



**LEUPHANA**  
UNIVERSITÄT LÜNEBURG

# Today's public costs – tomorrow's private costs?

The True Cost Accounting Method as an approach to include positive and negative externalities in business decisions in the food and land-use system

Master thesis



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## ABSTRACT

The food and land use system is one of the most important global economic sectors. At the same time, today's resource-intensive agricultural practices and the profit orientation in the food value chain lead to a loss of biological diversity and ecosystem services, high emissions, and social inequality – so-called negative externalities. From a scientific perspective, there is a broad consensus on the need to transform the current food system.

This paper investigates the suitability of True Cost Accounting (TCA) as an approach to integrating positive and negative externalities into business decisions in the food and land use system, focusing on the retail sector due to its high market power and resulting influence on externalities along the entire food value chain. For this purpose, a qualitative study was conducted with sustainability managers of leading European food retail companies in terms of their annual turnover, sustainable finance experts, and political actors related to environmental and social policy. A sample of N=11 participants was interviewed about the emergence and measurement of externalities along the food value chain, the current and future relevance of knowing about externalities for food retail companies, and the market and policy framework necessary for the application of TCA. The data collected was evaluated using the method of qualitative content analysis according to Mayring.

Findings show that TCA is a suitable method for capturing positive and negative external effects along the food value chain and thus also for meeting the growing social, political, and financial demands for its sustainable orientation. At the same time, there are still some challenges in the application of TCA, both from a theoretical and a practical point of view. The main challenges at present are the lack of a standardised methodology, data availability, and key performance indicators. Due to the focus on prices, margins and competitors, food retail groups, in particular, emphasise the risk of revenue and profit losses as well as customer churn when applying TCA.

Hence, the introduction of TCA in the food and land use system requires the development of measures that are socially acceptable, backed by legal frameworks and promote the scientific development of the methodology. This offers the opportunity to create a level playing field, apply the polluter-pays principle to the entire value chain and support science in developing appropriate indicators as well as a TCA database. Food retail companies can benefit from addressing TCA at an early stage by analysing their value chain to initiate change processes early, identify risk raw materials and products, reduce negative externalities through targeted measures, sensitise customers to the issue and thus differentiate themselves from competitors.

## ZUSAMMENFASSUNG

Das Lebensmittel- und Landnutzungssystem ist einer der wichtigsten globalen Wirtschaftssektoren. Gleichzeitig führen die heutigen ressourcenintensiven landwirtschaftlichen Praktiken und die Gewinnorientierung in der Lebensmittelwertschöpfungskette zu einem Verlust an biologischer Vielfalt und Ökosystemleistungen, hohen Emissionen und sozialer Ungleichheit - sogenannten negativen Externalitäten. Aus wissenschaftlicher Sicht besteht ein breiter Konsens über die Notwendigkeit, das derzeitige Lebensmittelsystem zu transformieren.

Die vorliegende Arbeit untersucht die Eignung der ‚Wahren Kostenrechnung‘ (True Cost Accounting, TCA) als Ansatz zur Integration positiver und negativer externer Effekte in unternehmerische Entscheidungen im Lebensmittel- und Landnutzungssystem. Dabei liegt der Schwerpunkt aufgrund der hohen Marktmacht und des daraus resultierenden Einflusses auf externe Effekte entlang der gesamten Lebensmittelwertschöpfungskette auf dem Einzelhandel. Hierzu wurde eine qualitative Studie mit Nachhaltigkeitsmanagern gemessen am Jahresumsatz führender europäischer Lebensmitteleinzelhandelskonzerne, Experten für nachhaltige Finanzen und politischen Akteuren aus dem Bereich der Umwelt- und Sozialpolitik durchgeführt. Eine Stichprobe von N=11 Teilnehmern wurde über die Entstehung und Messung von externen Effekten entlang der Lebensmittelwertschöpfungskette, die aktuelle und zukünftige Relevanz des Wissens über externe Effekte für Lebensmitteleinzelhandelsunternehmen und den für die Anwendung von TCA notwendigen Markt- und Politikrahmen befragt. Die erhobenen Daten wurden mit der Methode der qualitativen Inhaltsanalyse nach Mayring ausgewertet.

