee businesses collaborated closely in (1) understanding the current challenges in the coffee supply chains (assessment); (2) developing a vision for a joint sustainable international coffee supply chain; (3) building a strategy for achieving this vision; and finally (4) testing vision and strategy through a demonstration project (Table 1). Thereby, the researchers adopted different roles, namely, as process facilitator, knowledge generator, and knowledge broker (Wittmayer and Schöpke, 2014).

In the first phase, the current coffee supply and value chains of the two coffee businesses were mapped out and analyzed (cf. Castello Branco and dos Santos, 2018). Additional information about the current business practices was compiled and assessed against a comprehensive set of sustainability principles (cf. Weber et al., 2020), based on the Sustainability Assessment of Food and Agriculture (SAFA) framework of the United Nations Food and Agriculture Organization (FAO, 2014). Data was collected through document reviews, two semi-structured interviews (one per businesses) and five individual working sessions with the business owners (two with Catando Ando,

three with Considerate Coffee), as well as two site visits (one at each business site). Details on the price calculations for the value chains can be found in the **Supplementary Material**. In the second phase, a vision for a sustainable joint coffee supply chain was developed and refined based on a set of quality criteria, including coherence and plausibility (Iwaniec and Wiek, 2014). The vision process also included that participants shared their motivations and expected benefits of the collaboration to build trust and ownership for the process (Ostrom, 2003; Luederitz et al., 2017). In the third phase, a strategy (action plan) was developed on how to achieve the vision (Kay et al., 2014). Data for vision and strategy was collected through two 3-h all-hands working sessions, in which all seven team members joined, two individual meetings (one with each businesses), frequent email exchange, literature review, and reflections by the researchers (documented after each meeting). Some of the information was obtained by the intermediary businesses, who—due to short supply chain structures—had direct contact with farmers and consumers, respectively. For example, all upstream prices of the envisioned value chain were informed by Catando Ando's conversations with the coffee farmers. Catando Ando participated online in the working sessions. Main working language was English, with one of the researchers translating between English and Spanish as needed. In the fourth phase, based on the action plan, Considerate Coffee and Catando Ando piloted the joint supply and value chain. The process was documented with pictures and notes taken by the businesses. The researchers facilitated bi-monthly online meetings to share recent developments and address emerging issues. After the pilot project had ended (October 2019), the researchers facilitated a transfer workshop for coffee businesses in Phoenix (Weber and Wiek, 2020).

DESIGN PRINCIPLES FOR SUSTAINABLE INTERNATIONAL COFFEE SUPPLY

Incremental improvements do not suffice to address current sustainability challenges in international coffee supply (Zerbe, 2014). Approaches are needed that restructure international coffee supply in ways that align with a comprehensive set of sustainability principles (Samper and Quiñones-Ruiz, 2017; Castello Branco and dos Santos, 2018). The SAFA framework (FAO, 2014) provides a robust sustainability assessment framework for food systems. We made a few adaptations to fully reflect the nature of an international coffee supply chain with its variety of participating actors and entities. In addition, such principles are best formulated as design principles with clear direction of what to aspire to and applicable to what small intermediary businesses can do. The set of principles is most convincing (plausible) when grounded in existing pioneering practices (cf. Weber et al., 2020). We therefore indicate an exemplary coffee business that complies with the respective principle. The ten design principles used in this study are summarized in **Table 2**, below. They are adapted

TABLE 1 | Phases of the project.

Phase	(1) Current state assessment	(2) Sustainability visioning	(3) Strategy development	(4) Demonstration project	(5) Transfer workshop
Output	Current-state model of coffee supply and value chains	Vision of sustainable coffee supply and value chain	Strategy (action plan) to achieve the vision	Piloted sustainable coffee supply	Capacity in coffee businesses
Time period	Sep–Oct 2018 (4 weeks)	Oct–Nov 2018 (4 weeks)	Nov–Dec 2018 (2 weeks)	Dec 2018–May 2019 (6 months)	Oct 2019 (1 day)
Methods	Document review, interviews, site visits	Workshops and data analysis	Workshops and data analysis	Photo documentation, online meetings, reflections	Workshop and data analysis

from previous research (Weber et al., 2020), which provides the supporting literature.

RESULTS

Sustainability Problems Along the Current Coffee Supply Chains

The assessment exposed a number of sustainability challenges along the supply chains of Considerate Coffee and Catando Ando (Table 4-A).

Considerate Coffee's annual production volume was around 8,706 liters (or kg) cold brewed coffee, brewed from around 544 kg roasted coffee. Their customers, mostly restaurants and hotels, were located in Phoenix. Considerate Coffee's supply and value chain is illustrated in Figure 1. The coffee was transported more than 14,500 km from Ethiopia to Arizona with associated emissions (*Long distance/high CO₂ emissions*). There was a large number of actors ($n = 13$) involved in the supply chain (*Long complex supply chain*). The coffee was roasted in Arizona, not in the country of origin (*Value extracted from the country of origin*). Prices were unknown for most of the upper part of the value chain. Considerate Coffee was able to identify only a few prices, based on the closest business relationships and common knowledge, e.g., for exported Fairtrade certified green coffee. Based on current studies (Valkila et al., 2010; e.g., Chiputwa et al., 2015), we assumed that even Fairtrade prices could have been unfair (too low), at least for some supply chain actors (*Prices do not meet socio-economic needs*). Similarly, one has to assume—considering common practices—that coffee farming and processing were not based on organic, energy-efficient, and water-efficient technologies and practices (*Resource-intense production and processing techniques*); nor might they have supported equity efforts (*Lack of empowering women and minorities*). Finally, there were major gaps in information across the supply chain. Considerate Coffee only knew the two actors based in Arizona personally (retailer, roaster) and the names of two others (larger importer, farm site); yet, did not know any specifics about the life and work circumstances of any supply chain actors upstream. This translated into gaps in product information provided (*Insufficient product information*). With little/no knowledge, supply chain actors also displayed little/no support, assistance, and solidarity for each other (*Lack of caring professional relationships*). However, Considerate Coffee also displayed some positive sustainability features, for example, they

purchased Fairtrade-certified coffee which might have secured workers' health and safety (*Good working conditions*), and they produced coffee bio-char from coffee grounds and used only recycled material for their brewing equipment (*Resource-efficient processing techniques*).

There were fewer sustainability challenges related to Catando Ando's supply and value chain (Figure 2). Catando Ando operates and distributes in Mexico (*Short distance/low CO₂ emissions*), in direct contact to all six supply-chain actors, and with knowledge about prices associated with each element of the value chain. Knowing the farmers' life and work conditions and being in regular contact with them (*Caring professional relationships/Good working conditions*), Catando Ando indicates as a sustainability challenge that farmers and coffee pickers do not receive a fair price, at least 20% too low (*Prices do not meet socio-economic needs*): "Farmers get 3 pesos per kg [coffee cherries] as an average price. We pay [at least] 3.5 to 4 pesos per kg [coffee cherries]. This should be increased to 5 pesos to be fair." (Catando Ando, Visioning Workshop, 2018/11/08, for green coffee equivalents see Figures 2–4). Catando Ando is often not able to pay higher prices because its specialty coffee does not achieve adequate prices in Mexico. At the time of the project, Catando Ando was therefore exploring export markets, e.g., to Vietnam – with the implications of significantly higher food miles (*Long distance/high CO₂ emissions*) and more supply-chain actors involved (*Long complex supply chain*). While Catando Ando collaborates with coffee farmers on improving production and processing techniques in order to increase the quality of coffee cherries and green beans, most contracted farmers still use conventional coffee farming practices, e.g., using chemical pesticides against the fungus that causes coffee leaf rust (*Unsustainable production and processing techniques*). Catando Ando uses a packaging that displays the farmer's name, the coffee bean variety and the exact location of the coffee farm (*Relevant product information*).

The vision for a joint sustainable coffee supply chain

The vision reflects the desire to address the sustainability problems revealed in the assessment, starting with merging the two coffee supply chains of Considerate Coffee and Catando Ando. While this leverages their complementarities (Table 4-A), both companies were willing to explore additional efforts to enhance the sustainability performance of the joint supply chain.

TABLE 2 | Design principles for small intermediary businesses for sustainable international coffee supply, adapted from Weber et al. (2020), with correspondence to SAFA criteria and exemplary coffee businesses that have implemented the respective principle.

Principle	Definition (SAFA Criteria)	Example
Pay prices that satisfy socio-economic needs	Compensate every person working in the coffee supply chain, including temporary field workers (e.g., coffee pickers), a price that allows them to satisfy their socio-economic needs. This ensures that all supply-chain actors can live a decent life with sufficient levels of housing, food, health, education etc. (<i>Decent livelihood; Fair Trading Practices; Investment; Vulnerability; Local Economy</i>)	<i>Teikei Coffee</i> , Germany
Reduce number of supply-chain actors	Remove intermediaries, e.g., importers, exporters, trade associations, especially those, who do not add value to the coffee product. This reduces costs, enhances transparency, and allows for closer relationship building across the supply chain (<i>Accountability; Participation</i>)	<i>Peixoto Coffee</i> , USA
Shorten geographical distance	Reduce food miles along the coffee supply chain through partnering with actors located in regions as close as possible to each other. This reduces CO ₂ emissions and allows for closer relationship building across the supply chain (<i>Atmosphere; Participation</i>)	<i>Considerate Coffee & Catando Ando</i> , USA/Mexico
Add value in the country of origin	Shift value-added production steps from coffee importing countries to the country of origin, e.g., roasting and packaging the coffee in the country of origin. This ensures higher revenue generation in the country of origin where it is often needed most (<i>Fair Trading Practices; Local Economy</i>)	<i>Solino</i> , Ethiopia
Secure gender and race equality	Empower women and minorities through qualifications for entrepreneurship and management, e.g., through financing training courses. This helps women and minorities to become independent, as well as gain higher satisfaction in work environments (<i>Equity; Cultural Diversity</i>)	<i>Femcafe</i> , Mexico
Develop caring professional relationships	Get to know the partnering supply-chain actors, communicate (frequently) with them, share insights with them, appreciate their products/services, and recognize their needs. This facilitates collective decision-making, solidarity, assistance, and support across the supply chain (<i>Participation</i>)	<i>Pachamama Coffee</i> , USA
Secure good working conditions	Grant all supply-chain actors basic rights of safety, health, and participation, beyond existing legislation, if necessary (no slavery, exploitation, dominance). This ensures that all supply-chain actors are treated in accordance with human rights and other basic rights (<i>Labor Rights; Human Safety and Health; Participation; Rule of Law</i>)	<i>La Revancha</i> , Nicaragua
Disclose all relevant information about the coffee product	Compile and share all relevant information about the coffee product, including ingredients, production and processing steps, potential health implications, involved supply chain actors, value chain, etc., beyond existing legislation, if necessary. This ensures that supply-chain actors and in particular consumers are aware of all important features of the coffee product and can take an informed decision on participating in the supply chain, e.g., by purchasing the product (or not) (<i>Accountability; Rule of Law; Product Quality and Information</i>)	<i>Quijote Kaffee</i> , Germany
Apply resource-efficient production and processing techniques	Apply organic and other production, processing, and distribution technologies and practices that conserve soil, water, energy, and biodiversity, beyond existing legislation, if necessary. This ensures to not overexploit natural resource stocks and contributes to mitigating climate change (<i>Atmosphere; Water; Land; Biodiversity; Materials and Energy; Rule of Law</i>)	<i>Coopedota</i> , Costa Rica
Offset CO ₂ emissions	Offset remaining CO ₂ emissions caused during production, processing, and distribution, e.g., through financing reforestation projects. This contributes to mitigating climate change (<i>Atmosphere; Materials and Energy</i>)	<i>Jumarp</i> , Peru

The vision was therefore crafted to comply with the full suite of design principles for sustainable international coffee supply (**Table 4-B**).

The joint sustainable supply chain between Considerate Coffee and Catando Ando (**Figure 3**) envisions: Prices are truly fair and transparent to all supply-chain actors, who know and care for each other. This is facilitated by a reasonable number of supply chain actors ($n = 8$) with Catando Ando and Considerate Coffee being exporter and importer, respectively. All supply-chain actors are located in reasonable proximity from each other (Arizona, USA & Mexico) and stay in regular contact. Short transportation, organic farming practices, resource-efficient processing equipment, and offsetting remaining CO₂ emissions through reforestation projects in the regional mountain forest protect the environment.

The first core element of the vision are truly fair prices paid to *all* supply-chain actors, that means, that all supply-chain actors “are paid in such a way that they can cover their needs and live

a decent life far away from poverty” (Sotiropoulou, 2012). The project partners co-defined “living far away from poverty” as follows: all supply-chain actors (i) have sufficient food, clothing, and shelter, as well as access to education, health, and other social services; (ii) are empowered to participate in decision-making processes; and (iii) feel hopeful about the future (cf. UN-SDG2). Fair prices for all elements and actors of the value chain reflect differences in needs and decent-life costs across the regions and countries where supply chain actors reside. For example, the higher payments would allow coffee pickers to afford healthcare and education for their families; or coffee farmers would be incentivized to continue farming as opposed to abandon their land and migrate to the city. The prices are significantly higher compared to Considerate Coffee’s current value chain; for example, as compared to the envisioned 6.14 USD/kg roasted coffee for the individual farmer, currently, a farmers cooperative receives the standard Fairtrade price of 4.41 USD/kg, with individual farmers likely receiving even less

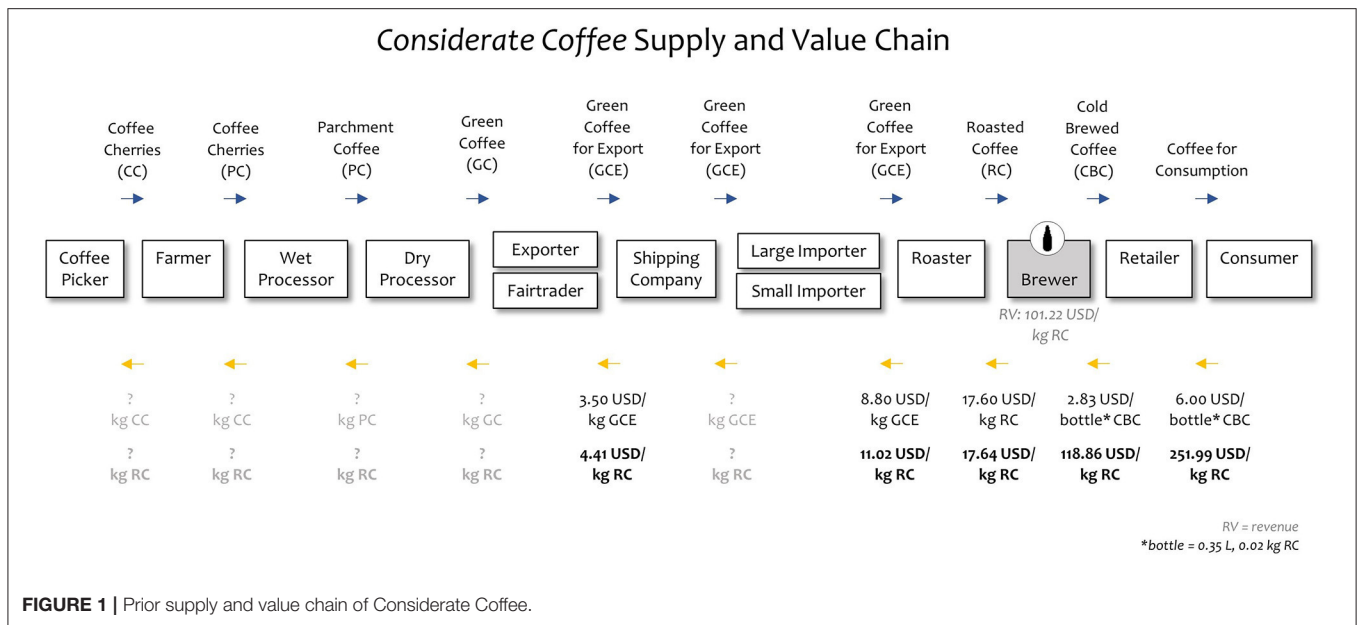


FIGURE 1 | Prior supply and value chain of Considerate Coffee.