Die Ergebnisse zeigen, dass TCA eine geeignete Methode ist, um positive und negative externe Effekte entlang der Lebensmittelwertschöpfungskette zu erfassen und auch den wachsenden gesellschaftlichen, politischen und finanziellen Anforderungen an deren nachhaltige Ausrichtung gerecht zu werden. Gleichzeitig gibt es noch einige Herausforderungen bei der Anwendung von TCA, sowohl aus theoretischer als auch aus praktischer Sicht. Die größten Herausforderungen sind derzeit das Fehlen einer standardisierten Methodik, der Verfügbarkeit von Daten sowie von geeigneten Leistungskennzahlen. Aufgrund der Fokussierung auf Preise, Margen und Wettbewerber betonen Lebensmitteleinzelhandelskonzerne bei der Anwendung von TCA vor allem das Risiko von Umsatz- und Gewinneinbußen sowie Kundenabwanderung.

Die Einführung von TCA im Lebensmittel- und Landnutzungssystem bedarf daher der Entwicklung von Maßnahmen, die sozialverträglich sind, durch rechtliche Rahmenbedingungen gestützt werden und die wissenschaftliche Weiterentwicklung der Methodik fördern. Dies bietet die Möglichkeit, gleiche Wettbewerbsbedingungen zu schaffen, das Verursacherprinzip auf die gesamte Wertschöpfungskette anzuwenden sowie die Wissenschaft bei der Entwicklung geeigneter Indikatoren und einer TCA-Datenbank zu unterstützen. Lebensmitteleinzelhandelsunternehmen können von einer frühen Beschäftigung mit TCA profitieren, indem sie ihre Wertschöpfungskette analysieren, um frühzeitig Veränderungsprozesse einzuleiten, Risiko-Rohstoffe und -Produkte zu identifizieren, negative externe Effekte durch gezielte Maßnahmen zu reduzieren, Kunden für das Thema zu sensibilisieren und sich so vom Wettbewerb abzuheben.

**TABLE OF CONTENTS**

<b>Abstract</b> .....	<b>I</b>
<b>Zusammenfassung</b> .....	<b>II</b>
<b>Table of contents</b> .....	<b>III</b>
<b>List of Figures</b> .....	<b>V</b>
<b>List of Tables</b> .....	<b>V</b>
<b>List of Abbreviations</b> .....	<b>V</b>
<b>List of Symbols</b> .....	<b>VII</b>
<b>1 Introduction</b> .....	<b>1</b>
<b>1.1 Problem definition</b> .....	<b>1</b>
<b>1.2 Objective and approach</b> .....	<b>2</b>
<b>2 Theoretical Principles</b> .....	<b>4</b>
<b>2.1 Corporate governance and value creation in the food and land use system</b> .....	<b>4</b>
<b>2.2 System change and sustainable corporate governance</b> .....	<b>6</b>
<b>2.3 Methods and frameworks to capture external effects</b> .....	<b>8</b>
<b>2.4 True Cost Accounting</b> .....	<b>9</b>
2.4.1 Holistic framing.....	9
2.4.2 Measurement and Metrics .....	10
2.4.3 Potential and limitations .....	13
<b>3 Case study PENNY Markt GmbH</b> .....	<b>15</b>
<b>3.1 Project background and design</b> .....	<b>15</b>
<b>3.2 Benefits and limitations of the project</b> .....	<b>16</b>
<b>3.3 Effects on customer behaviour</b> .....	<b>16</b>
<b>3.4 Conclusions from the PENNY study</b> .....	<b>17</b>
<b>4 Methodology</b> .....	<b>18</b>
<b>4.1 Qualitative Content Analyses</b> .....	<b>18</b>
<b>4.2 Description and implementation</b> .....	<b>22</b>
4.2.1 Assumptions.....	22
4.2.2 Deductive category development .....	23
4.2.3 Interview guide .....	24

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<b>5</b>	<b>Evaluation of the results</b> .....	<b>25</b>
<b>5.1</b>	<b>Analysis of the category system</b> .....	<b>25</b>
<b>5.2</b>	<b>Review of the quality criteria</b> .....	<b>32</b>
<b>6</b>	<b>Discussion</b> .....	<b>33</b>
<b>6.1</b>	<b>Conclusions on theory</b> .....	<b>33</b>
<b>6.2</b>	<b>Derivation of recommendations for action</b> .....	<b>36</b>
6.2.1	For European food retail companies.....	37
6.2.2	The role of politics in accelerating sustainable agriculture .....	41
<b>7</b>	<b>Conclusion and outlook</b> .....	<b>44</b>
<b>8</b>	<b>Critical reflection of the thesis</b> .....	<b>46</b>
	<b>References</b> .....	<b>VIII</b>
	<b>Appendix</b> .....	<b>XVI</b>
	<b>Appendix A – Interview Guide A – Food Retail Companies</b> .....	<b>XVII</b>
	<b>Appendix B – Interview Guide B – Sustainable Finance</b> .....	<b>XIX</b>
	<b>Appendix C – Interview Guide C – Politics</b> .....	<b>XXI</b>
	<b>Appendix D – Category system</b> .....	<b>XXIII</b>

## LIST OF FIGURES

Figure 1 - Simplified overview of all stages of a food value chain .....	4
Figure 2 - Systems model of organisation change .....	7
Figure 3 - Example calculation True Cost Accounting .....	12
Figure 4 - PENNY dual price labelling .....	16

## LIST OF TABLES

Table 1 - Main environmental impacts of the food value chain according to their intensity of use of the natural resources at each stage of the food value chain.....	5
Table 2 - Scope of social and environmental accounting approaches.....	9
Table 3 - Potential Core TCA Key Performance Indicators per capital type .....	12
Table 4 - Stages of the food value chain already covered (green) or not covered (grey) by true cost indicators .....	14
Table 5 - Deductive categories .....	24

## LIST OF ABBREVIATIONS

BLE	Federal Agency for Agriculture and Food
BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
BSCI	Business Social Compliance Initiative
CA	Corporate Accountability
CAP	Common Agricultural Policy
cf.	compare
CFA	Cool Farm Alliance
CG	Corporate Governance
CO <sub>2</sub>	Carbon dioxide
CSR	Corporate Social Responsibility
EC	European Commission
e.g.	for example
EPA	Environmental Protection Agency

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EU	European Union
EC	European Commission
ESG	Environmental Social Governance
FAO	Food and Agriculture Organization of the United Nations
FSC	Forest Stewardship Council
GAFF	Global Alliance for the Future of Food
GDP	Gross Domestic Product
GEMIS	Global Emissions Model of Integrated Systems
GHG	Greenhouse-Gas
GmbH	Limited company
GRI	Global Reporting Initiative
IDH	The Sustainable Trade Initiative
IINAS	Institute for Sustainability Analysis and Strategies
IFOAM	International Federation of Organic Agriculture Movements
IPES	International Panel of Experts on Sustainable Food Systems
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IRP	International Resource Panel
ISO	International Organization for Standardization
KPI	Key Performance Indicator
LCA	Life-cycle assessment
Ltd.	Limited
NGFS	Network for Greening the Financial System
OECD	Organisation for Economic Co-operation and Development
RISE	Response-Inducing Sustainability Evaluation
RUSLE	Revised Universal Soil Loss Equation
SAFA	Sustainability Assessment of Food and Agriculture Systems
SBTi	Science Based Targets-Initiative
SCG	Sustainable Corporate Governance
SEA	Social and Environmental Accounting
SKPI	Sustainable Key Performance Indicator
TCA	True Cost Accounting

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TCI	True Cost Initiative
TEEB	The Economics of Ecosystems and Biodiversity
UBA	German Federal Environment Agency
UN	United Nations
UN FSS	United Nations World Summit on Food Systems
UNEP	United Nations Environmental Programme
UN OHCHR	United Nations Human Rights Office of the High Commissioner
UN SDG	United Nations Sustainable Development Goals
WBGU	German Scientific Advisory Council on Global Change

### **LIST OF SYMBOLS**

\$	US Dollar
€	Euro
%	per cent



## 1 INTRODUCTION

Food and agricultural land use systems form one of the most important global economic sectors. At the same time, conventional agricultural practices in particular lead to overconsumption of water, overfertilization, soil erosion and massive use of pesticides with often serious impacts on nature, climate, and biodiversity (cf. EC 2020). In the last decade, numerous reports were published on the failure of our current food system (cf. Gemmill-Herren et al. 2021a, 1; Dasgupta 2020, 220 f.; WBGU 2020, 26). Only recently the EU published its 'Farm to Fork' strategy striking the urgency of a holistic food system transformation (cf. EC 2021a). Here, according to the EC, food retailers as the interface between producers, manufacturers, and consumers have a key role to play (cf. EC 2020).

### 1.1 Problem definition

Businesses and entrepreneurs are the backbone of our prosperity. Solving our societal challenges can only be done with the innovative spirit and resources of business. However, companies can only ignite this potential if they measure the right things and set appropriate goals.