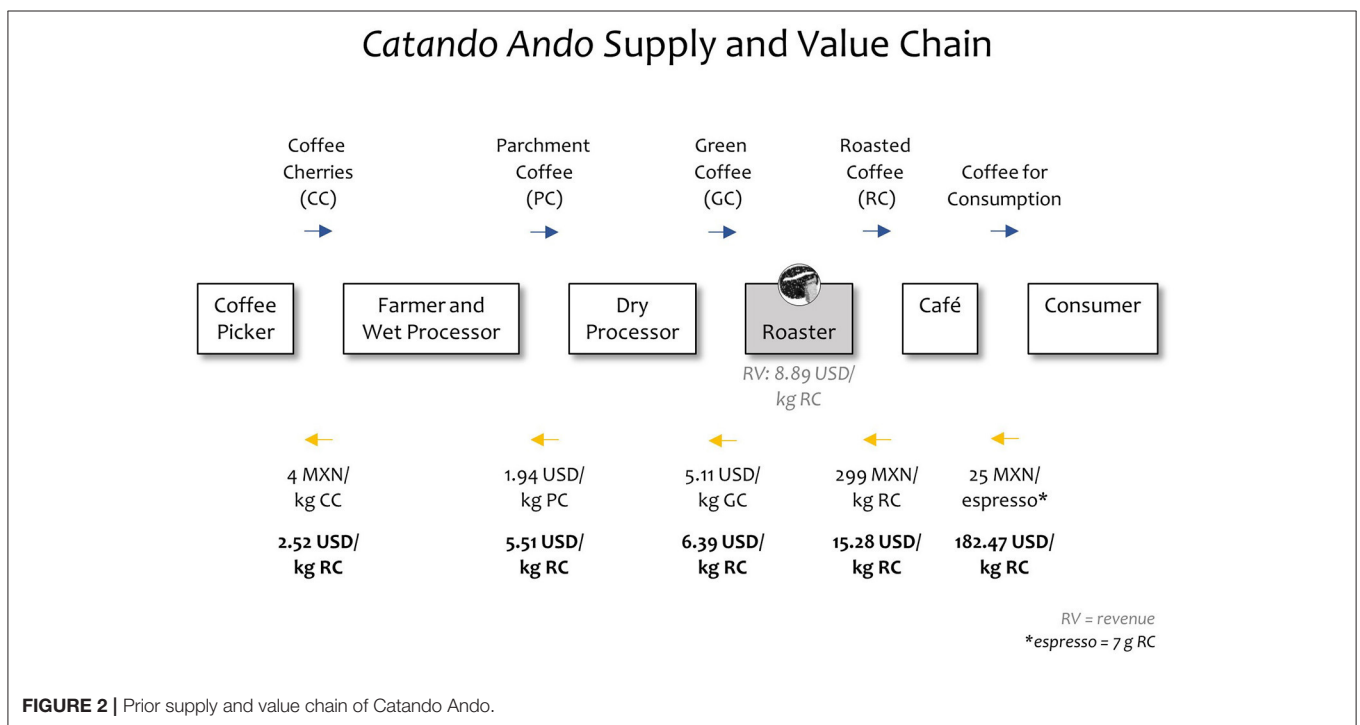
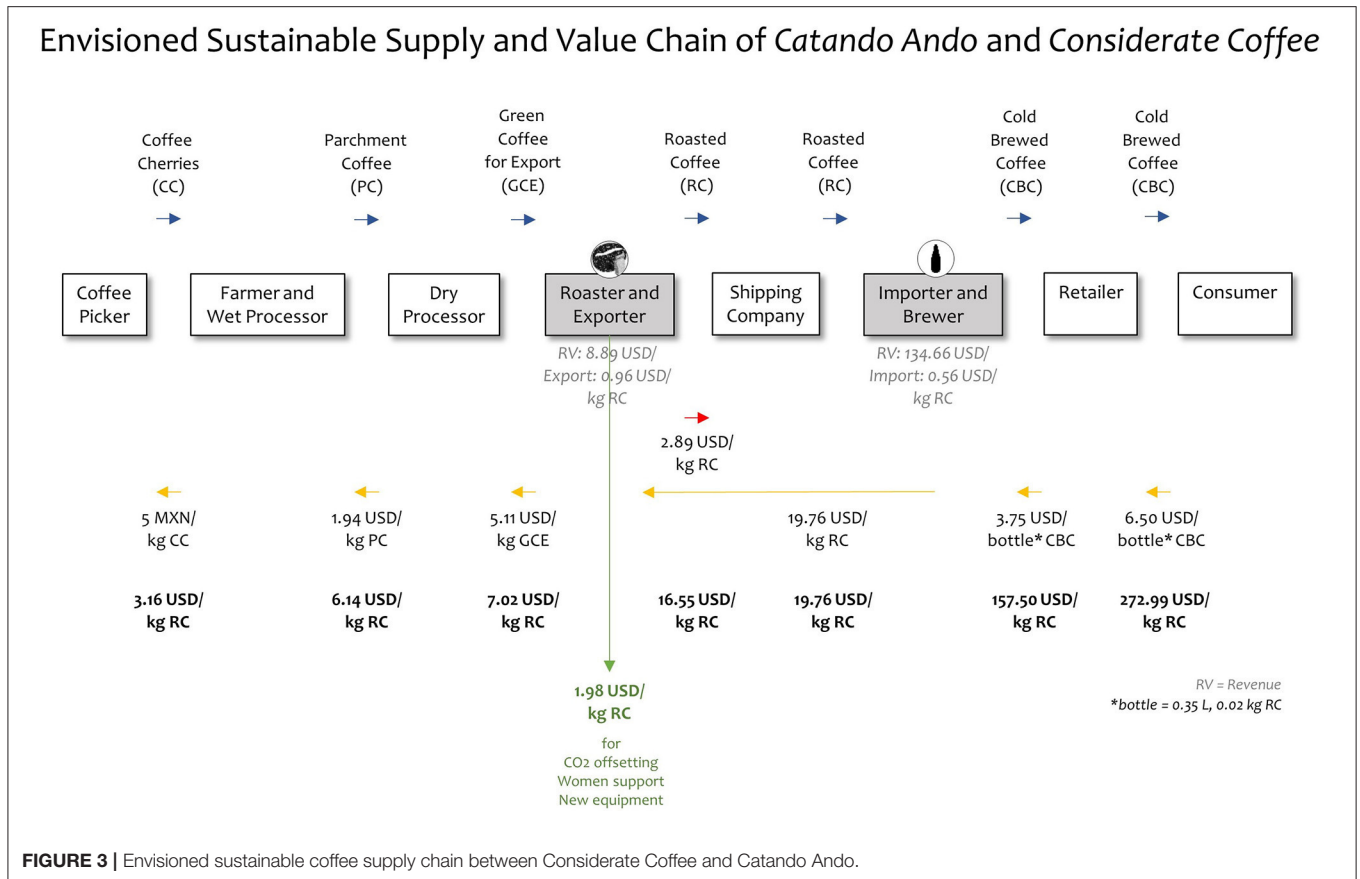


FIGURE 2 | Prior supply and value chain of Catando Ando.

(Chiputwa et al., 2015). This is indicative of the fact that Fairtrade prices often do not keep up with increased cost of living, as suggested in other studies (Bacon, 2010).

The second core element of the vision is the short supply-chain structure with Catando Ando operating as the exporter, Considerate Coffee as the importer, a customs broker taking care of the paperwork, and a shipping company transporting the coffee (annual exporter/importer certification fees and shipping costs are included in the value chain). This facilitates close

and caring professional relationships across the entire supply chain with regular (online) contact and occasional visits, as well as achieving transparency and securing good working conditions across all stages of production, processing, and distribution. Striving for full transparency includes disclosing all relevant information on the product, e.g., coffee variety, locations, people, and payments, to all supply chain actors, including consumers, through personal communication, product packaging, and company websites.



Sourcing roasted coffee from Mexico to Arizona instead of green beans from Ethiopia significantly reduces food miles (from 14,500 to 2,600 km) and CO₂ emissions, while adding value in the country of origin. Both businesses agreed on investing up to 10% of the sales price between both companies into supporting gender equality, resource-efficient production and processing techniques, as well as offsetting CO₂ emissions. Catando Ando's women employees would receive training to become certified as specialty coffee barista; coffee farmers would be 100% organically certified; and the wet processor would operate with a new, water-efficient wet processing machine, which would reduce water input by a factor of 10; and remaining CO₂ emissions would be offset through reforestation projects by a local NGO in the mountain forest within the coffee-growing region (Cofre de Perote). An annual volume of 720 kg supplied coffee would allow to finance 1 ha of planted trees per year (Catando Ando, Strategy-Building Workshop, 2018/12/05).

The Strategy (Action Plan) for Achieving Sustainable International Coffee Supply

The strategy to achieve the vision of a sustainable supply chain between Catando Ando and Considerate Coffee is structured into three main phases (Table 3), namely, initiation, acceleration, and consolidation, following the standard order of key components of transition strategies (Rotmans et al., 2001; Kay et al., 2014).

The first phase (initiation) is about piloting the strategy and setting up the cooperation. Key activities are negotiating and agreeing on fair prices across the supply/value chain, and then conducting a pilot project on this base to test as many cooperation elements as possible (see next section, below). Using the insights from the pilot project, final adjustments can be made, contracts need to be issued among all supply-chain actors (incl. for shipping and for offsetting), and additional core cooperation elements, e.g., exporter/importer application, need to be completed. Finally, necessary expansion of Considerate Coffee (facility, equipment, staff) need to be initiated (fundraising, etc.).

In the second phase (acceleration), the cooperation becomes fully operational. Acceleration activities advance the cooperation, with focus on completing Considerate Coffee's expansion, broadening caring professional relationships, adding new infrastructure at Catando Ando (wet processing machine, packaging system), establishing trainings (organic farming, barista). Regular evaluation and adjustments secure continuous improvement of the cooperation.

The third phase (consolidation) allows for expanding the cooperation based on long-term contracts among all key supply-chain actors and for standardizing processes through certifications (e.g., organic), new business model (worker cooperative), and advanced professional procedures (monitoring, identification of new opportunities).

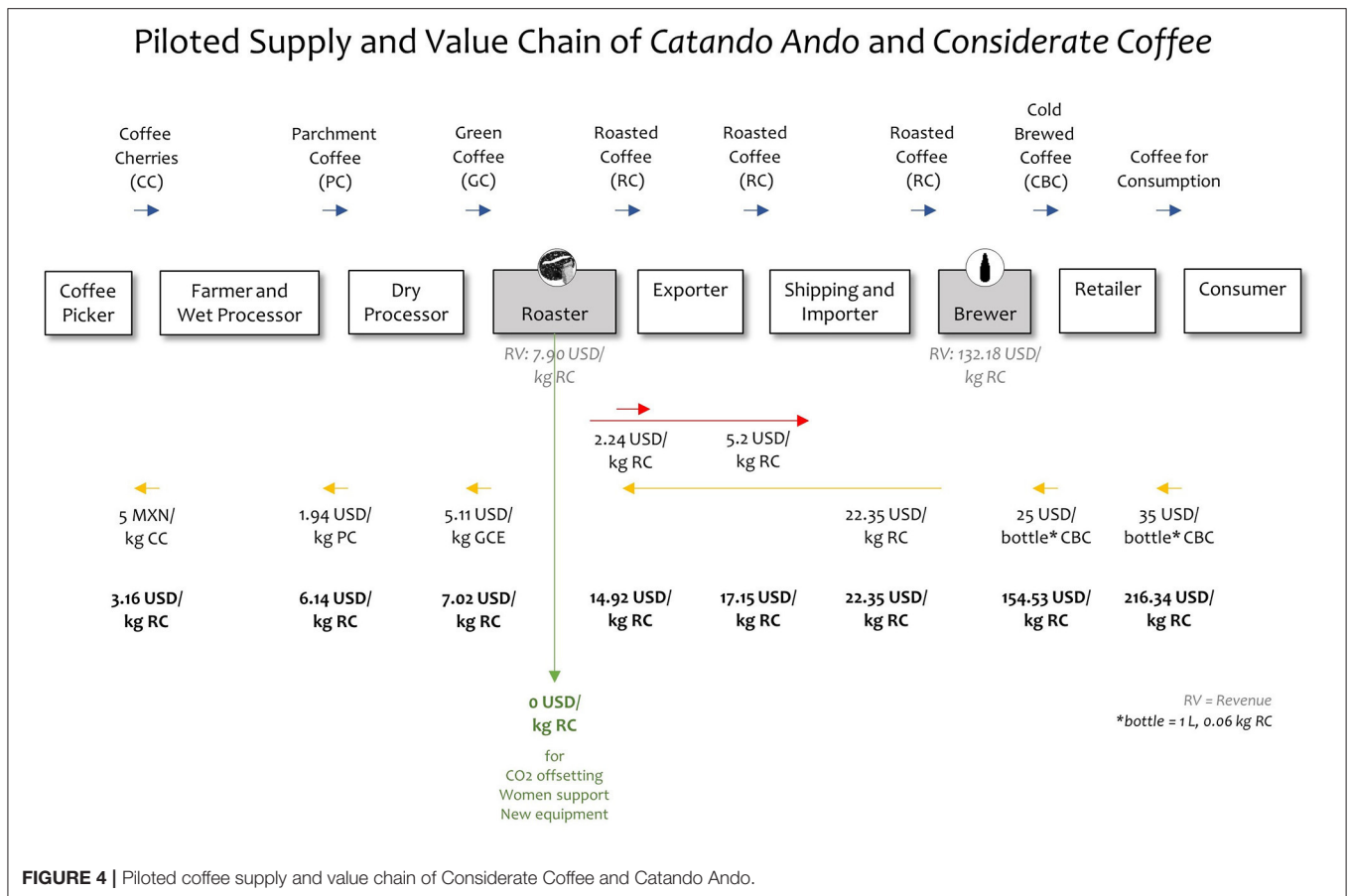


FIGURE 4 | Piloted coffee supply and value chain of Considerate Coffee and Catando Ando.

Regular evaluation and adjustments continue to improve the cooperation.

Piloting Sustainable International Coffee Supply

The first phase of the action plan included execution of steps 1–5 (Table 3) with a focus on carrying out a pilot or demonstration project on the new supply and value chain (Figure 4). Catando Ando roasted green coffee (received from the dry processor after the last coffee harvest in 2017/2018), and shortly thereafter, on December 26, 2018, sent 20 kg with UPS to Considerate Coffee in Phoenix, where it arrived on January 8, 2019. The sales price was 447 USD. Considerate Coffee cold-brewed 4.5 kg of Catando Ando’s roasted coffee and filled 28 1 L-bottles of cold brew coffee. These bottles were sold at a tasting event to their main clients on February 14, 2019. The event offered an opportunity to explore their clients’ satisfaction with the new product and their willingness-to-pay (price range). The marketing approach of the event was communicating the achievements of the new supply chain, including increased payments for coffee pickers, reduced CO₂ emissions, offsetting remaining emission caused by transport, and building caring professional relationships to the roaster in Mexico, among others.

The demonstration project yielded a number of positive results (Table 4-C): Considerate Coffee was able to significantly

reduce food miles and CO₂ emissions by importing coffee from Mexico instead of Ethiopia. Importing roasted coffee from Catando Ando instead of green coffee beans added value in the country of origin (Mexico). Through regular (online) meetings between Considerate Coffee and Catando Ando caring professional relationships started to develop. Other vision elements were at least partly achieved. The pilot project reduced the number of supply-chain actors to 9 (from 13, for Considerate Coffee). As indicated in Figure 4, higher prices were paid and they made a difference for the most vulnerable supply-chain actors (i.e., the coffee pickers). Information on the product and the mission behind it was disclosed to the majority of supply-chain actors (from producers to consumers).

However, during the project, partners also encountered several obstacles that resulted in diversions from the vision (Table 4-C) and yielded important insights for the strategy implementation. First, the export and import activities had to be provided by external services due to the short timeframe of the pilot vs. the long approval process for exporters and importers. As soon as there approval processes are completed, supply-chain complexity can be further reduced and efforts can begin to familiarize all supply-chain actors with each other. Second, the pilot shipment of a small amount of coffee (20 kg) incurred relatively high costs for shipment and import (5.2 USD/kg roasted coffee) that resulted in compromising other

TABLE 3 | Strategy (action plan) for the new supply chain between Considerate Coffee and Catando Ando.**(1) Initiation (Year 1)**

1. Verify and update critical information (shipping, fees, etc.)
2. Negotiate and agree on fair prices across the supply/value chain
3. Plan pilot project
4. Carry out pilot project
5. Make adjustments to vision and strategy based on results from pilot
6. Re-negotiate and agree on fair prices across the supply/value chain
7. Develop and sign mid-term contracts among key supply-chain actors
8. Contract shipping company
9. Contract offsetting organization
10. Complete process of becoming an exporter/an importer (admin, fees, etc.)
11. Raise funds for necessary physical expansion of Considerate Coffee (facility and equipment)
12. Recruit and hire additional personnel for expanded Considerate Coffee's operations

(2) Acceleration (Years 2–3)

1. Transition into full operations
2. Complete expansion of Considerate Coffee (facility and equipment)
3. Establish regular visits across the supply chain
4. Expand consumer contacts and relations (incl. experiential marketing & capacity building)
5. Contract and carry out trainings in organic farming and other sustainable practices
6. Purchase and start using new wet processing machine
7. Introduce new packaging practices across the supply chain (refund, reuse, and recycling systems)
8. Participate in barista certification course (women employees)
9. Convert Considerate Coffee into a worker cooperative (or employee ownership)
10. Regularly evaluate process and outcomes
11. Make adjustments as necessary

(3) Consolidation (Years 4–8)

1. Develop and sign long-term contracts among key supply-chain actors
2. Expand operations
3. Obtain organic and other sustainability certifications
4. Expand offsetting activities (incl. LCA assessment, identifying additional offsetting project opportunities)
5. Regularly evaluate process and outcomes
6. Make adjustments as necessary

vision elements (e.g., offsetting CO₂ emissions; barista training for women employees). An annual volume of at least 720 kg supplied coffee would be needed to realize the vision elements omitted in the pilot. However, 720 kg roasted coffee is still a little amount compared to the more than 165,000 tons of green coffee produced in Mexico in 2019 (FAO, 2020). This higher minimum volume of 720 kg (compared to 544 kg Considerate Coffee had processed previously) and aspired additional expansion contracts would require securing a larger brewing facility and additional (or new) brewing equipment for Considerate Coffee. This aligned with aspirations to convert from a microbrewery (2 owners) to a small brewery (~10 employees). An alternative (partnership with a brewery in California that produces shelf-stable kegs of cooled-down hot-brewed coffee using liquid nitrogen instead of bottling cold-brewed coffee) was considered but rejected due to the additional CO₂ emissions from transportation and packaging (kegs from California vs. bottles from Phoenix) as well as a more energy intense cooling process. Third, despite the increased

premium, conversations with coffee pickers revealed that even these higher prices did not allow them to sufficiently satisfy their socio-economic needs. Fully accounting for their needs would require to further increase the premium (>5 MXN/kg coffee cherries). The main reason for arriving at a sub-sustainable price level was that commodity prices still served (even if indirectly) as reference point for price negotiations (see also Sotiropoulou, 2012). A way out is to engage “honest brokers” and decouple price negotiations from commodity prices and focus on socio-economic needs. While conceptually reasonable, the pilot indicated that this is a major paradigm shift that has to go through major “growing pains.” Fourth, the timeframe of the demonstration project was too limited to go through the change from conventional to organic farming practices. This requires extensive re-training and, at least in part, new material and/or equipment. As indicated in **Table 3**, related actions are planned for the acceleration phase, with full conversion in the consolidation phase. Finally, the tasting event at Considerate Coffee yielded the insight that some of Considerate Coffee's clients still demanded the previous product brewed from the Ethiopian coffee. Potential solution to this challenge include: convincing the clients of Considerate Coffee's new vision/mission (more compelling story); recruiting new clients open to the new vision/mission of Considerate Coffee; or exploring and securing other coffee varieties from Mexico that satisfy the demand of Considerate Coffee's existing clients.

DISCUSSION

The project assessed the current state of two small intermediary coffee businesses' individual supply and value chains; generated a vision and a strategy for a joint sustainable supply and value chain between the two businesses; as well as piloted the joint supply and value chain through a demonstration project. The results of each project stage are summarized in **Table 4** regarding the extent to which they comply with the sustainability principles presented in section Design Principles for Sustainable International Coffee Supply, above.