From an economic perspective, nature is an asset that must be preserved. Biodiversity and the so-called ecosystem services, in particular, are nature's direct and indirect contributions to human well-being and at the same time have a high value for the global economy. Alongside human capital and physical capital, nature is an asset from which valuable services are derived (cf. TEEB DE 2012, 9).

This contrasts with an economic system in which the environmental consequential costs of economic action are not priced in. In the food industry as one of the most relevant global economic sectors, subsidies amounting to \$500 billion annually are directly associated with the destruction of ecosystems while only 0.2 per cent of global subsidies (\$0,89 billion) are invested in its restoration (cf. Dasgupta 2020, 220; OECD 2019). According to the Dasgupta Review (2020), however, this is only a rough estimate as environmental damage often cannot be attributed to subsidies according to the cause (cf. Dasgupta 2020, 220). A large part of this investment comes from political subsidies (cf. Dasgupta 2020, 2019 f.). Moreover, food retail companies and farmers themselves contribute to the destruction of ecosystems. Since the impacts of food and farming systems on society and the environment are not valued, the systems that damage natural, social, and human capital are currently more profitable than their sustainable counterparts (Holden & Jones 2021, 85 f.). Furthermore, present global economic structures, with a huge increase in technological growth, international trade and the institutionalisation of the price-based market model have contributed to a massive externalisation of costs in food and agriculture through the pursuit of higher common public costs and lower food prices around the world (cf. Gemmill-Herren et al. 2021b, 9)

These effects of economic activities on uninvolved third parties like the environment or society are referred to as externalities. They can be both tangible and intangible and occur when side effects of production or consumption are not reflected in the market price. A distinction is made

between positive and negative ones. Externalities can either reduce the benefit of others when negative effects occur or improve their welfare when positive effects occur. They can affect private parties or the public (cf. Gołębiowska & Pajewski 2018, 114; TEEB 2018b, 79).

Besides negative externalities, positive contributions by food retail companies to the preservation or restoration of ecosystems are not considered in company accounting (cf. Dasgupta 2020, 220). This can be explained by the tenets of conventional economics where the focus is on increasing corporate profits (cf. Friedman 2007, 178). Besides increasing production output and implementing technical advances, externalising costs is a common way to raise profits (cf. Dasgupta 2021, 137 ff.; Holden & Jones 2021, 85 f.). This contrasts with the ecological economic perspective - a more complex linkage between human and natural systems that need to be seen as interconnected rather than independent (cf. Costanza et al. 2015, 87 f.; Costanza 1989, 1). In the field of ecological economics, a distinction is made between four different forms of capital: natural capital, social capital, human capital and produced capital (cf. TEEB 2018a, 47). Thus, regarding future business decisions, ecological economics provides a method which leads to true economic efficiency by considering all forms of capital relevant for a sustainable allocation of resources and thus capture the true costs of economic activities (cf. Costanza et al. 2015, 87 f; Natural Capital Protocol 2016, 4).

To incentivise impact reduction and enhance food system transformation an approach is needed where both positive and negative environmental impacts of companies are integrated into internal business decision metrics and processes as well as into reporting to capital providers and financial markets (cf. Bakker 2021; El-Hage Scialabba & Obst 2021, 23).

Such an approach to acquire all external costs – positive and negative, environmental, economic, and social, is provided by the method of True Cost Accounting (TCA). In contrast to the management accounting method which still today is the most used method in business management, TCA offers a way to systemically capture the interconnectivity of the food supply chain, to stress environmental impacts and human rights (Gemmill-Herren et al. 2021b, 9). Besides that, the TCA approach offers food retail companies an opportunity to create transparency regarding positive and negative externalities in their supply chain (cf. Gemmill-Herren et al. 2021b, 1 f.). Internally, the TCA method provides scope for dialogue across different value chains and gives food retail companies the chance to communicate transparently about their environmental and social impact.

As a result, the TCA method could be another building block for the sustainable transformation of the food system.

## **1.2 Objective and approach**

The purpose of this thesis is to explore whether the true-cost approach is a suitable method for integrating positive and negative externalities into business decisions in the food and agricultural land use system. Here, the focus lies on European food retail companies with a large purchasing volume of agricultural products and a resulting high market power responsible for a sustainable orientation of their supply chains.

In the context of this work, the terms agricultural land use system and land use system are used synonymously. They are understood as how productive land is used for agriculture (cf. US EPA 2021). To answer the research question, a qualitative study in the form of expert interviews with sustainability managers of leading European food retail companies in terms of their annual turnover (cf. , political actors related to the food system as well as experts from the sustainable finance sector will be conducted.