Comparing the vision to the current state assessment, the results show that a cooperation between small intermediary coffee businesses has the potential to infuse sustainability into their supply and value chain to a much larger extent than currently done operating independently: there is a potential change from at least partly complying with 2 and 7 principles, respectively, to full compliance with all 10 sustainability principles. The demonstration project showed that this can actually be implemented to a large extent: at least partly complying with 8 of the 10 principles. However, the demonstration project revealed that compliance with some sustainability principles is difficult to achieve despite good intentions. The demonstration project also showed that at least one of the vision elements (“Pay prices that satisfy socio-economic needs”) was insufficiently developed and needed revision.

In the following, we discuss the presented project results against the *conditions* that enable small intermediary coffee

TABLE 4 | Compliance of current state, vision, and demonstration project with sustainability principles.

Sustainability Principle	(A) Current State		(B) Sustainability Vision	(C) Demonstration Project
	Compliance Considerate Coffee	Compliance Catando Ando	Compliance of envisioned supply chain Considerate Coffee and Catando Ando	Compliance and diversion from the vision during the pilot (20 kg roasted coffee)
Pay prices that satisfy socio-economic needs	No	No	Some (revised after pilot) (main change: 5 MXN for coffee pickers)	Some (5 MXN still not enough)
Reduce number of supply-chain actors	No	Yes	Yes (8 supply chain actors who know each other)	Some (9 supply chain actors; not all know each other)
Shorten geographical distance	No	Yes	Yes (reduced food miles; personal visits)	Yes (reduced food miles)
Add value in the country of origin	No	Yes	Yes (purchasing <i>roasted</i> coffee from Mexico)	Yes (purchasing <i>roasted</i> coffee from Mexico)
Secure gender and race equality	(N/A)	No	Yes (barista training female employees)	No
Develop caring professional relationships	No	Yes	Yes (frequent, direct online exchanges; visits)	Yes (frequent, direct online exchanges)
Secure good working conditions	Yes	Yes	Yes	Yes
Disclose all relevant information about the coffee product	No	Some	Yes (packaging and website; info for producers and consumers)	Some (tasting event for clients; conversations with coffee pickers)
Apply resource-efficient production and processing techniques	Some	Some	Yes (water-efficient wet coffee processing; organic farming; etc.)	Some
Offset GHG emissions	No	No	Yes (offsetting through local reforestation projects)	No

businesses to infuse sustainability into their supply and value chains through cooperation, namely by explaining how these conditions have worked out (or not) in the project. Key factors seem to be economic resilience through cooperation, problem recognition, transparency, trust, and solidarity across supply-chain actors – in short, cooperating with “open cards.”

Small Intermediary Businesses Are Willing to Enhance Their Economic Resilience Through Cooperation

Infusing sustainable practices into the supply chain primarily depends on the small intermediary companies staying in business. While small businesses demonstrate some advantages in pursuing sustainability compared to large companies (Burch et al., 2016), they are also vulnerable due to their small size. Changes in business partnerships, new career aspirations, personal crises, sickness, accidents, and other human (resources) factors can quickly turn into an existential threat to the business (Cooper and Burke, 2011). In this project, both businesses were run by entrepreneurs and staff of <5 people. And indeed, a major personal disturbance led to the closure of Considerate Coffee and, by extension, to the dissolution of the cooperation described. Economic resilience cannot be achieved through a cooperation, as the one demonstrated in this project, alone. Potential solutions, apart from growing the individual businesses in size, might be offered by advanced forms of

cooperation and collaboration (Nidumolu et al., 2014), including support structures of alternative food networks, or different forms of cooperative businesses, including multi-stakeholder cooperatives, or peer-learning networks (Jaffee, 2007; Burch et al., 2016; Weber and Wiek, 2020). To avoid negative side-effects, such advanced forms of cooperation still need to adhere to the other sustainability principles, including short supply chain structures (participation, accountability).

Supply-Chain Actors Are Willing to Recognize Sustainability Challenges and Take Action

Awareness and readiness to act are key conditions to address sustainability challenges along the coffee supply chain. In this project, the collaborative sustainability assessment of the current supply and value chains helped facilitate collective problem recognition by identifying tangible sustainability strengths and weaknesses. The conversations among the entrepreneurs revealed that personal experiences with issues of unsustainability motivates to take action toward sustainability, as indicated in other studies (e.g., Handy et al., 2002), too. Nguyen and Sarker (2018) report that coffee farmers who experienced negative effects such as soil erosion and water shortages are more willing to participate in sustainability programs. Reynolds (2009) suggests that intermediary coffee businesses adopt fair trade practices to counteract global socio-ecological problems caused

by externalizing socio-ecological costs (cf. Clapp, 2015). Yet, problem awareness alone is often not sufficient for taking action. Limited time, capital, workforce, and expertise are factors that can hinder small businesses to take action despite problem recognition (Burch et al., 2016). This indicates the necessary *interplay* of the conditions discussed here.

Supply-Chain Actors Are Willing to Openly Share Value Chain Information

Openly sharing value chain information challenges the still prevalent “value chain secrecy” in favor of broad transparency and empowerment of *all* supply-chain actors (Mol, 2015). Transparency is widely considered a key principle of direct trade arrangements (MacGregor et al., 2017) and relationship coffee models (Vicol et al., 2018). In this project, disclosing all relevant value chain information, after some hesitation, enabled the entrepreneurs to collectively identify insufficient payments along the entire supply chain, and eventually move toward paying fair prices to all supply chain actors. However, Gardner et al. (2019) point out that transparency should be considered a *means* toward sustainable supply chains, not an end in itself. It is a necessary, yet, not a sufficient condition for ensuring fair prices are being paid along the entire value chain. But even if transparency meets willingness to pay higher prices, it might just not be enough. The demonstration project points to the importance of validating adjusted prices with all supply chain actors, which might reveal the need for additional adjustments (as was the case in this project – see comment about prices paid to coffee pickers). Transparency is often facilitated by trust, as disclosing value chain information might reveal unsustainable business practices and affect business image. Thus, alternative trade arrangements for coffee build trust in pursuit of transparency (Vicol et al., 2018; Edelmann et al., 2020) – see next condition.

Supply-Chain Actors Trust and Commit to Each Other

In supply-chain relationships trust is a special quality that facilitates reciprocity and accountability in following through with obligations and granting benefits (Castello Branco and dos Santos, 2018). It has been identified as a key factor in successful (sustainable) coffee supply chains (Cuong, 2019). There is agreement in the literature that trust and commitment are key conditions for successful alternative trade arrangements (Edelmann et al., 2020), even more important than contracts, in some cases (Borrella et al., 2015). In this project, trust enabled the development of caring relationships and was initially built through continuous constructive conversations that revealed similar values and commitment toward sustainability, as well as mutual cultural sensitivity. Indicative of the latter was, for example, that both businesses showed an honest interest in learning about the cultural context in which the other business operated as well as undertook efforts of learning to communicate in both languages (English and Spanish). Trust was further built through the demonstration project, which was considered successful by both cooperating partners.

Supply-chain actors Are willing to Act in solidarity across the supply chain

This condition refers to an attitude that places “more importance on people than on capital and profit” (Sahakian and Dunand, 2015, p. 3). Applied to sustainable supply chains, this condition has four dimensions. First, *consumers are willing to pay adequate prices*. Mission-driven coffee businesses (Raynolds, 2009) seem to attract mission-driven consumers. And Weber et al. (2021) show that if consumers understand the sustainability mission of a coffee business, they are willing to pay a higher price for the product. However, convenience or routines might still get in the way of sustainable consumption choices (Rathgens et al., 2021). The demonstration project yielded some insights into retailers’ or consumers’ willingness to pay higher prices, namely, that they were not willing to pay significantly more, only 2% and 8%, respectively, more per bottle cold brewed coffee. As a consequence, additional investments for CO₂ offsetting, women support, or new equipment, which had been envisioned earlier, could not be realized (Figure 4). Second, *supply-chain actors are willing to pass on profit*. This is a condition for fair payment of all supply-chain actors, including temporary field workers and other vulnerable supply-chain actors, which is the main objective of alternative trade arrangements (Bacon et al., 2008; Vicol et al., 2018). Intermediary coffee businesses play a critical role in demonstrating this solidarity with the upstream coffee producers (Borrella et al., 2015). In this project, trustful relationships facilitated open conversations about prices and confirmed the commitment to adequate distribution of benefits, as demonstrated in the iterative increase of payments for the coffee pickers. Third, *supply-chain actors’ are willing to use profit for enhancing the environmental performance of the supply chain*. Current global food supply chains externalize environmental costs (Clapp, 2015). Sustainable supply chains, on the contrary, seek to internalize such costs, e.g., through offsetting and compensation mechanisms, if negative environmental effects are not directly being avoided (Weber et al., 2020). In this project, using or even producing solar energy instead of burning gas in the roastery seemed cost-prohibitive (and there were some other considerations about taste); instead, paying for projects that reforest the surrounding mountain forest was considered an economically viable option and thus was included into the vision. Yet, it was not practiced in the demonstration project after all due to reemerging economic concerns (willingness not sufficient, maybe). This points to the need for policies and financial incentives that ensure internalizing of environmental cost across the supply chain (Ding et al., 2016). However, research calls for a more proactive approach, namely, to adopt sustainable practices that avoid environmental costs from the beginning and thus make compensation schemes obsolete (Montabon et al., 2016). Fourth, *supply-chain actors are willing to compensate for negative systems effects*. Changing supply chain structures might have negative effects on previously involved supply chain actors. In this project, substituting coffee produced by Ethiopian farmers with coffee produced by Mexican farmers could negatively affect livelihoods in Ethiopia. Hence, the sustainability

assessment ought to adopt a systems perspective that accounts for distal socio-environmental feedbacks or telecoupling (Eakin et al., 2017). Mitigation strategies could include diversifying cooperation networks without significantly enlarging the supply chains. While this solidarity facet was briefly discussed in this project, it was not pursued due to the complex nature of such a system-wide compensation endeavor (willingness not sufficient, maybe).

Limitations

Despite the achievements, the presented study has limitations, too. First, transferability of practices and insights depend on specific contexts. Some of the sustainability principles might be easier to adopt than others depending on the specifics of a given supply and value chain, as well as the preferences of the supply-chain actors. In any case, the proposed iterative process from assessment to piloting should allow for context-specific re-design of coffee supply chains to enhance their sustainability through cooperation. Second, some findings of the study are not conclusive, for instance, if the multiple-adjusted prices across the value chain indeed allow for a decent life for *all* supply-chain actors. Additional evaluative research is needed to verify those numbers over the mid-term. Third, some information was provided by the intermediary businesses as the researchers were unable to interview coffee farmers working with Catando Ando (although the researchers had conversations with other coffee farmers in the region). Primary data collection would be needed for full verification. Fourth, this demonstration project was realized with a very small quantity of coffee (20 kg), which by itself had no impact on larger issues such as poverty alleviation. Additional research would be needed to demonstrate the scale that would be required to succeed on such issues. Fifth, findings are based on a demonstration project with small intermediary food businesses in a short supply chain, which might have less validity for conventional supply chain structures. For that, rigorous certification continues to be a promising approach, despite pitfalls and setbacks. However, the conversion of small supply chains, as demonstrated in this study, is equally viable – as a different approach to amplify the positive impact of sustainable practices (Lam et al., 2020). Such efforts, however, call for significant changes in consumer behavior, business education, and governmental incentives; and as such, they need many coordinated efforts over long periods of time. Sixth, the tasks of the research team consisted of designing the project, identifying potential partners, forming the partnership, facilitating the project (collecting technical information preparing and facilitating workshops, etc.), collecting and analyzing research data, and reflecting on the processes. While researchers can and often need to take various roles in transdisciplinary sustainability projects (Wittmayer and Schöpke, 2014), this comes with benefits and costs. Being deeply involved in all facets of the cooperative project provided in-depth insights into sustainability challenges and opportunities that small intermediary food businesses face. Yet, it also affected

the accompanying research, which needed to be organized pragmatically, and, at times, was deemphasized in favor of the cooperative partnership.

CONCLUSIONS

This study explored extent and conditions under which sustainable international coffee supply could be realized through small intermediary businesses such as roasteries, breweries, and/or retailers. Using the case of a cooperation between two intermediary coffee businesses the study shows that there is great potential of infusing sustainability across the supply chain, including paying prices that meet socio-economic needs, simplifying the supply chain, and reducing food miles, amongst others. Based on these findings, the study identified conditions for infusing these practices into the supply chain including economic resilience through cooperation, problem recognition, transparency, trust, and solidarity across supply-chain actors. Some of these factors have been detailed in the literature and are confirmed here; others are nuanced or added through this study. For example, while transparency and trust are widely discussed as key factors in sustainability-oriented direct trade and coffee relationship models, solidarity has been less nuanced in the literature (focusing on the willingness to pass on profit). Also, problem recognition has been recognized as a motivational condition for producers, which is here confirmed for intermediary businesses, too. All of these confirmed, nuanced, and added conditions seem to point to the importance of *cooperating with “open cards”* as the summative condition to advance sustainability across the supply chain. Further research is needed on effective political and financial support for small intermediary food business to infuse sustainability into the supply chain; cooperative arrangements that help small intermediary food businesses to increase their economic resilience; and how to account and compensate for systems-wide negative effects of redesigning supply chains.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Office of Research Integrity & Assurance, Arizona State University. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

HW and AW designed the research project together and structured the paper and wrote the manuscript together. HW did the field visits, data collection and analyses. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fsufs.2021.663716/full#supplementary-material>

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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5 Synthesis

This section summarizes the overall findings of this dissertation and its implications. In the first part (Section 5.1), I focus on the role of entrepreneurial solution approaches and of small intermediary businesses in providing sustainable business practices to address sustainability challenges in international food supply (5.1.1), and second to their potential role in catalyzing sustainability transformations of food systems (5.1.2) (Figure 4). In the second part (Section 5.2), I reflect on the methodology with a focus on the transdisciplinary and solution-orientated research practice in my work and describe limitations of this dissertation. In the third part (Section 5.3), I discuss scientific and practical contributions of my work.

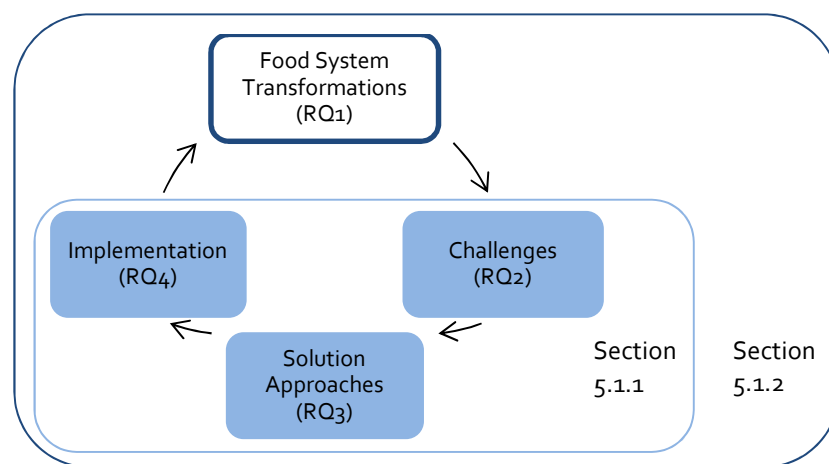


Figure 4. Structure of the first synthesis section (5.1) on overall findings and answers to specific research questions (RQs).

5.1 Overall findings

5.1.1 *Entrepreneurial solution approaches to address large distances*

The findings regarding the role of entrepreneurial solution approaches can be grouped into three categories, each of them encompassing two findings: the first category relates to the different entrepreneurial solution approaches to address large distances in international food supply, with the International Community-Supported Agriculture (I-CSA) showing a high transformative potential; the second relates to the specific dimension of geographical and on relational distances; and the third is on implementing these solution approaches.

The first category of the different entrepreneurial solution approaches to address large distances in international food supply, includes two findings. The first of these, which draws on previous studies (Eakin, Rueda et al., 2017; Princen, 1997, 2002), is that challenges in international food supply chains can be conceptualized as negative

effects of large geographical and relational distances (e.g., a high number of food miles and lack of strong relationships, respectively). This is an answer to RQ2. It does not only confirm the importance of these two dimensions, but, more importantly, identifies challenges related to these two dimensions. This adds to the theoretical debate but may also have practical implications for the identification of effective solutions. Eakin, Rueda et al. (2017) add a third dimension of distances in food systems, namely institutional distance, when they analyze the governance of telecoupled coffee systems in Mexico and Columbia. However, as the focus of this dissertation is on small, mostly intermediary, food businesses, I focused on the relational and geographical dimension of distance, as this is where businesses can have an influence. Consequently, sustainable international food supply would be achieved via overcoming these large distances (e.g., reduce food miles; strengthen relationships) or – as I argue in the entrepreneurship study (Study#2) – at least by mitigating their negative effects (e.g., reduce emissions; pay fair prices).

The second finding of the same category are the five entrepreneurial solution approaches specified by twelve sustainability-oriented design principles. They provide an answer to RQ3. These approaches revealed from an analysis of current practices of small businesses that aim to advance sustainability in international food supply. Approaches include:

- Reducing greenhouse gas emissions
- Reducing food miles
- Certification
- Direct international trade, and
- International Community-Supported Agriculture (I-CSA).

These approaches can be specified by a set of twelve concrete sustainability-oriented design principles (for an overview see Appendix A2). To give an example, adopting some of these principles to a sustainable international coffee supply chain, could result in

“[p]rices [that] are truly fair and transparent to all supply-chain actors, who know and care for each other. This is facilitated by a reasonable number of supply chain actors (n = 8) with Catando Ando and Considerate Coffee being exporter and importer, respectively. All supply chain actors are located in reasonable proximity from each other (Arizona, USA & Mexico) and stay in regular contact. Short transportation, organic farming practices, resource-efficient processing equipment, and offsetting remaining CO2 emissions through reforestation projects in the regional mountain forest protect the environment. (Weber & Wiek, 2021, p. 5).

Each of these principles and approaches may tackle different leverage points, that is, showing a different effectiveness when it comes to intervening in and changing the system (Abson et al., 2017; Meadows, 1999). In particular, the I-CSA is a fairly new and promising approach with a high transformational potential because it addresses a

key problem, namely the dominant economic paradigm of neoliberalism and exploitation. It is characterized by participatory governance principles and co-financing schemes, in which producers and consumers share benefits and risks of a harvest among each other (Rommel, 2019; Weber, Wiek et al., 2020). Local community supported agriculture has been shown to promote social transformation as consumers and producers engage in a political economic transformation (e.g., Hvitsand, 2016; Matzembacher & Meira, 2019). This finding points to the potential of this approach for a new context, namely the international context, and presents some initial empirical evidence.

While the findings included in the first category point to the challenges and overall approaches to address large distances, the findings in the second category become more specific to the geographical and relational dimensions. In this category, the first finding is that because large geographical distances cannot always be reduced in international food supply, small businesses have to figure out how to mitigate the negative effects. Some businesses have shown how this can be done, for example by using a cargo sailboat for long-distance coffee transportation (Teikei Coffee) or planting one tree per one chocolate bar sold (Original Beans). However, the usefulness of another approach, carbon offsetting to reduce emissions, has been contested. Researchers disagree as to whether offsetting delivers the expected benefits and whether offsetting can morally be justified, that is, if it soothes the conscience rather than providing an actual solution to climate change (Hyams & Fawcett, 2013).

The second finding of this category, as shown here, is that it seems even more important to focus on reducing relational distance and creating relational proximity to create a sustainable international food supply. Indeed, Edelmann et al. (2020) recently proposed the proximity concept as an analytical framework for alternative or direct coffee trade models. Touzard et al. (2016) likewise used relational proximity when comparing and contrasting local wine with face-to-face relations between consumers and producers from anonymous global wine. Relational proximity, as it is understood in this dissertation, is determined by “knowledge and care about each other” (Weber, Wiek et al., 2020 building on Kneafsey et al., 2008) and corresponds to Edelmann et al.’s (2020) social proximity assessed by looking at “[t]rust, [k]nowledge about each other, [and the d]egree of personal acquaintance” (p. 467). Another benefit of trust is that it can also improve supply chain responsiveness (Handfield 2002). These are all relevant findings because they emphasize relationships as an integral component of international food supply when it comes to sustainability instead of being considered only as an “add-on” or “desirable”.

Until now, to the best of my knowledge, the concept of proximity has been proposed to be applied at the international scale only to relationships between intermediary food businesses leaving out consumers and producers, for example between coffee roasters and coffee traders, and this only very recently (e.g., Edelmann et al., 2020). A step further would be to connect not only intermediary businesses but also to involve

producers and consumers despite their geographical distance. The goal of bringing food consumers and producers closer together to achieve sustainable food systems is at the heart of Alternative Food Networks (AFNs) (Dowler et al., 2009; Dubois, 2018; Goodman et al., 2012; Kneafsey et al., 2008), a concept that first emerged in local food systems. AFNs are “new and rapidly mainstreaming spaces in the food economy,” in which “production and consumption of food are more closely tied together spatially, economically, and socially” (Goodman & Goodman, 2009, p. 208). Kneafsey et al. (2008) locate this (re)connection of people with food products, processes and places within an ethic of care (Tronto, 1993), namely care about food, the people who produce it, and care about the environment. Transferring this idea of “care to (re)connect” from its local origins to international food supply, taking into account not only connections between intermediary businesses but also between consumers and producers, has been proposed by the concept of an I-CSA (Rommel, 2019), the new emerging approach with a high transformative potential discussed above.

As a consequence, researchers and practitioners should not only distinguish between local and international food supplies, but also between relationally distant or close, disconnected or connected food supply. In other words, the scale is neither the end nor the means. The means would be (re)connection or relationship building to achieve sustainable food systems.

The third category of findings deals with the implementation of solution options and thus provides an answer to RQ4. Creating such relationships characterized by proximity, that is knowledge and care over distance, is not easy and bears challenges. The marketing study (Study#3) has provided empirical evidence for the particular case of the I-CSA Teikei Coffee, showing that experiential marketing interventions, in particular affective experiences, seem to be a viable instrument to connect consumers to producers over distances, which is, to create relational proximity. The study furthermore found evidence for a mediation effect of relational proximity increasing consumers’ willingness to pay a higher price for the coffee. This tool therefore could be used to incentivize consumers to participate or engage in such relational schemes for international food supply. There are other concepts that could support such relationship building over distance, too, for example temporary geographical proximity, that is short-term face-to-face meetings at crucial stages of a business collaboration (Edelmann et al., 2020; Torre, 2008), or virtual connection through online communication (Bos & Owen, 2016).

In addition to the findings on experiential marketing interventions, the transdisciplinary supply chain study (Study#4) provides another important insight regarding relational proximity, showing that it can also increase the economic resilience of a business. Conditions that enabled the implementation of a sustainable coffee supply included trust, transparency, solidarity, recognizing and being concerned about socio-economic and environmental problems, and, there is another point, namely economic resilience through a collaborative effort between intermediary supply chain

businesses. In particular, the latter aspect of collaboration seems to be important among not only actors involved in the same supply chain but also among peers i.e. similar intermediary businesses embedded in the same local or regional food economy. Such advanced forms of cooperation and collaboration among businesses are likely to create value for everyone involved in such collaborations (Nidumolu et al., 2014). Participants of the two coffee workshops also emphasized the importance of building local networks among sustainability-oriented businesses instead of competing against each other to share resources and knowledge to be competitive, especially against unsustainable market incumbents (Workshop reports 1+2).

5.1.2 Small businesses contributing to sustainability transformations

As outlined above, accounting for negative effects of large geographical distances, creating relational proximity, connecting people along the supply chain, and forming local networks with other small intermediary businesses is key to advance sustainability in international food supply. In this context, these businesses can play a major role in providing solutions to challenges, for example by changing their business practices, redesigning supply chain structures, and changing attitudes (for example toward collaboration instead of competition) or underlying paradigms (for example paying prices based on needs). Linking these findings to the findings from the food systems review (Study#1) in the following section, I explore if and in how far small, mostly intermediary businesses may catalyze sustainability transformations well beyond solutions to the initial problems. In this context, I discuss four actions that may contribute to this.

First, small intermediary businesses could adopt a variety of design principles in order to address all dimensions of transformation. The different entrepreneurial solution approaches and their design principles tackle different leverage points and spheres of transformation (Weber, Wiek et al., 2020), that is, they show a different effectiveness when it comes to intervening in and changing the system (Abson et al., 2017; Meadows, 1999). By adopting a variety of principles, small intermediary businesses may not only tackle the underlying problems (by focusing on deep leverage points by, for example, coming up with a transformational supply chain design and intent) but also generate some tangible short-term success moments (often achieved by shallow interventions, such as dealing with alternative materials or processes, that are easier to implement). The latter may keep up the motivation and strengthen the commitment of such companies acting between consumers and producers to change business practices and to continue to look for new solutions. Also, there is not only one solution but many pathways to transformations. “An attempt to establish a hierarchy of solutions too soon can greatly narrow the scope for action” (Chambers, 2019, l. 12). This is important as it acknowledges the smaller and bigger efforts of a business to take action.

Second, small intermediary businesses could change the intent of their trade relations. This is an example of addressing a deep leverage point (Abson et al., 2017; Meadows,

1999) (see also Table 1) or for stimulating change in the personal sphere of a system because it also addresses the values of individuals, in this case of food entrepreneurs or business owners (O'Brien & Sygna, 2013). Re-thinking the intention or purpose of international food supply can be both the result of and the driving force leading to relational proximity. Instead of focusing on the intention to achieve the cheapest price to maximize profits, thus putting the product and its market at the center of food supply, or seeking to construct primarily efficient and responsive supply chains through collaboration (Matopoulos et al., 2007), the focus could be on the socio-economic needs of all actors involved in a supply chain, thereby putting the people at the center and considering relational proximity as an integral part of sustainable international food supply.

This is a solution that has been proposed by proponents of the I-CSA (Rommel, 2019) for the case of international food supply and by proponents of alternative economic approaches in general, for example the community supported economy (Rommel & Knorr, 2021) or the economy of the common good (Felber, 2019). Changing the intent of international trade relations might also have the potential to engage in questions of power and justice in food systems, two of the major underlying challenges that are not easy to solve but urgently needed to be addressed (McWilliams, 2010). This action, then, corresponds to one of the four key components for change identified in the food systems review, namely the “*deep value shift* with regard to food and food systems informing actions” (Weber, Poeggel et al., 2020, p. 12) underlining moral and value-based motivation of transformational actions.

Third, small intermediary businesses could collaborate to expand their local networks. One key prerequisite for them to do so is trust. Trust is crucial when working together and when relying on each other's commitment and contribution (Luederitz, Schöpke et al., 2017; Ostrom, 2003). This action is a logical next step, especially in light of the key findings regarding the importance of relational proximity and of building networks among peers discussed earlier. This confirms another key component for change identified in the food systems review, namely “*close collaboration* of stakeholders in food systems in new networks and platforms” (Weber, Poeggel et al., 2020, p. 12). In their literature review on interventions in food and energy systems, Dorninger et al. (2020) found out that more collaboration and a shift in norms and paradigms are the least described interventions by scholars so far. Young (2010) likewise has shown that “locally and extra-locally oriented firms in the community of Port Hardy, British Columbia, have different types of help networks that reflect different competitive realities in local versus extra-local economies and that the social resources that do well at one scale frequently come from the other. The findings of this dissertation underline the utility and importance of such local collaborative networks and might provide some initial evidence on how interventions in food supply chain practices might lead to those outcomes.

As already mentioned above, collaborations and networking are a common characteristic in Alternative Food Networks (AFNs) (Goodman et al., 2012) and alternative food movements (for details on the latter see Weber, Poeggel et al., 2020). Alternative food movements aim to create new spaces and local networks through collaboration and grassroots innovations to develop solutions “that respond to the local situation and the interests and values of the communities involved” (Smith & Seyfang, 2013, p. 585). Researchers working on this field primarily discuss local food initiatives and grassroots organizations, mainly consisting of consumers and producers, as change agents in advancing sustainability transformations of food systems (Weber, Poeggel et al., 2020). Small intermediary businesses in the area of international food supply could be part of these movements, too and constitute an equally important change agent in these networks. They further might provide a link between local and international food supply collaborations and connect with other local networks globally. According to Avelino et al. (2019) such “translocal connections [can be] an opportunity for up-scaling and institutionalization” (p. 19). Indeed, this insertion into broader social movements has been empirically been identified by a study on a social enterprise in the bike sharing sector as a mechanism for such businesses to accomplish wider transformations (Sunio et al., 2020). One example of a network of businesses that work under the same community supported economic principles for international food supply is the Teikei Network (<https://teikei.global>). All these example underline the importance of collaborative networks and provide empirical evidence that this is already practiced.

Fourth, building on the previous action regarding forming collaborative networks, a fourth action is that small businesses could disseminate their sustainable business practices to other businesses by using these networks. This links to processes of “amplifying out” a sustainability initiative by Lam et al. (2020), which in this case would rather refer to the transfer or dissemination of a sustainable business practice to more businesses adopting this practice. This process could for example be

“[a] growth in the number of [such businesses], and coincides with the diffusion of information and skills [e.g. on sustainable international business practices], for example through books, conferences, workshops, formal education, or person-to-person communication within a committed [...] network” (Boyer, 2018, p. 34).

The practical training workshop for small coffee businesses in the Phoenix region, AZ, is a concrete example for that (see Workshop report 2, Appendix A1.2). Such trainings of sustainable sourcing practices can be a key mediator for disseminations or transfer, thereby corresponding to a third key component for change identified in the food systems review, namely “*education* to support [stakeholders]” (Weber, Poeggel et al., 2020, p. 12). The fourth key component, “*political action* to support inclusive and participatory governance structures,” (ibid) could not directly be related to the findings of the three individual studies included in this dissertation. This emphasizes the

importance to integrate or combine entrepreneurial with for example policy approaches at all scales (from local to global) and all levels (from individual to institutional) to transform food systems.

All four actions described here correspond to the enabling approach of transformations (Scoones et al., 2020) in some way. It emphasizes small businesses as individual agents embedded in a wider community or network of peers that share similar values, educate each other and learn together to create sustainable food systems guided by new paradigms. Researchers can form part of this community, too.

Box 2. Summary of findings as responses to the general research question

What are entrepreneurial solution approaches for international food supply...

- Challenges in international food supply chains can be conceptualized as negative effects of large geographical and relational distances
- Five solution approaches specified by twelve design principles address these challenges, with the I-CSA showing a high transformative potential
- Mitigating negative effects of geographical distances should be a minimum requirement for businesses in international food supply
- Building relationships and connect people is a key factor to achieve sustainable international food supply
- Creating affective experiences (as a marketing intervention) can support relationship building
- Building (local) networks can strengthen economic resilience of a business

... to contribute to sustainability transformations of food systems?

- Small businesses could adopt a variety of design principles in order to address all dimensions of transformation.
- Small businesses could change the intent of their trade relations.
- Small businesses could collaborate to expand their (local) networks and foster transformations.
- Small businesses could diffuse their sustainable business practices to other businesses to amplify impact.

5.2 Methodological reflections

In this section, I reflect on the transdisciplinarity of my research, on the solution-oriented methodology, and describe the limitations of this dissertation. With these reflections, I hope to complement the multiple facets transdisciplinary solution-oriented research can have. They may further provide insights on the additional questions asked in the research design (Section 2.1) on what such transdisciplinary collaborations between research(ers) and small intermediary businesses can look like and how they can contribute to sustainability transformations of food systems.

5.2.1 Multiple facets of transdisciplinary research

Transdisciplinary research projects in reality often look different from the ideal case. This may be related to different degrees of stakeholder involvement (Schneider & Buser, 2018) or interactive knowledge generation (Wiek, 2007). The two transdisciplinary collaborations of this dissertation also differed in some points from ‘ideal-typical’ projects as proposed for example by Lang et al. (2012). In the following, I point out five characteristics of my transdisciplinary work and share related benefits and challenges that I have experienced, and strategies how challenges could be addressed.

Observed characteristics of included transdisciplinary research projects

Homogenous teams involving one stakeholder: It is widely acknowledged that multi-stakeholder collaboration among a variety of actors (businesses, governments, NGOs, scientists) is crucial to solve complex real-world problems (Lang et al., 2012; Mauser et al., 2013; Roux et al., 2017). However, this often comes with conflicting interests and power relations; a group which is too heterogeneous may even decrease the potential of such research for societal effectiveness (Lux et al., 2019). In both collaborations presented in this dissertation, researchers collaborated prominently with one stakeholder, namely one or two small coffee businesses. In addition, the transdisciplinary research teams (researchers and food entrepreneurs) can be described as homogenous in terms of their age, educational background (university degrees), values, and commitment (strong interest in sustainability).

Time for scoping, exploring, and trust building: Phases of scoping and trust building are often not mentioned separately in the literature but rather are included in the first phase of problem framing and team building (Lang et al., 2012). However, there is often an “initial and fairly unstructured pre-phase” (Wiek, 2007, p. 53) of scoping and exploring potential research opportunities that can be crucial for the further process and project success (Bennich et al., 2020). In the collaboration with Teikei Coffee, this pre-phase was rather long (17 months) and involved joint activities benefitting mostly Teikei Coffee as a business. For example, the researcher volunteered in supporting the process of establishing a local coffee consumer community. As a consequence, the research question emerged during that scoping phase and was driven by the project partners. In ideal transdisciplinary processes, the process of jointly framing the research question and design would emerge equally from both science and society at the very beginning (Lang et al., 2012).

Involving strong practitioners: While ideal transdisciplinary collaboration relies on a balanced partnership and well-designed processes (Lang et al., 2012), the partnership with Teikei Coffee seemed to be imbalanced and practitioners were leading the project, at least in the pre-phase of scoping, exploring and trust-building. I observed imbalances regarding the workforce (six Teikei Coffee team members compared to one PhD student/ researcher) and personal dependency on project success (high time

and money investment resulting in an interest in project output of Teikei Coffee team members compared to be “part of the research/ job” resulting in an interest in project process on the PhD student/ researcher side).

Applying integrative and disciplinary methods: Adopting integrative methods for knowledge generation is key to transdisciplinarity (Bergmann et al., 2012; Mauser et al., 2013; Norström et al., 2020). While with Considerate Coffee & Catando Ando, I adopted this type of methods (e.g. strategy and vision building), the collaboration with Teikei Coffee led to an experiential intervention study using rather disciplinary quantitative methods, which are usually applied in psychology or marketing studies. Related to the methods selection was the degree of intervening as a researcher, from low, in encouraging consumers to participate in the intervention study, to high, in facilitating the implementation of a piloted sustainable coffee supply chain.

Benefits, challenges, and strategies

These observed project characteristics came with certain benefits and challenges, which I summarize in Table 4 as well as providing strategies for how to address these challenges. I elaborate on two aspects in more detail below as they have been very central to my work.

The major challenge related to the long phase of trust-building overlapping with the condition of homogenous and one-stakeholder collaborations was dealing with different positionalities of me as the researcher with respect to the project partners – from being far away as an observer to becoming a member of the Teikei Coffee team and supporting their business. What I am framing now from a retro-perspective as a long scoping phase, which later facilitated the scientific study, made me struggle that time and I experienced it as a rather imbalanced partnership with strong practitioners. Communicating this transparently to my project partners, reflecting on it in my research diary, discussing the situation with my peers and asking for advice from experienced researchers, i.e. my supervisors, all helped as an early career researcher to deal with this struggle. Since this difficulty occurred during the first year of my PhD I was able to have enough time to take these steps. In addition, a formative evaluation together with the team how they perceived my role(s) as a researcher during the first scoping phase, provided me with a different perspective on this situation (see Appendix A3).

Despite these challenges, the great opportunity of this long pre-phase was to earn and build trust. In addition, I had the time to get a deeper understanding of the business and the concept of an I-CSA, and let a research study evolve, which I have not thought about in the beginning. At the same time, it was important to ensure a win-win situation and identify a need in research that could also be connected to Teikei Coffee’s need or interest in order to avoid being merely a “service provider” for a business. While Newig et al. (2019) found out that “contributions from practitioners in early phases of research projects positively influence certain societal and practice-relevant outcomes,”

this long pre-phase led to an empirical study that facilitated also scientific disciplinary integration to a great extent. This confirms another finding of their study, namely that “a combination of disciplinary as well as inter- and transdisciplinary project phases helped projects to meet both demands” (Newig et al., 2019).