After a brief introduction to the topic, a presentation of the objectives and a description of the approach of this thesis, the theoretical foundations are presented in the second chapter. Hereby, it is to be shown how TCA can be classified in the retail application context. Due to their high market power and their resulting influence on external effects along the entire food value chain, this work focuses on European food retail groups. Based on the current value creation process in the food and land use system, which is oriented toward classic corporate governance, the development towards sustainable corporate governance is outlined, which requires a corporate change process. This process includes the recording of the economic, ecological, and social sustainability guidelines of a company. In this context, accounting models are presented and compared. With a focus on the true cost approach, the availability and practicability of indicators and metrics for measuring positive and negative external effects will be analysed. Finally, the potential and limitations of the TCA approach are highlighted and the possible benefits of incorporating the TCA method into retail business decisions regarding agricultural products are identified.

The third chapter creates the link between theory and practice. Here, a case study of PENNY Markt GmbH is used to show how externalities of agricultural products can be calculated and included in business decisions by using TCA. The benefits and limitations, as well as the effects on customer behaviour derived from the associated market research in the PENNY store 'Grüner Weg' in Berlin, will be analysed.

The fourth chapter describes the methodology used to analyse the expert interviews conducted. The process of qualitative content analysis according to Mayring is explained. Following this, the description and implementation of the study are explained. Within this chapter, the preliminary assumptions, the interview guide, and the sample are described in more detail.

In the fifth chapter, the results of the study are presented. For this purpose, the category system is illustrated and the quality criteria on which qualitative content analysis is based are reviewed for the present study.

The sixth chapter forms a discussion of the results of the study. This is done first by comparing the results of the qualitative research with theory. In addition, recommendations for action for the food retail sector and political decision-makers are developed to outline how both the retail sector and politics can accelerate sustainable agriculture and thus a transformation of the food system.

The results of the master thesis are summarised in the seventh chapter. In addition, an outlook on further developments is given and additional research needs are identified.

The thesis concludes with a critical reflection

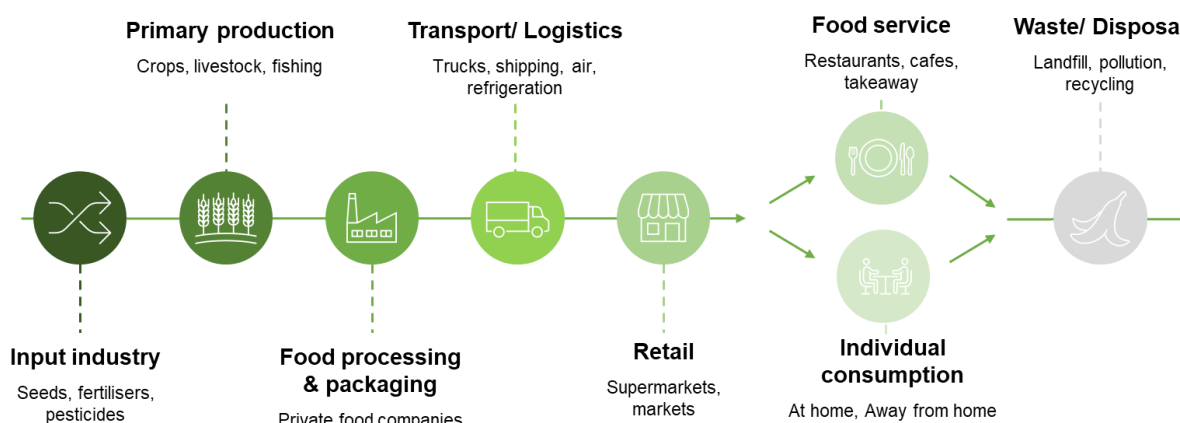
## 2 THEORETICAL PRINCIPLES

### 2.1 Corporate governance and value creation in the food and land use system

According to du Plessis et al. (2011) corporate governance (CG) is a set of rules and organisational structures which form the basis of proper business operation understood as balancing the sometimes divergent interests of stakeholders (cf. du Plessis 2011, 6 ff.; Naciti et al. 2021, 56).