In summary, having enough time to let research questions evolve may come with challenges regarding the positionality and roles of researchers, which needs guidance for young researchers, but at the same time has the great opportunity of doing scientifically and societally relevant research, being surprised and truly learn from and with each other.

The major challenge of applying integrative methods and seeking to create real-world change in the collaboration with Catando Ando & Considerate Coffee was handling various tasks at a time. I struggled with the variety of tasks that accumulated during a short limited time and with the fact that the researcher team was quite small for fulfilling and managing these tasks. In this context, my primary role in this collaboration was (among others) to set up the project, bring two businesses together, work with them on their current supply chains, and facilitate the process of implementing a sustainable coffee supply chain in the real-world, while at the same time not neglecting the scientific part of the project. A benefit of engaging in the many tasks was that this allowed me to infuse transformational sustainability ideas to the project, and facilitate a change process. This enabled mutual learning both for me as the researcher and for project partners, because we had to rethink our own assumptions, for example defining what a fair coffee price for project partners and for me as a sustainability researcher could mean.

In summary, being involved in initiating a project and doing research about it with only a small number of researchers, can make scientific re-integration difficult as most of the time resources may be needed to advance the project. However, the benefit is to increase the real-world impact and contribute to change.

Table 4. Challenges, benefits, and strategies related to observed characteristics of included transdisciplinary research projects.

		Challenges (o) / Benefits (+)	Strategies to address challenges
Homogenous teams collaborating with one stakeholder		<ul style="list-style-type: none"> • (o) Struggles with researcher’s positionality (observing ↔ becoming a member) • (o) Many roles and tasks as a researcher • (o) Balancing project outcomes and scientific outcomes • (o) Limited perspectives to solve complex problems • (+) Short communication and decision structures • (+) Facilitates transparency • (+) High potential for bringing in ‘transformational’ ideas 	<ul style="list-style-type: none"> • Reflecting on it (research diary), making positionalities explicit and communicate them transparently • Exchange with peers and experienced researchers • Hand over responsibilities, involve more people and distribute tasks • Add an accompanying researchers team (Defila & Di Giulio, 2018) • Organize multi-stakeholder roundtables to verify results (Workshop report 1, Appendix A1.1)
Strong project partners	workforce	<ul style="list-style-type: none"> • (o) Limited resources of one researcher compared to many practitioners • (+) High commitment of practice partners, for example to participate in research activities (interviews, workshops) 	<ul style="list-style-type: none"> • Communicate clearly and repetitively the role of the researcher and clearly distribute responsibilities at an early stage in order to avoid wrong expectations (Lang et al., 2012)
	dependency	<ul style="list-style-type: none"> • (o) Process too slow for practitioners and too fast/little reflective for researcher • (o) Output- versus process-oriented perspective (lower commitment of project partners in applying process-oriented methods) • (+) High engagement and reliability of practice partners in working on expected outputs and advancing the project 	<ul style="list-style-type: none"> • Jointly evaluate researcher and practice partner interaction and research process (Bergmann et al., 2005; Schneider & Buser, 2018) • Map the project progress made • Communicate that both sides should be open to new methods and should trust in each other’s competences.
Time for scoping, exploring, and trust building		<ul style="list-style-type: none"> • (o) Priority in solving real-world problem than in scientific output • (o) Unclear role(s) of the researcher • (o) High level of uncertainties regarding further research process • (+) Increased social robustness of co-produced knowledge • (+) Process as part of the research can lead to unexpected outcomes (see Appendix A3) • (+) Facilitates further research 	<ul style="list-style-type: none"> • Reflecting on it (research diary) and communicate roles transparently • Jointly evaluate researcher and practice partner interaction and everyone’s roles (Bergmann et al., 2005; Schneider & Buser, 2018) • Be patient and trust in the process • Work with evidence-based systematic research approaches (Wiek, 2015)
Methods	disciplinary	<ul style="list-style-type: none"> • (o) Required method to address a research question may lay out of own expertise • (o) Societal re-integration may be less prioritized • (+) High probability of successful scientific re-integration 	<ul style="list-style-type: none"> • Involve an expert (interdisciplinary team) • Discuss study findings and jointly identify potential implications together with project partners
	Integrative	<ul style="list-style-type: none"> • (o) Balancing project outcomes and scientific outcomes • (o) Many tasks and roles for a researcher • (+) High probability to increase real-world impact 	<ul style="list-style-type: none"> • Add an accompanying researcher (team) (Defila & Di Giulio, 2018) • Frame potential research questions from the beginning on that can guide the process but are still flexible enough for adaptation

Lessons learned

Lessons learned and implications from the insights described above include:

- There are many ways of doing transdisciplinary research. A transdisciplinary collaboration can also have the function of preparing an interdisciplinary study (not only co-producing knowledge). Moving out of one's own comfort zone and making use of a wide spectrum of methods (choosing a rather pragmatic approach for data collection) can turn into unexpected results.
- It is crucial to be self-reflexive about the potential changing roles of a researcher (Wittmayer & Schöpke, 2014) and dynamic positionalities (Freeth & Vilsmaier, 2020) with regard to the project partners. However, for early-career researchers it can be challenging to engage in such action-oriented knowledge production. A training on how to apply “essentials of second-order transformation research” (Fazey et al., 2018) could support them.
- “Methodological groundedness” and “epistemological agility” have been proposed as guiding competencies for the dilemma of early career researchers performing rigorous sustainability research when “starting as interdisciplinary individuals without profound roots in a discipline” (p. 193). Support from researchers with a certain expertise in a method can sometimes compensate for this lack in methodological competence. In this context, a network of interdisciplinary researchers (who can to a certain extent compensate for this lack in methodological competence) are as important as experienced transdisciplinary researchers who can provide guidance to early-career researchers in this balancing act.
- Transdisciplinary projects should acknowledge the importance of the pre-phase of scoping and exploring potential research collaborations and trust building by making time for this, already in the project proposal.
- Where possible, transdisciplinary research projects, although they are comparatively small, should be supported by accompanying researchers to support scientific re-integration of transdisciplinary projects (see for example Defila & Di Giulio, 2018). These could also be subject to Master's theses.

5.2.2 Advancing solution-oriented research practice

Based on the adopted transformational sustainability research methodology (Section 2.1), this research was solution-oriented. One goal of this study was to (co-)produce knowledge on what small businesses could do to solve certain problems related to the international food supply. This includes knowledge on the system of inquiry (challenges of international food supply), crafting a sustainable vision and solution options (how could sustainable international food supply look like), and strategies of how to get there (for example, a business's action to change a certain practice).

Generating these different knowledge types, and creating actionable knowledge that can be applied to the practice requires different research methods (Wehrden et al., 2017; Wiek & Lang, 2016). This study may provide an example of making use of a wide spectrum of research methods.

First, rather classical research approaches, such as systematic literature reviews, can be designed in a solution-oriented way. For example, the systematic literature review on food system transformations (Study#1), in particular the text analysis, extracted concrete actions and actors in the food systems and *how* they change the system in addition to providing bibliometric information.

Second, in line with the epistemological perspective of pragmatism, solution-orientated research can imply applying a diversity of methods covering the entire spectrum from quantitative to qualitative methods. Methods used in this study ranged from an experimental intervention study with subsequent statistical analysis (Study#3), to a systemic literature review combining a hierarchical cluster analysis and qualitative text analysis (Study#1), to a conceptual work further supported by semi-structured interviews (Study#2), to participatory vision- and strategy building workshops (Study#4).

Third, this variety of methods also corresponds to the different types of research in the context of transformation (Box 1). While the food systems review (Study#1) would correspond rather to transformation research (researching about transformation, what others have said about it), identifying potential sustainability solution options in the entrepreneurship study (Study#2) would correspond to transformation-*al* research. The transdisciplinary collaboration and the coffee supply chain study (Study#4), would correspond to transformati-*ve* research because I directly intervened in the system and caused change, namely in the supply chain structure of two businesses, and then explored conditions conducive to implement sustainable coffee supply chains. To answer my general research question and with the objective to make practical contribution to food systems change, all types of research were necessary and complemented each other.

As already mentioned, different research practices, in particular transdisciplinary research, may come with certain challenges (lacking expertise, proximity conflicts, many roles) but there are also strategies to overcome this (get experts on board and collaborate, reflect, trust, making uncertainties explicit, stick to general principles of doing evidence-based research, be open and motivated to learn and try out new things). The great opportunity of doing solution-oriented research is to contribute to sustainability transformations as a researcher, too. Although it is only on small scale.

5.2.3 Limitations

This dissertation is not without limitations. First, this study focused on small, mostly intermediary businesses. This limits the results to the size of the business and its

specific position within the supply chain. However, it does not imply that bigger businesses cannot adopt these approaches. It might be a little bit more difficult or take longer given the typically less flexible structures or traditions in such market incumbents to change their practices. For generalizability of results, studies on other types of businesses would be needed.

Second, this study is limited regarding measuring the sustainability outcomes of the identified approaches. I theoretically discussed approaches against sustainability criteria but did not examine how, for example, livelihood opportunities or access to education may have improved with adopting a certain business practice, or in how far even broader sustainability challenges, such as power imbalances or social inequalities may have changed. Some of the changes may be even far from deep and radical and we might not be able to talk about the role of small intermediary businesses in transforming the international food supply but rather incrementally improving it (at least in some cases).

Third, the finding of the importance of relational proximity in international food supply chains, is limited to the perspective of the intermediary business (Studies#2-4) and the consumer (Study#3). The study lacks a comprehensive instrument to measure relational proximity, which is able to include all supply chain actor's perspective including producers. This is particularly important because relational proximity might mean something different to people with a different worldview or in different contexts. This also is linked to my own limitations being a white female researcher, who grew up with a Western worldview and in a small-family context, which shaped my research. For people growing up in larger families, intentional communities or socially outgoing cultures, relational proximity may imply other meanings.

5.3 Contributions

5.3.1 Scientific contributions

The overall scientific contribution of this study is fourfold:

First, this study contributes to the concept of sustainability entrepreneurship in the area of international food supply in particular and of food system transformations in general. Conceptualizing sustainability challenges along large distances might help researchers to systematically develop and identify effective solution options. The study further contributes by providing empirical evidence on how small intermediary businesses can advance sustainability in international food supply through overcoming large distances. This also supports recent attempts to apply the proximity concept to global food supply (Edelmann et al., 2020).

Second, this study, in particular the food systems review (Study#1), contributes to structuring the literature on food system change by identifying five distinct yet complementary research clusters and their approaches to changing food systems. In

this context, together with the findings from the other three individual studies (Studies#2-4), this dissertation might provide a new perspective on one of the identified clusters, namely alternative food movements and their characteristics of collaboration and networking. What has been discussed so far as a local approach initiated by consumers and producers, might open up to the international scale and add a business perspective. Relational proximity is the integral part and connecting element of both. Consequently, this emphasizes the role of small businesses as change agents in such alternative food movements through forming networks and collaboration, not only to other supply chain actors, but also with similar businesses and beyond.

Third, my research, in particular the marketing study (Study#3) contributes with empirical evidence to what has been theoretically discussed in the literature on experiential marketing and sustainability (Dettori, 2019). It also enhances our understanding of how consumers can be included in relationally close food supply chains for international food products.

Fourth, given the variety of methods applied in this study, this dissertation might also contribute to the development of the scientific discourse on solution-oriented knowledge production and its implementation, and shows how many facets transdisciplinary research can have, while acknowledging its challenges and limitations.

5.3.2 Practical contributions

Practical contributions of this study include, on the one hand, the real-world implementations that occurred during this research. This encompasses the piloting of a sustainable coffee supply chain between a local coffee roaster and its producers in Mexico and a cold brewing coffee business and its customers in Arizona. The two related workshops have initiated and strengthened a network of local coffee businesses in Arizona. On the other hand, the study findings can also provide guidance to practitioners working in the area of international food supply, be it on how to sustainably source ingredients or how to involve consumers in international community supported food supply schemes. Corresponding to the practice-oriented nature of this study, key messages that practitioners could take away from this work are summarized in Box 3. Whilst these messages address rather the type of small businesses investigated here, they might not be limited to this group. Maybe this work will even motivate bigger businesses to adopt sustainability practices, too.

Box 3. Take-away messages for practitioners

1. **Look at multiple answers** to current challenges in international food supply. The set of sustainability oriented design principles (see Appendix A2) suggests many concrete ways to work on your supply chain. You can take it as a source of inspiration but adapt it to your own context, always having in mind general sustainability principles.
2. **Invest in trust building** to create relational proximity to your supply chain partners. It is the basis for sustainable food supply. Experiential marketing, in particular creating affective experiences, for example through watching video messages, could facilitate the so important connection between consumers and producers. However, it is important that there is an honest desire to do so, which also includes critically reflecting on dominant paradigms such as profit maximization.
3. **Collaborate.** You are not alone. Look for peers with similar values. Collaborate (instead of compete) and form a network with like-minded people to create support structures and advance sustainability beyond your own business. Transformation processes are not easy. They take time and continuous adjustments. They can be fragile and vulnerable. Therefore, it is even more important to look out for supporting structures, which can be your peers, but also other actors in your surroundings, including (transdisciplinary) researchers, too.
4. **Small (intermediary) businesses have the potential** to make a difference through changing their international business practices. Small businesses are still the majority of all businesses in the world. In addition, as the anthropologist Margaret Mead said: “Never underestimate the power of a small group of committed people to change the world. In fact, it is the only thing that ever has”.

6 Conclusions and outlook

6.1 Conclusions

The main goal of this study was to provide sustainable solution options, namely sustainable business practices, to address current challenges and advance sustainability in international food supply, with a particular focus on small, mostly intermediary businesses, as well as to provide guidance for the implementation of these business practices. Another aim of this study was to enhance our understanding of the potential of these businesses to contribute to food system transformations. Adopting an enabling approach to transformation, this study further aimed at actively engaging with small businesses in advancing sustainability through transdisciplinary collaboration.

This study identified and conceptualized challenges in international food supply as consequences of two types of large distances, namely relational and geographical distances (Study#2). Based on empirical evidence, it further identified different entrepreneurial solution approaches for overcoming these large distances, specified through sustainability-oriented design principles for international food supply (Study#2), each of them tackling different leverage points. As geographical distance often remains, creating relational proximity becomes even more important, in particular among *all* supply chain actors, including producers and consumers, and not only between intermediary businesses, for example between a coffee trader and a coffee roaster. The International Community-Supported Agriculture (I-CSA) seems to be a promising approach to do so because it aims at these direct connections, also by questioning underlying dominant economic paradigms, such as profit maximization. An experimental intervention study (Study#3) with the I-CSA Teikei Coffee further showed that consumers can be incentivized in such schemes via creating relational proximity through affective experiences that further can foster sustainable consumption behavior. The transdisciplinary case study on designing and piloting a sustainable coffee supply chain between the two coffee businesses Considerate Coffee and Catando Ando further identified problem recognition, solidarity, transparency, trust, and economic resilience through collaboration as major conditions for infusing sustainable business practices into the supply coffee chain (Study#4). All these findings clearly support the relevance of creating relational proximity across all actors involved in the international food supply chain.

If and how small intermediary businesses can contribute to sustainability transformations becomes clearer when linking the findings from above to findings from the food systems review (Study#1). The review identified (local) alternative food movements as one research cluster or approach to foster sustainability transformations of food systems, aiming for a shift toward (local) alternative networks. Findings from Studies#2-4 may add a new – an international and entrepreneurial – perspective to alternative food movements. The review furthermore revealed four key elements for

transforming food systems including political action, education, collaboration, and deep value shift, of which the latter three correspond to the findings above on solutions for international food supply.

From a methodological point of view, this study shows the multiple facets of transformational sustainability research making use of a wide range of methods and acknowledging different ways of doing transdisciplinary research. Providing training workshops to food entrepreneurs to scale their impact emphasizes the active role of transdisciplinary researchers in contributing to food system transformations.

Overall, this study has gone some way toward enhancing our understanding of sustainability entrepreneurship in the area of international food supply emphasizing the role of small intermediary businesses as an important agent in transforming food systems from the bottom-up through creating collaborative networks. These networks can span through international food supply chain actors as well as to other businesses embedded in the same local food system. Entrepreneurial solution approaches for international food supply chains also encompass shifting from economic paradigms of growth to collaboration, solidarity and trust as guiding principles, putting not the product but people at the center.

6.2 Outlook

As this study focused on small intermediary businesses as actors of change, further studies regarding the role of producers and consumers in providing solutions to unsustainable international food supply are worthwhile undertaking because their practices and behaviors on the one hand also drive sustainability challenges, and on the other hand have shown innovative practices already on the local scale. In addition, the focus of this study was on coffee, which facilitated comparison but also limits the results. Further research should explore other international food products, such as fruits, vegetables, spices or tea.

Regarding the I-CSA approach, that has been discussed in this study as a promising approach in advancing sustainability and transforming the international food supply, future research could explore the motivations of consumers and producers to commit to such schemes. Future studies could measure if and where entrepreneurial solution approaches may initiate change also in other areas beyond international food supply. Other studies may provide empirical evidence of the expected sustainability outcomes of certain sustainable business practices, such as social justice or balances power relations, and validate a causal relation between relational proximity and these outcomes. This would also include developing appropriate instruments to measure relational proximity that reflect multiple perceptions taking into account different cultural backgrounds of involved supply chains actors.

Further, future research should be undertaken to explore how other approaches of transformations can complement, help, or hinder the here investigated entrepreneurial approaches. Of particular interest could be governance approaches which have shown effects in the past, for example the International Coffee Agreement stabilized domestic coffee prices through local institutions, so called coffee boards (Eakin, Rueda et al., 2017).

Although the solution approaches presented in this study might work on the small scale, the big question of scalability of these initiatives or sustainable business practices remains. Future studies should be undertaken to identify potential scalability or amplification pathways and their (potential) limitations with respect to sustainability.

7 References

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Appendix

A1. Workshop reports

A1.1 Workshop report 1

Sustainable International Coffee and Cacao Supply: Insights from a Stakeholder Roundtable Discussion

Hanna Weber, Arnim Wiek

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Sustainable International Coffee and Cacao Supply

Insights from a Stakeholder Roundtable Discussion

Hanna Weber and Arnim Wiek



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Sustainable Food Economy Lab

ASU School of
Sustainability
Arizona State University

Sustainable Food Economy Lab

The Sustainable Food Economy Lab supports and advances sustainable food economies and enterprises through solution-oriented research in collaboration with stakeholders and researchers. We believe in the value of food that is healthy and delicious, fairly priced and broadly accessible, while produced in environmentally friendly ways along the entire life cycle, with high standards of animal welfare. We also believe in the value of food that provides decent, stable jobs, while supporting local communities and cultures.

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Background, Objectives, and Participants of the Roundtable Discussion

International coffee and cacao supply is continuously increasing around the world.¹ Despite improvements along the supply chain (Eakin et al., 2017), which are often limited to specific aspects (Defries, 2017), current practices continue to cause negative externalities. These include: imbalance in the economic value chain favoring trade over production and processing; significant transport-related greenhouse gas emissions and packaging waste; negative impacts on the farming ecosystems; as well as poor working conditions in the regions where coffee and cacao is being produced or processed (Caswell et al., 2012; Weaver et al., 2012; Millard, 2017). However, several pioneering companies and partnerships have started to demonstrate how coffee and cacao could be produced, processed, and distributed in ways that align with *strong* sustainability principles along the *entire* supply chain, including provision of livelihoods, environmental integrity, social well-being, and justice (Cagliano et al., 2016; Weber et al., 2019).

Our research team has supported a collaborative pilot project between *Considerate Coffee* in Phoenix, Arizona and *Catando Ando* in Xalapa, Veracruz, Mexico with the objective to create and demonstrate a sustainable international coffee supply and value chain (Weber & Wiek, 2019). After four months of intensive work, we invited a number of interested stakeholders to share with them initial insights and stimulate an early conversation about transfer and scaling of results to advance sustainable international coffee and cacao supply across Arizona and beyond. The specific objectives were:

- (i) familiarize participants with initial findings from the *Considerate Coffee* and *Catando Ando* partnership;
- (ii) discuss sustainable principles for (re-)designing international coffee/cacao supply chains;
- (iii) share good practices and ideas on how to infuse sustainability into local coffee/cacao businesses.

The roundtable discussion took place on December 12, 2018, at the School of Sustainability on the Arizona State University campus in Tempe, Arizona. The workshop was hosted and organized by Hanna Weber and Prof. Arnim Wiek from the Sustainable Food Economy Lab at the School of Sustainability.

The participants in the roundtable discussion were: the *Catando Ando Coffee Roasters* team with Alejandro Chazaro, Leopoldo Chazaro, Luis Murillo Mercado, Leila Gil Martinez; the *Considerate Coffee Company* team with Dustin Clapp and Nicholas Shivka; Dr. Braden Kay, Sustainability Director of the City of Tempe; local coffee business owners Burc Maruflu and Sena Maruflu from *Savaya Coffee Market* in Tucson, as well as Stephanie Vasquez from the *Fair Trade Cafe* in Phoenix; Jake Swanson and Helene Tack from *Local First Arizona*; as well as Natalie Morris, the Program Coordinator of ASU's *Prepped* Program, an accelerator program for small food businesses.

Importance of Pilot Projects

During the opening remarks, Dr. Braden Kay, Sustainability Director of the City of Tempe and member of the Urban Sustainability Directors Network (USDN), highlighted the importance of pilot projects for the transition of cities into a sustainable future. In partnership with Arizona State University and *Local*

¹ While there are differences between international *coffee* supply vs. international *cacao* supply (see Potts et al., 2014, Chapter 7 vs. Chapter 8), for the purpose of this report, we focus on the similarities of these two major global commodities.

First Arizona, the City of Tempe supports incubation and transformation of sustainable local food businesses to drive this change. Honoring the “real passion project” between *Catando Ando* and *Considerate Coffee*, Dr. Kay confirmed the commitment of the local Governmental to collaborate with other government entities, non-profit organization, small coffee businesses, and research institutions to advance and learn from projects like this one.

Development of International Coffee Supply since the 1980ies

To contextualize our pilot study and the roundtable discussion, we are providing here a brief overview of major developments in international coffee supply since the 1980ies, citing from and briefly discussing Eakin et al.’s (2017) study [all following citations are from this study, if not indicated otherwise].

“Coffee is one of the most heavily traded commodities in the world. About 60 million people, mainly in tropical regions, are involved in the production of more than 8.5 million tons of green coffee every year. Brazil, Vietnam, and Colombia are the main producers of coffee, Brazil and Colombia being the largest producers of mild Arabica coffee, considered of higher quality than the Robusta variety. North America, Europe, and Japan are the largest consumers, although the more dynamic markets are in the emerging economies of Eastern Europe, Brazil, and even China and India.”

“In terms of producers, there are more than 30 countries in tropical areas growing and trading coffee. Coffee is usually grown by smallholders, i.e. “suppliers.” Manufacturing has been historically dominated by a few companies that roast, pack, label, and sell coffee through retailers. These companies are located predominantly in North America, Europe, and Japan. The governance system for the coffee value chain was, between 1962 and up to 1989, the International Coffee Agreement (ICA). The agreement was reached between the largest producing and consuming countries and determined a fixed quota of production to be allocated to each country. Producing countries, in turn, developed [national] institutions to stabilize domestic prices, known as coffee boards, that taxed exports in times of high prices to subsidize the price when they were low. The coffee agreement ended, under the pressure of the U.S. government, and national boards were dismantled [...]. The fall of the agreement was followed by substantial increases in production from Brazil and Vietnam that flooded the market, further reducing the price and contributing to the collapse of most national boards [...].”

“When the ICA broke, producing countries, especially those offering mild coffee such as Mexico and Colombia, failed to restrain their supply. The national boards had collapsed across the developing world, with a few notable exceptions, and thus coffee growers were left to the ups and downs of international trade. Free market conditions, support from local governments, and multilateral funding for coffee expansion, particularly in Brazil and Vietnam [...], further depressed the price of coffee. Prices reached a historical minimum in 2001, falling from an annual average of US\$1.17/lb in 1989 to US\$0.71 in 2001, adjusted by inflation [...]. As a result of the disruption to the international market, smallholders around the world, the backbone of the coffee industry, suffered a dramatic decrease in their standards of living, spawning a humanitarian crisis”.

“[I]nternational efforts were organized to specifically address market issues and social equity through institutional innovations, such as the Max Havelaar label, created under the auspices of the Dutch ecumenical development agency Solidaridad, to mainstream coffee as a fair-trade product [...].

Certification schemes in coffee had existed prior to the collapse of the ICA, but it was the market shock of 1989 that is widely interpreted as catalyzing these initiatives into new forms of coffee system governance [...]. Other initiatives gained ground in the 1990s, such as the Fairtrade Foundation (Germany), Transfair (USA), the UTZ Kapeh Foundation (also from the Netherlands), the Rainforest Alliance (UK-USA), and the organic movement, under the umbrella of IFOAM”.

“The humanitarian organizations created a space in international coffee markets, generating and responding to a demand for ethical products; larger coffee traders realized the market benefits of these grass roots institutional innovations. The result was the emergence of private governance mechanisms for sustainability, mainly certification programs that delivered technical assistance, created codes of conduct, and allowed compliant products to use a label to differentiate the product in the market”.

“The aggregated result of these initiatives is remarkably high: according to a recent report (Potts et al. 2014) over 40% of the total amount of coffee produced around the world is done following a sustainability certification or verification program. Nevertheless, impacts on livelihoods remain a matter of discussion with abundant research showing small or negligible impacts whereas others present a more positive picture”.

“The demand for sustainable coffee continues to grow. The surge in demand has also translated in higher international prices [...] that reached their highest level in 2010, but have since stabilized at about three times the value of 2001, when the crisis hit bottom.”

While these citations from Eakin et al.’s (2017) study provide valuable context information, they might, in part, paint a more positive picture than is reality for many actors in the international supply chains. The authors acknowledge “abundant research showing small or negligible impacts” but refer to Potts et al.’s (2014) study stating that “over 40% of the total amount of coffee produced around the world is done following a sustainability certification or verification program”. Potts et al. (2014) provide more nuanced insights about major remaining challenges including oversupply of sustainably produced coffee and lack of rigorous evaluation of sustainability certification programs, in particular voluntary ones. There remains a lot to be done to ensure comprehensive sustainability as illustrated with persisting issues along the international cacao supply chains: “In 2012, 4.1 million metric tons of cocoa beans were produced in more than 50 countries on 0.2 per cent of the world’s agricultural land, for a total export value of US\$8.4 billion [...]. This is a small fraction of the total value of the chocolate market, estimated at more than US\$83 billion. [...] Due to the concentration of large cocoa buyers and in some cases taxation and fixed low payments to farmers by national cocoa marketing bodies or other intermediaries, farmers may receive as little as 40 per cent of the world market price [...]. In addition to poverty, however, child and forced labour, deforestation, pesticide use and biodiversity maintenance are all important sustainability issues facing the sector.” (p. 131)

Sustainable International Coffee Supply – A Pilot Project between *Catando Ando* and *Considerate Coffee*

While partial improvements along the international supply chains of coffee and cacao have been achieved (see previous section), there are still significant gaps and deficits when confronting current practices with a holistic approach to sustainability, i.e., a comprehensive set of sustainability principles.

Our pilot project set out to demonstrate how to design a comprehensively sustainable international coffee supply chain, delivering on a broad set of sustainability principles.

Catando Ando Coffee Roasters is a local coffee business with roastery and coffee shop in Xalapa, Veracruz, Mexico. The small business with seven employees purchases green coffee directly from local coffee farmers to be processed in their roastery. Together, they work on improving the production and processing techniques in order to increase the quality of the roasted coffee. *Catando Ando* is committed to ensuring fair payment for all people involved in the coffee supply, including the coffee pickers, which are chronically underpaid and struggle with their livelihood.

Considerate Coffee Company is a cold brew coffee company in Phoenix, Arizona. When starting the project, the two-person company processed coffee from Ethiopia, which was roasted in Phoenix by a different company. *Considerate Coffee* was primarily focused on waste management by producing coffee bio-char from coffee grounds and to use recycled material for their equipment.

Due to both parties strong interest in sustainability, they were willing to enter a pilot project to learn and experiment with sustainability practices in international coffee supply. The initiation of the project was facilitated by Hanna Weber and Arnim Wiek from the Sustainable Food Economy Lab at the School of Sustainability. All parties collaborating on the project are driven by the guiding vision of coffee supply “with human sense”. Through field visits and several working session in Fall 2018, the project developed a collaborative vision of a sustainable coffee supply chain between *Catando Ando* (and its suppliers) and *Considerate Coffee* (and its customers) as well as a strategy to achieve this vision.

The design principles of the envisioned international coffee supply chain are compiled in the following table.

Design Principle	Description and Justification
Investing in organic production	<p><i>Invest in conversion from conventional to organic agricultural practices, i.e., complement farmers’ income due to lower yields during the conversion phase.</i></p> <p>Organic agriculture builds and maintains healthy soils by applying compost or other biologic substances instead of using synthetic fertilizers, pesticides, or herbicides. Integrated farming practices, e.g. shade-grown coffee, can complement organic practices and also contributes to healthy ecosystems. The use of old coffee varieties as part of biological pest control contributes to biodiversity. All of these practices strive to maintain healthy plants and soils for future generations to come.</p>
Reducing food miles	<p><i>Reduce food miles along the entire supply chain through selecting partners located in countries that are as close as possible to each other.</i></p> <p>Apart from lowering GHG emissions due to less transportation, reducing food miles makes it easier to connect and even meet (trust building) across the supply chain.</p>
Offsetting greenhouse gas emissions	<p><i>Offset the remaining GHG emissions caused by transportation and energy imports through different measures, e.g. applying coffee bio-char or reforestation projects.</i></p> <p>Offsetting GHG emissions can have a positive effect on climate change, even if does not mitigate emissions completely.</p>
Adding value in the country of origin	<p><i>Shift value-added production steps from importing countries to the country of origin, e.g. coffee is roasted in Mexico and then exported for cold brewing to Arizona.</i></p> <p>Adding value in the country of origin provides more livelihood opportunities for partners in need.</p>

<p>Paying fair prices along the entire supply chain</p>	<p><i>Pay every person working in the coffee supply chain, including coffee pickers, a price that sufficiently acknowledges contributions and needs (= fair prices).</i></p> <p>Paying fair prices along the entire supply chain contributes to equity and justice between individuals and countries. It allows for building sufficient livelihoods everywhere, instead of gradients from minimum to maximum gains. If coffee production is economically beneficial to everyone, the young generation is more likely to continue this line of work.</p>
<p>Shortening supply chains</p>	<p><i>Remove intermediaries, e.g. larger importers, importers, exporters, fair trade associations, especially those, who do not add value to the product.</i></p> <p>Short supply chains offer more benefits to the real contributors and allow all supply chain partners to participate in decision-making.</p>
<p>Gender equality (women empowerment)</p>	<p><i>Invest in qualification of women to support them on their ways to become entrepreneurs, e.g., by financing trainings to obtain an official barista certificate by the Specialty Coffee Association (SCA). This could also help women to become more independent and self-determined in life.</i></p> <p>Empowering women contributes to equity between men and women and creates livelihood opportunities for them, independent from their family.</p>
<p>Caring about each other (across the entire supply chain)</p>	<p><i>Get to know the partners, communicate (frequently) with them, appreciate their products/services, and recognize their needs.</i></p> <p>In caring relationships, all partners, including the consumers, look out for each other and are willing to pay a fair price (at each stage of the supply chain). Farmers are motivated to do the hard farm work of growing coffee (compared to the “simple” act of drinking coffee) because they know that the consumers appreciate their work. Consumer appreciation allows farmers to integrate vegetable and fruit production on the coffee farms instead of maximizing coffee production. In terms of health and food safety, producers care for their consumers and do not apply chemicals, which could affect the consumer’s health. Caring relationships include building knowledge: consumers learn about coffee production and producers learn about the communities of consumers.</p>

In the first phase of the pilot project, both teams from *Catando Ando* and *Considerate Coffee* jointly developed an ideal supply chain and a transparent (“vitreous”) value chain considering fair payment for each person involved in the supply chain. All participants recognized and appreciated the shared values across the groups, in particular transparency, honesty, and solidarity, which were crucial for price negotiations.

In the second phase, both teams worked on detailing the vision further. For example, *Considerate Coffee* started to gather information about how to become an importer, e.g., if contracting a customs broker is necessary or not; *Catando Ando* already started the process of becoming an exporter, identified a transportation company as well as a reforestation project to compensate the greenhouse gas emissions



caused by the transportation of the coffee from Mexico to the U.S. In June 2019, *Catando Ando* is expected to be certified as an exporter and will ship their roasted coffee to *Considerate Coffee* in Phoenix. As an initial trial, in December 2019, *Catando Ando* shipped 20 kg of their roasted coffee to Phoenix with the help of an external exporter for *Considerate Coffee* to process first samples of cold

brewed coffee from *Catando Ando*. The cold brew from this shipment of coffee tasted very promising and *Considerate Coffee* is committed to order regularly and with increasing volume over the coming months.

For more details on the pilot projects, please review the first report (Weber & Wiek, 2019).

Insights from the Roundtable Discussion

Building on the insights presented from the pilot project, roundtable discussants brought up and discussed the following aspects related to sustainable international coffee supply.

Vale Chain Transparency and Consumer Education

Telling the story behind a sustainably designed supply chain to customers is important for building broader buy-in and the willingness to pay higher prices. This might even include reforming established, often somewhat secretive reporting practices. In conventional coffee supply chains, there is little information provided on the low wages coffee pickers and farmers receive, and those supply chain actors who profit most are reluctant to disclose information on their sales prices and profits. Full honesty and transparency not only about the supply chain but also about the *value chain*, that means, disclosing all sales prices and profits, is very uncommon. This level of transparency requires adding information about different living standards and costs to contextualize sales prices and profits. At the same time, full disclosure seems to be key for creating fair prices and wages across the value chain. All relevant information about the supply and value chain could be published on the company's website, or directly on the product label, maybe through a QR code. A controversial conversation ensued over the question whether or not consumers are interested in the backstory of the product they consume. Some market research on consumer preferences is needed to "tell the story" in an appealing and engaging way. The ultimate goal is to educate consumers in order to empower them to be a trusted partner in sustainable international coffee production, distribution, and consumption.



Making Impacts Tangible

The information about sustainable coffee supply and value chains should focus on the positive features and on tangible impacts. This is most relevant in the context of paying fair prices for coffee. The knowledge what differences a higher price actually makes should be explained in real world cases. For example, if a coffee picker in the Veracruz region of Mexico receives X\$ instead of \$Y per pound coffee, this allows her/him to send her/his children to school, see a doctor when needed, and buy healthy food. This translates higher prices and wages from abstract dollar-figures into real positive changes that are associated with them.

Fair Prices

In many coffee-producing regions around the world, fair trade pricing is still too low for a decent life, at least for the coffee/cacao pickers, as evidenced in the pilot project and confirmed by roundtable discussants. Full transparency regarding coffee value chains, as discussed above, would show this evidence and make customers and other stakeholders aware of this fact. The price-per-pound for

coffee pickers envisioned in the pilot project would improve the current living conditions of coffee pickers in the short-term, as indicated above. However, in the long-term, prices would need to be further increased to ensure decent livelihoods for all players along the supply chain.

New Culture of Doing Business

Another issue that was discussed is balancing social ambition and economic feasibility in sustainable international coffee supply. The pilot project demonstrates a new culture of doing business, it is a “passion project” about care, compassion, and solidarity. At the same time, it is undertaken by two companies, in association with other actors, that intend to continue running economically viable businesses. The roundtable discussion addressed the often undefined phrase of “economic viability”. Economic viability is often associated with excess profits for few (concertation of capital gains on individuals). However, in sustainable business practices, economic gain is equally distributed across the network of actors who add value to the product or service. This is the main difference to all large coffee companies (Starbucks, Nestlé, etc.) showcasing “sustainability” in their practices. While there are achievements, the main source of injustices and inequity is not touched. In contrast, there was agreement that coffee supply chains should be designed with the intention to redistribute profits within (!) the supply chain to everyone’s benefits and responding to everyone’s needs (which are different, but definitely higher than “minimum wage”). A sustainable international supply chain does not need to generate excess profits to be economically viable, but it internalizes gains and negotiates benefits using care, compassion, and solidarity.

Collaboration

Instead of competition, collaboration between coffee businesses was discussed as a key process to work towards a sustainable future in the coffee sector. As big coffee businesses (Starbucks, Nestlé, etc.) are getting bigger and bigger, there is a need to unite the strengths and forces of the smaller and sustainability-oriented coffee businesses to make their voice heard. Bonding across these businesses might benefit from other sectors such as craft breweries that have successfully collaborated as opposed to competing against each other.

Willingness to Experiment and Learn

The sustainable coffee sector seems to be willing to conduct pilot projects and learn in all areas of the coffee supply. Burc Maruflu from *Savaya Coffee Market* and Luis Murillo Mercado from *Catando Ando* reported about pilot projects on coffee production and processing techniques. Associated farmers experiment with different varieties, production methods, and wet processing practices and technologies in order to improve the quality of the coffee beans, generate a variety of tastes, and/or manage pests, e.g. the coffee roast. Burc Maruflu also mentioned that it is crucial to carefully document these pilot projects and its results to demonstrate tangible result, for instance, higher cupping score, to customers and business partners. Dustin Clapp and Nicholas Shivka from *Considerate Coffee* conduct experiments with the production and application of coffee bio-char, obtained from their coffee grounds. Based on the promising results of these first



experiments, Luis Murillo Mercado is interested in applying the practice with farmers in the Veracruz region and document the effects on the taste of the roasted coffee.

Next Steps

Based on the positive experience from this initial roundtable discussion, there are several future networking activities planned.

Dustin Clapp and Nicholas Shivka from *Considerate Coffee* plan to visit *Catando Ando* in Mexico this year. In return the *Catando Ando* plans to visit Arizona.

Burc Maruflu from *Savaya Coffee Market* has previously enabled farmers from Brazil to visit Tucson and he is willing to share experiences and best practices of these visits and exchanges.

Stephanie Vasquez from the *Fair Trade Cafe* would be interested in selling *Catando Ando* coffee and support a visit of *Catando Ando* to Arizona.

Sena Maruflu from *Savaya Coffee Market* is willing to explore how to support *Catando Ando* through marketing and other activities.

Jake Swanson and Helene Tack from *Local First Arizona* are willing to use the results from the pilot project to inform coffee shops and roasters in Arizona, e.g., by teaching about sustainable practices and supporting the SMEs in changing their business practices.

Natalie Morris, the Program Coordinator of ASU's *Prepped Program*, is willing to facilitate an alumni training session on sustainable practices in international coffee supply for the coffee micro-businesses who have participated in the *Prepped* program over the past years.

There is a general interest in further exchanging sustainable practices across different stakeholder groups, for instance, through regular meetings, a newsletter or joint events.

Workshop Feedback

The research team received feedback on the workshop. We share here two of them articulating excitement about and commitment to the pilot project, in particular, and the efforts in the emerging network, in general.

"Thank you very much everyone! We, the Catando Ando Coffee Roasters, are honored and happy to collaborate in this great project. We will make sure to share ideas to further enrich it. [...]"

„[...] excellent work bringing this project together! I was truly impressed by the connections [...] made between these local companies and the thoughtfulness [...] given to each individual and yet important component in the system. I'm honored to be a part of the group [...] allowed to participate, and look forward to the rest of the progress. Best of luck and great to meet (or see!) the rest of you. [...]"

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A1.2 Workshop report 2

**Sustainable Coffee Sourcing: A Workshop for Small Coffee Businesses in
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Sustainable Coffee Sourcing

A Workshop for Small Coffee Businesses in Arizona

Hanna Weber and Arnim Wiek



January 2020

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Photos

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Background, Objectives, and Participants of the Workshop

International coffee supply is continuously increasing around the world. Despite improvements along the supply chain (Eakin et al., 2017), which are often limited to specific aspects (Defries, 2017), current practices continue to cause negative externalities. These include: imbalance in the economic value chain favoring trade over production and processing; significant transport-related greenhouse gas emissions and packaging waste; negative impacts on the farming ecosystems; as well as poor working conditions in the regions where coffee and cacao is being produced or processed (Caswell et al., 2012; Weaver et al., 2012; Millard, 2017). However, several pioneering companies and partnerships have started to demonstrate how coffee could be sourced in ways that align with *strong* sustainability principles along the *entire* supply chain, including provision of livelihoods, environmental integrity, social well-being, and justice (Cagliano et al., 2016; Weber et al., 2019).

Over the years, our team conducted research on practices of sustainable coffee sourcing based on literature reviews, field trips, interviews with small coffee businesses, and expert consultations (Weber & Wiek, 2019). We also initiated a collaborative pilot project between two coffee businesses – *Considerate Coffee Co.* in Phoenix, Arizona and *Catando Ando* in Xalapa, Veracruz, Mexico – with the objective to create and demonstrate a sustainable international coffee supply and value chain (Weber & Wiek, 2020).

In fall 2019, we invited a number of small coffee businesses from Arizona (mostly roasters and coffee shops) to a workshop on sustainable coffee sourcing to transfer our findings from research to practical application in local businesses. The specific objectives for this workshop were:

- (i) Familiarize participants with sustainable sourcing practices
- (ii) Explore sustainable sourcing options for small coffee businesses in Arizona
- (iii) Strengthen the local network of small coffee businesses in Arizona

The workshop took place on October 29, 2019, at ASU's HEALab in Downtown Phoenix. The workshop was hosted and organized by Hanna Weber, Prof. Arnim Wiek, and Nick Shivka from ASU's School of Sustainability in partnership with Jake Swanson from *Local First Arizona* and Natalie Morris from ASU's *Prepped Program*, an accelerator program for small food businesses.

The participants were local coffee business owners from Phoenix (*Fair Trade Cafe*, *Azucar Coffee*, *Empowering Coffee Roasters*, and *Copper Star Coffee*), Glendale (*Luana's Coffee Yard*, *Bull Brew Co*), and Tucson (*Savaya Coffee Market*). Participants represented different stages of business development: from well-established coffee business with a number of locations through economically stable coffee businesses with a single location to coffee businesses in the start-up phase.

The workshop was part of a series of opportunities to connect coffee businesses in Arizona. In December 2018, our team hosted a round table discussion for interested stakeholders to stimulate a conversation about adopting sustainable practices of coffee supply (Weber & Wiek, 2019). Participants were local coffee business owners as well as representatives from *Local First Arizona* and the *ASU's Prepped*

Program. In addition, in March 2019, *Local First Arizona* organized a public [walking tour](#) to experience multiple local coffee businesses ranging from roasters and cold brewers to coffee shops (ca. 30 people participated). The growing consumer base offers a window of opportunity for pioneering coffee businesses to bond. As big coffee businesses (*Starbucks, Nestlé,* etc.) further expand, there is a need to join forces and to make the voices of small sustainability-oriented coffee businesses heard. Lessons can be learned from other local food economy sectors such as craft breweries that successfully collaborate rather than compete against each other (Said, 2019).

Structure of the Workshop

The workshop was structured in three parts. First, each coffee business identified their own supply chain (Activity 1). Then five potential actions with empirical examples to advance sustainable coffee sourcing were discussed (Activity 2). Finally, it was planned to explore concrete steps to implement these actions (Activity 3). For each activity, our research team provided a brief theoretical input and empirical examples from Arizona to make the input tangible and practical. In addition, we invited Nick Shivka, the former owner of *Considerate Coffee Co.*, to offer his personal experiences from participating in a recently completed pilot project on sustainable coffee sourcing (Weber & Wiek, 2020).

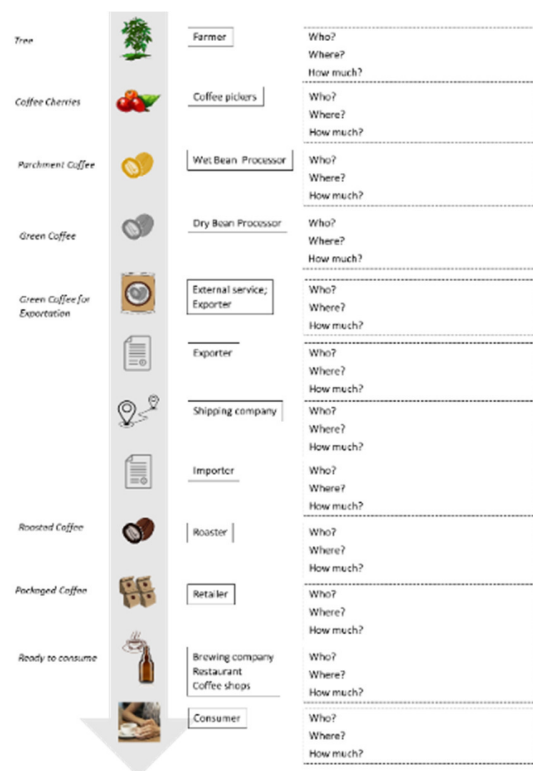


For each activity, our research team provided a brief theoretical input and empirical examples from Arizona to make the input tangible and practical. In addition, we invited Nick Shivka, the former owner of *Considerate Coffee Co.*, to offer his personal experiences from participating in a recently completed pilot project on sustainable coffee sourcing (Weber & Wiek, 2020).

Activity 1: Identifying own supply chain

First, we presented the basic coffee supply chain structure. From previous research, we learned that coffee businesses are often not aware about the details of their own supply chain. From a sustainability and justice perspective, there are concerns about the steep price gradient across the coffee value chain, and that some people in the coffee supply chain cannot even meet their basic needs. However, there are good examples how this can be done differently (Weber et al., 2019). For example, *Sustainable Harvest* facilitates ‘compassionate’ negotiations between roasters and coffee producers.

Then, we asked Mr. Shivka to share his experiences. When he had gone through a similar process of building trust and understanding each other’s needs with his coffee business *Considerate Coffee Co.*, he was humbled as he realized that he “hardly knew anything about the around 20 people who touched our coffee before us”. As a coffee company, it seems relatively easy to know the



‘downstream’ part of the supply chain (roasters, brokers, fellow coffee shop owners). “As so much thought goes into just securing a supply of coffee beans, it is easy to bypass who the other people in the supply chain are, because you don’t necessarily need to know them in order to be a part of it.” This workshop activity was intended to help the participants realize, as Mr. Shivka put it, that “there is more that you don’t know about your own coffee supply chain, and learning about it now is an incredible step and awakening for a business.”

Finally, we asked the participants to map out the supply chain of their coffee business as much as they could. In particular, we urged them to try to identify names (Who?), locations (Where?) and numbers (How much? Namely, volumes and prices) for each supply chain element. Participants had a blank supply chain (see figure above) to fill in relevant information and add elements, as needed (additional importer or a producer cooperative, etc.). We offered participants the option not to disclose any information they considered sensitive. This activity took about 25 minutes.



Activity 2: Discussing five potential actions



In the second activity, we first presented five potential actions that foster sustainability in coffee sourcing. We had identified those actions through literature review, interviews, expert consultations, and pilot projects prior to the workshop. The goal of this activity was to explore participants’ aspirations – what they might want to do differently in their sourcing practices in the future to enhance sustainability.

Participants received an information sheet for each of the five actions to guide them through the activity. For each action, we presented (corresponding to the information sheet): the basic definition of the action and concrete examples from/options for Arizona, as well as benefits and risks of taking the action.

Action 1 – Purchase a Type of Sustainable Coffee

- Purchase certified organic; fair trade; from a distributor/ importer with shared values (without direct contact to the farmer)
- Purchase from the farmer you have direct contact with, even if facilitated through an importer/ distributor
- Purchase coffee produced close to you, e.g. in Mexico
- Purchase from a roaster located in the country of coffee origin

Examples from/ options for Arizona	Benefits	Risks
Certified Coffee <ul style="list-style-type: none"> - Prescott Coffee Roaster, Prescott, AZ - Passport Coffee & Tea, Scottsdale AZ Direct contact <ul style="list-style-type: none"> - Cortez Coffee, Tempe AZ - Sustainable Harvest, Importer, Portland, OR Coffee from Mexico <ul style="list-style-type: none"> - Catando Ando, Xalapa, Veracruz, México Roasted coffee <ul style="list-style-type: none"> - Vega Coffee, Nicaragua 	Ensures stability against price volatility Creates livelihood opportunities and future perspectives for the next generation (in the country of origin) Develops trusting relationships	Higher purchasing costs Fair trade certification is often too expensive for small farms No oversight of direct-trade relationships

Action 2 – Create/Run/Participate in a Coffee Purchasing Cooperative for Arizona
 Rosters and/or coffee shop owners collaboratively import coffee directly from farmers and/or roasters. Arizona legislation allows for creating purchasing cooperatives. There are support organizations that help with creating cooperatives in Arizona.

Examples from/ options for Arizona	Benefits	Risks
<ul style="list-style-type: none"> - Coop Coffees, USA and Canada https://coopcoffees.coop/ - Savaya Coffee Market (for oat milk) 	Enables purchasing smaller amounts of coffee directly from the producer Lower purchasing cost Creating a community of sustainable coffee businesses in Arizona Advance a cooperative business culture	Additional organizational effort (time)

Action 3 – Offer Subscriptions to Your Customers (Community-Supported Coffee)
 Consumer subscriptions, e.g., for one year, finance coffee production in advance. This is similar to the established community-supported agriculture (CSA) scheme.

Examples from/ options for Arizona	Benefits	Risks
<ul style="list-style-type: none"> - Pachamama Coffee, CA Coffee purchased directly from the farmer https://www.pacha.coop/our-team/ - Cartel Coffee Lab, Tempe, AZ - Teikei Coffee, Germany https://www.teikeicoffee.org 	Contributes to a solidary relationship among coffee consumers and producers Sharing risks: up-front payments protect producers from price fluctuations	No/Low demand for subscriptions (extra marketing effort)

Action 4 – Invest Part of Your Profits in Sustainable Projects:

By investing profits in social and/or environmental projects in the region of origin or of consumption, you help advancing progress towards sustainable development goals around the world. Options include offsetting CO₂ emissions along the supply chain through certified organizations; collaborating with a local (environmental) NGO on addressing specific environmental causes; or supporting women entrepreneurship in the country of origin. Direct contact between supply chain actors allows for making the impact of invested money tangible and transparent for all actors (see Action 5).

Examples from/ options for Arizona	Benefits	Risks
<ul style="list-style-type: none"> - Tucson Audubon Society, Tucson, AZ Creates, improves, or restores valuable bird habitat http://tucsonaudubon.org/get-involved/offset-your-carbon-footprint/ - MyClimate, Switzerland Invests in climate-friendly technology and reforestation https://www.myclimate.org - ProNatura, Mexico Environmental NGO http://www.pronatura.org.mx/ - Cartel Coffee Lab, Tempe, AZ Financing new kitchen for a farmer’s family 	<p>Opportunity to “give back” to the community where coffee comes from</p> <p>Can contribute to balance ecologically unequal exchange</p> <p>Can have a positive effect on climate change, even if it does not mitigate emissions completely</p>	<p>Projects should be based on broad stakeholder engagement and buy-in</p> <p>Offsetting should not increase the absolute amount of GHG emissions (rebound effect) beyond critical thresholds</p>

Action 5 – Tell Stories about the Benefits for Farmers and Positive Impacts on the Region where the Coffee is Produced:

Making your supply chain transparent (as much as you can) and telling the story behind your sustainable supply chain helps for building broader buy-in and the willingness to pay higher prices. Relevant information about the supply and value chain with a focus on the positive impacts could be published on the company’s website, social media, or directly on the product label (through a QR code). Consumers are keen on understanding what specific difference it makes when they pay a higher price. The goal is to educate consumers to empower them as a trusted partner in sustainable international coffee production, distribution, and consumption.

Examples from/ options for Arizona	Benefits	Risks
<ul style="list-style-type: none"> - Peixoto Coffee Roasters, Chandler, AZ - Fairtrade Café, Phoenix, AZ - CUPZ Coffee, Tempe, AZ 	<p>Raises awareness of consumers about their impact on the region and the people</p> <p>Helps understanding where the money goes and with that may increase the willingness to pay</p>	<p>Information provision needs to be ethical (no “greenwashing”)</p> <p>Lack of data availability: long-term impacts can be difficult to demonstrate</p>

Once again, we asked Mr. Shivka to share his experiences. His initial commitment to transparency had been called into question when he realized how many blind spots were in the supply chain of *Considerate Coffee Co.* This is when he started to envision “a future where we could purchase coffee that was already roasted in the country of origin”. He became even more ambitious: “We wanted the coffee pickers and farmers to receive a wage for their work that would keep them involved in the work, while improving their livelihoods. We also wanted to offset GHG emissions from this new supply chain, which shrank from more than 10,000 miles to 1,600 miles.” The pilot project with *Catando Ando* allowed to explore all these actions and their impacts.

We then asked the participants to share any experiences they might have already made with any of these actions. We also asked for and collected additional ideas for concrete options in Arizona. The main task for the participants was to individually reflect on the respective action with respect to the following potential responses:

- I can imagine taking this action because ...
- I don't think I will take this action because ...
- I'm not sure I will take this action because ...

The entire activity took about 50 minutes.

Activity 3: Exploring concrete steps for implementation

The objective of the last activity was to formulate concrete steps of implementing the aspired actions. The steps should describe what the business owners need to do in order to move from the current state to the envisioned state of sustainable coffee sourcing for their business.

Mr. Shivka shared the several steps *Considered Coffee Co. (CC)* and *Catando Ando (CA)* had to take:

- CC requested a sample of coffee from CA and did a tasting
- CC researched concrete steps to become an importer
- CA spoke to the farmers and coffee pickers about fair prices
- CA shared photos and names of coffee pickers
- CC and CA negotiated prices for coffee pickers (retain good workers and provide for livelihood)
- CA identified appropriate NGO for offsetting (Pro Natura reforestation in the region where the coffee is grown)
- CC determined pilot amount (20kg = 44lbs) of roasted coffee and ordered from CA
- CA roasted the coffee and shipped it to CC
- CC brewed a test batch, offered it to consumers (tasting) and shared the story of the relationship with CA, the farmers, and the coffee pickers

We asked the participants to pick the activity that was most inspiring to them and ask about implementation steps. As we were running out of time, we closed with each business sharing the action they wanted to pursue and the reason for that choice.

Feedback request

In order to receive information on the workshop’s usefulness for coffee businesses and further interests, we asked the participants to complete a feedback questionnaire responding to the questions:

- What insights will you take away from today’s workshop?
- What support would help you most in taking action towards sustainable coffee sourcing?
- What other sustainability-related topics would you be interested in learning about?

Insights from the Workshop

We arrived at the following insights after analyzing the workshop material that had been completed and submitted by the participants (6 supply chains, 9 action reflections, 10 feedback questionnaires). We also analyzed the audio-recorded discussions for additional insights.

Understanding and engaging with the supply chain

In general, the supply chain sheets were not completed with a lot of details. From the three questions *Who?*, *Where?*, *How much?*, responses to the latter were almost entirely missing. Direct business partnerships, e.g. with the roaster, were almost always indicated. In contrast, almost none of the coffee businesses could indicate the coffee pickers working for the coffee farms. Also, intermediaries, i.e. exporter, shipping company, importer, were mostly unknown. From the material the participants provided, three types of supply-chain structures can be distinguished, which differ in number of supply-chain actors involved and available knowledge (Figure 1). Type A is comparably short and well-known supply chain (exporter might be unknown); it involves 3-4 supply-chain actors, with one actor performing several activities. Type B is a relatively long and well-known supply chain; it involves 7-8 entities, of which 1-2 might be unknown. Type C is similarly long but mostly unknown supply-chain actors between the farmer and the consumer.

Supply chain actor \ Type	A short & known	B long & known	C long & unknown
Farmer (+coffee picker)	x	x	
Processor (wet/ dry)	x	x	?
Exporter (+shipping)	(?)	x/ ?	?
Importer	x	?	?
Roaster	x	x	?
Retailer		(x)	?
Coffee shop	x	x	?
Consumer	x	x	x

Fig. 1: Different types of coffee supply-chain structures (x = known actor, ? = unknown actor).

One effect of the supply chain activity was that participants got inspired to *better understand their own supply chain*. Many participants were surprised by how many steps are needed to produce the final coffee product and how little they know about the people involved in the supply chain. Statements included:

“The biggest thing I took away from this is the length of the process of getting the beans to [our business]. And that the transparency is necessary.”

“Making this a high priority to understand fully where my product comes from.”

These insights led to further-reaching aspirations. Participants got motivated to *actively engage with their supply chain* to better understand and meet the needs of the people involved. This included the intent to contact their direct business partners (e.g., the roaster or importer) to collect missing information about the supply and value chain. Some participants even considered visiting the farms where their coffee originates from.

“I need to completely understand my supply chain. I need [this] to facilitate a strategy on how I can best create a mutually beneficial relationship. What needs do they have?”

“Being truly knowledgeable of all supply chain process – and who is behind it & what can I do to ensure fairness.”

“Understand needs and get to know the supply chain, relationship building, visiting”

“Understand every element of the supply chain, speak with [the] roaster [and] then contact farms directly. Take a look, verify, understand, dig deeper.”

Visiting the country of production was not only mentioned in terms of relationship building but also to see positive impacts and to verify good practices, e.g., to find out what “rainforest-certified” means on the ground.



Motivations and concerns for taking an action

In general, all actions received some attention and were met by some aspiration. Most concerns were expressed regarding the first action (i.e., purchase a sustainable type of coffee). At the same time, this action, and action four (i.e., invest a share of profits in sustainable projects), were the most favored ones (Table 6).

Table 6: Motivations for and concerns about potential actions

Potential action	Motivations for taking the action	Concerns about taking the action
1 – Purchase a sustainable type of coffee	<ul style="list-style-type: none"> • Curious to understand the own supply chain and getting in touch with people involved • Committed to sustainable business identity (reducing CO₂ emissions, having positive impact, supporting people in need) • Business gains (lower costs, respond to increasing market) 	<ul style="list-style-type: none"> • Doubts about quality control when purchasing from a local roaster in the country of origin
2 – Create a purchasing cooperative	<ul style="list-style-type: none"> • Business gains (strength in numbers, cutting costs, access to smaller quantities) • Strengthening and expanding the local network, i.e., building a community among business owners, helping new companies and start-ups 	<ul style="list-style-type: none"> • Not enough time
3 – Offer subscriptions	<ul style="list-style-type: none"> • Giving consumer a feeling of meaningful responsibility and involvement, mutual benefits (supporting farmers AND engaging consumers) • Brand loyalty, a way to stay in touch with consumers who move out of town 	<ul style="list-style-type: none"> • Providing cash up-front
4 – Invest profit share in sustain. projects	<ul style="list-style-type: none"> • Aligns with overall mission of the business/ passion (women empowerment, having impact, education, giving back) • Business gains (giving a brand an identity) • Easy to realize (if funds available) 	<ul style="list-style-type: none"> • Charity for marketing purposes only
5 – Tell the story of your sustain. supply chain	<ul style="list-style-type: none"> • Motivation to get to know the story better (demonstrating that practices are good, pricing is fair, etc.) • Business gains (brand awareness, increasing sales, responding to consumers interest) • Shifting dated practices/ norms 	<ul style="list-style-type: none"> • Extra effort • Not enough time • Costs would be passed to consumer

Next Steps

Collaboration instead of competition

In the final round of sharing and feedback, many participants stated that they were appreciative of the opportunity to connect with other sustainability-interested coffee businesses. Therefore, it was not surprising that the idea of creating a purchasing cooperative for sustainable coffee (and other sustainable products such as packaging) was brought up again. Many participants emphasized the importance of collaboration.

“I would love the business culture to grow together. It would also help start-ups/new companies have better access to affordable coffees.”

“I also love the idea of strengthening the local coffee networks.”

“That there are enough of us to start a coop now!”

“Most importantly, the value of community & collaboration! Specialty coffee does not need to be competitive in the way it currently is. We can all add value to each other! People inspire each other! I believe facilitating these discussions among the players of the field is the most necessary step at this time.”

“It was so insightful to hear more about your action plans and to hear what other local shops are thinking and doing. It is always inspiring to be in a room full of people that share your values! I hope I am able to continue the connections I made.”

The workshop confirmed that connecting small businesses seems beneficial for most businesses and for advancing sustainable practices in international coffee sourcing. It also suggests an interest in more (regular) opportunities for networking and discussing sustainable practices.

Identified needs and what to do about it

In the feedback questionnaires, participants articulated the following needs:

- Guidance in starting a cooperative
- Strengthening the network (trust building, networking, sharing contacts)
- Additional resources (time/support and funds)
- Instruments for assessing sustainability performance of coffee ingredients, products, and practices; in addition, guidance on which sustainability projects to support (legitimacy)
- Better understanding customers and market (e.g. through a survey) to inform decisions on taking one of the potential actions
- Availability of technical solutions, e.g., solar-powered coffee trucks

In order to respond to these needs, our team compiled a few potential strategies:

- For starting a coffee purchasing cooperative, it could be helpful to contact an already existing cooperative (e.g., *Coop Coffees*, <https://coopcoffees.coop/>), or to contact a cooperative development network in Arizona (e.g., *Tucson Cooperative Network*).
- *Local First Arizona* is an important facilitator to strengthen the local network of coffee businesses. As already mentioned, in March 2019, *LFAZ* organized a sustainable coffee walk in Phoenix. More activities might follow. Please contact Jake Swanson (jake@localfirstaz.com) and visit the *Local First Arizona* website (<https://www.localfirstaz.com>). In addition, this could be a valuable source for contacts or a platform for connecting with like-minded coffee businesses. Finally, our team provided some concrete options for each action during the workshop (see tables above).
- In order to make more time resources available, collaborating with other businesses and sharing tasks (e.g., creating a purchasing cooperative) could be beneficial. We know from our own project that trust building is often time intensive; yet, it always pays off and is beneficial and time-efficient in the long-term. Regarding financial resources, grants might be available from USDA, municipal economic development agencies, foundations, or social investment companies.
- For assessing the sustainability performance of a product or project, you might consult a recent paper we published in this context (Weber et al., 2019), as well as encourage to directly ask these questions to a potential collaborator and check for relevant sustainability dimensions (our team can help). The strategic framework for sustainable development (Broman & Robèrt, 2017) could be useful for this.
- As already suggested by one participant, customer surveys could help to better understand their needs and the market (demand). In general, activities like the sustainable coffee walk indicate that consumer demand for sustainable products is increasing. Surveys could specify consumer preferences and also broaden consumer demand (if designed with promotional elements).
- Regarding technical solutions, we have contacted several solar companies in Arizona regarding special solutions for mobile food businesses including coffee carts and trucks. We have not received a satisfying offer yet (working on it). For regular coffee shops, there might be renewable-energy offerings available through the local utilities (they have residential programs) and solar companies can help with design and installation of independent solar systems (e.g., *Technicians for Sustainability* at: www.tfssolar.com).

Other interests in future workshop topics

Participants aired interest in the following sustainability-related topics for future workshops:

- Learning more about waste management and biodegradable and/or reusable packaging.
- Learning more about carbon cutting practices for small businesses.
- Learning more about the supply chain of other products.
- Learning more about community supported coffee in a separate workshop.

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A2. List of sustainability-oriented design principles

This is a summary of the sustainability-oriented design principles extracted from the entrepreneurship study (Study#2, Weber et al., 2020).

- **P1 – Use renewable energy sources for long-distance transport** (e.g. use sailboats or electric trucks instead of fossil fuel)
- **P2 – Offset GHG emissions** (caused by transportation and energy imports through different measures, for example, supporting reforestation)
- **P3 – Display information about geographically distal regions** (e.g. about environmental, cultural, and socioeconomic conditions of the region of production and/or processing site)
- **P4 – Substitute internationally sourced/ exported food products** (e.g. produce a food product with similar nutrition properties locally)
- **P5 – Select food providers located closer** (e.g. produce in countries that are as close as possible to each other or produce internationally imported food products locally)
- **P6 – Pay standard “fair” prices** (i.e. a minimum price plus a premium according to standards of the Fairtrade Labelling Organization)
- **P7 – Add value in the country of origin** (e.g. produce chocolate bars in local factories and exporting the bars instead of the cocoa beans)
- **P8 – Shorten supply chain** (i.e. reduce the number of intermediaries, for example, additional importers, exporters, or trade associations)
- **P9 – Pay fair prices based on needs** (i.e. pay a price that recognizes contributions and socio-economic needs to *every* person working in the supply chain)
- **P10 – Support socio-ecological projects in the region of origin** (e.g. invest a ratio of profits in social and/or ecological projects in the region of origin or of consumption)
- **P11 – Create community supported economy schemes** (e.g. share benefits and risks among producers and consumers, through pre-financing the next year of production)
- **P12 – Create participatory governance schemes** (e.g. take decisions collaboratively with involvement from all actors along the supply chain)

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Weber, H., Wiek, A., & Lang, D. J. (2020). Sustainability entrepreneurship to address large distances in international food supply. *Business Strategy & Development*, 3(3), 318–331. doi: 10.1002/bsd2.97

A3. Evaluation of researcher's roles

After seven months of intensive collaboration with Teikei Coffee, hence still during the pre-phase of scoping and exploring research opportunities, the collaboration and the researcher - practice partner interaction was formatively evaluated, that means that the evaluation also served to initiate learning processes for team members, researchers and evaluators (Bergmann et al., 2005; Schneider & Buser, 2018). Another objective was to gain insights on how the Teikei Coffee team perceived the role as a researcher during the collaboration so far and to clear expectations for the future process.

To do so, I carried out a focus group discussion with the team members using the typology of roles of a researcher by Wittmayer & Schöpke (2014). In a first step, I presented the different roles to the team providing brief descriptions and cartoons for each role. In a second step, building on a previous activity, in which we reflected on the different milestones and activities using a timeline, I asked the question “How have you perceived my role(s) as a researcher?” Team members first answered one after the other and then went into a conversation about what had been said. The discussion was audio-recorded. Using the software MaxQDA, the transcript was first analyzed deductively (using the role types as categories). During the analysis, other categories emerged when team members were talking about different positionalities of the researcher with respect to them as the team and the project Teikei Coffee, and how this influenced the project. This inductive analysis related the roles to different levels of researcher's proximity to the project partners from low, to middle and high (Table A1).

Table A3.1. Different levels of proximity between researcher (•) and project partners (○) and their implications for the project.

	Level of proximity researcher-project partners		
	Low ○ •	Middle ○•	High ⊙
Descriptive vocabulary used by practice partners	researching, having a clear role, having clear responsibilities, observing, being separated	accompanying, in frequent exchange, joining meetings, giving new impulses, structuring	part of the group/team/project/process/dynamics, driving force, creating, influencing, motivating, networking
Corresponding role(s) of the researcher	Reflective researcher, knowledge broker	Process facilitator, reflective researcher	Change agent
Implications for the project (from the project partners' perspective)	<ul style="list-style-type: none"> Facilitated smooth start of relationship building Allowed for shared (and clearly separated) responsibilities Ensured insights to be documented and shared with science and practice by the researcher 	<ul style="list-style-type: none"> Enabled co-learning by doing (applying theory in practice) Encouraged business-internal evaluations and reflections Initiation and structuring of project-relevant processes 	<ul style="list-style-type: none"> Advanced the business (toolbox, consumer community, new contacts) Changed (traditional) understandings of science Acknowledged emotionality of researcher and the team

The analysis shows the different implications that different positionalities of transdisciplinary researchers can have for a project. It also shows that these implications are mostly related to processes than direct project outcomes. This “dynamic positionality” is similar to what Freeth & Vilsmaier (2020) described for formative accompanying research in interdisciplinary teams.

Although it might not have been wise to do the evaluation on my own in terms of generalizable knowledge because I was the researcher the others were talking about, and the results needed to be interpreted carefully with the context, it was still useful to get an idea of how the team members perceived my role as researcher. This supported me in my position experiencing what I described earlier as personal struggles with dynamic positionalities.

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A4. Declaration of Authorship

According to §16 of the guideline for cumulative dissertations, the following section details my own individual contribution in preparing the four research articles and two workshop reports. This entails specifying the individual scientific contribution of all co-authors, including me (author's contributions), and the relative importance of the PhD student's own contribution in relation to the contributions of other co-authors (declaration of authorship) together with a weighting factor. Although the two workshop reports have not been submitted to a scientific journal but are published as grey literature, they are mentioned here, too, for reasons of completeness.

According to §12b of the guideline for cumulative dissertations, PhD student's contributions can be as follows (number in brackets is the respective weighting factor):

- *Single authorship*, if the PhD student's own contribution is 100% (1.0).
- *Predominant contribution*, if the PhD student's own contribution is greater than the individual share of all other co-authors and is at least 35% (1.0).
- *Equal contribution*, if (1) the PhD student's own contribution is as high as the share of other co-authors, (2) no other co-author has a contribution higher than the PhD student's own contribution, and (3) the PhD student's own contribution is at least 25% (1.0).
- *Important contribution*, if the PhD student's own contribution is at least 25%, but is insufficient to qualify as single authorship, predominant or equal contribution (0.5).
- *Small contribution*, if the PhD student's own contribution is less than 20% (0).

Research article 1 (Study#1)

Title	What are the ingredients for food systems change towards sustainability? — Insights from the literature
Authors	Weber H, Poeggel K, Eakin H, Fischer D, Lang DJ, von Wehrden H, Wick A.
Authors' contributions	HW, KP, DF, DJL, and HvW designed the study and developed the method. HW and KP collected and analyzed the data and wrote the original draft of the manuscript. HvW supported in the quantitative data analysis with the software. HW, KP, HE, DF, DJL, HvW, and AW reviewed and edited the manuscript.
Declaration of authorship (weighting factor)	Equal contribution (1.0)
Publication status	Published 2020 in <i>Environmental Research Letters</i>
Presentations at conference	17th Meeting (Tagung) of the junior research group Environmental Sociology „Behind the Buzzword: Zum Verständnis von Transformation in der Nachhaltigkeitsdebatte“, University of Hamburg, Germany (online), October 8-9, 2020, URL: https://www.schader-stiftung.de/themen/nachhaltige-entwicklung/fokus/sne/artikel/call-tf-symposium-2021-vom-experiment-zum-mainstream

Research article 2 (Study#2)

Title	Sustainability entrepreneurship to address large distances in international food supply
Authors	Weber H, Wiek A, Lang DJ
Authors' contributions	HW, AW, and DJL developed together the study and the structure of the manuscript. HW collected and analyzed data (literature review, semi-structured interviews). HW wrote the original draft of the manuscript. HW, AW and DJL reviewed and edited the manuscript.
Declaration of authorship (weighting factor)	Predominant contribution (1.0)
Publication status	Published 2020 in <i>Business Strategy & Development</i>
Presentations at conference	Leverage Points Conference on Sustainability Research and Transformation, Leuphana University Lüneburg, Germany, February 6-8, 2019, URL: https://leveragepoints.org/conference/

Research article 3 (Study#3)

Title	Connecting Consumers to Producers to Foster Sustainable Consumption in International Coffee Supply — A Marketing Intervention Study
Authors	Weber H, Loschelder DD, Lang DJ, Wiek A.
Authors' contributions	HW, DDL, DJL, and AW designed the study and structured the manuscript. HW executed research (data collection). DDL and HW analyzed data and prepared results. HW wrote the original manuscript. HW, DDL, DJL, and AW reviewed and edited the manuscript.
Declaration of authorship (weighting factor)	Predominant contribution (1.0)
Publication status	Published (2021) in <i>Journal of Marketing Management</i>
Presentations at conference	No presentation of this study at a conference so far.

Research article 4 (Study#4)

Title	Cooperating with 'Open Cards' — The Role of Small Intermediary Businesses in Realizing Sustainable International Coffee Supply
Authors	Weber H, Wiek A.
Authors' contributions	HW and AW designed the research project together. HW did the field visits, data collection, and analyzes. HW and AW structured the paper and wrote the manuscript together.
Declaration of authorship (weighting factor)	Predominant contribution (1.0)

Publication status	Under review since February 2021 in <i>Frontiers in Sustainable Food Systems, Research Topic: Achieving Food System Resilience & Equity in the Era of Global Environmental Change</i> .
Presentations at conferences	tF(transformative Forschung)-Symposium “Vom Experiment in den Mainstream“, Schader-Stiftung, Darmstadt, Germany, March 18, 2021, URL: https://www.schader-stiftung.de/fileadmin/content/tF-Symposium_call2021.pdf 7th International Degrowth and 16th ISEE Joint Conference: Building Alternative Livelihoods in times of ecological and political crisis, The University of Manchester, UK (online), 5-8 July 2021, URL: https://www.isee-esee-degrowth2021.net/call-for-papers