In its traditional form, CG was designed as a model to protect the economic interests of shareholders from abuse by opportunistic managers, mostly disregarding individual, and communal interests (cf. Scherer et al. 2016, 287; Naciti et al. 2021, 56). For based on the Friedman doctrine published in 1970, a company's social responsibility is solely to increase its profits (cf. Friedman 2007, 173 ff.; Schwab & Vanham 2021, 14). Thus, an economic system known as shareholder capitalism has emerged in recent decades. This system is still dominant in most Western industries today and can be directly linked to a company's value creation approach (cf. Schwab & Vanham 2021, 171).

The value creation of a company takes place along the corporate value chain. In general, the value chain covers all stages of a product's life, from raw materials to the final disposal of the end product, and includes all activities related to value creation, such as business models, investments, and regulation (cf. UNEP 2021, 21). Figure 1 gives a simplified overview of all stages of a food value chain. However, it is important to keep in mind that food value chains are inherently diverse and can vary by country or region, depending on whether the local food system is more traditional or modern (cf. UNEP 2021, 49).



**Figure 1 - Simplified overview of all stages of a food value chain based on UNEP 2021, 49**

The food value chain is characterised by high consumption of natural resources, which extends across all stages. Table 1 gives an overview of the main environmental impacts of the food value chain. The highest consumption of natural resources is in primary production. Thereby, the massive use of natural resources is linked to various negative impacts on the environment (cf. UNEP 2021, 51). Hence, current food production accounts for 26 per cent of anthropogenic greenhouse gases, 32 per cent of soil acidification and 78 per cent of eutrophication globally. Thus, it holds the potential to fundamentally change the species composition of our natural

ecosystem with a direct impact on biodiversity and ecological resilience (cf. Poore & Nemecek 2018, 4). According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) about one million species were threatened with extinction in 2019 – number increasing (cf. IPBES 2019, 14). Furthermore, scientific studies assume that agriculture is responsible for about two-thirds of global freshwater consumption (cf. Poore & Nemecek 2018, 5). Moreover, 77 per cent of global farming land is used to grow crops for animal feed whereby livestock only produces 18 per cent of global calory supply and 37 per cent of global protein supply (cf. Poore & Nemecek 2018, 16; Ritchie & Roser 2019).

Food value chain stages Impact	Primary Production	Food Processing & Packaging	Distribution & Retail	Food Consumption	Waste/ Disposal
Land, soil, landscapes	●●●●●	●	●		●
Water	●●●●●	●		●	●
Biodiversity & Ecosystem services	●●●●●	●	●	●●	●●
Genetic resources	●●●●●	●			
Minerals & nutrients	●●●●●	●●	●●	●	●
Fossil fuels	●●●	●●	●●●	●	●

Use of natural resources/  
Impact on environment: ● low ●● moderate ●●● substantial ●●●● high ●●●●● very high

**Table 1 - Main environmental impacts of the food value chain according to their intensity of use of the natural resources at each stage of the food value chain based on UNEP 2021, 50**

In contrast, the actors in the middle stages of the food value chain - food processing and packaging, retail, and food services - do not consume the most resources themselves, but they have an enormous influence on activities at both ends of the value chain. They are structurally powerful and have a disproportionate influence on both primary production and final consumption, largely determining what food farmers produce and sell and what food consumers buy and eat (cf. Castilleja 2021, XXXII f.; UNEP 2021, 55). According to the United Nations Environment Programme (UNEP), there are about one billion farmers worldwide with 450 million farms, 85 per cent of which belong to the smallholder category (cf. UNEP 2021, 54). This contrasts with food systems that are increasingly controlled by a small number of large private corporations that set their own standards and enter contracts with farmers that vary according to the size, quality and quantity of the products produced. Thereby, the top ten food retail companies alone control ten per cent of the global food market (cf. UNEP 2021, 53). To meet the demand of these powerful actors, modern agricultural production methods are increasingly focused on high output. As a result, the way food is currently produced, distributed, sold, and consumed causes significant environmental damage with impacts on soil, water, biodiversity, and climate and has devastating consequences for rural populations and public health (cf. Gemmill-Herren et al. 2021a; IRP 2021, 8). However, due to the far-reaching influence of European food retail groups regarding externalities along the food value chain, this paper focuses on the application of TCA in food retailing and not in primary production.

This goes in line with a large land use impact and a significant GHG footprint outside the EU's borders due to a high import rate of agricultural products into the EU (cf. Lóránt & Allen 2019, 14). Wage workers in the agricultural sector whose salaries are insufficient to support their

livelihoods, levies on tap water that include the cost of cleaning pesticides from drinking water, and the public health costs of diet-related diseases as a consequence of industrially produced, highly processed foods, are a direct result of this development (cf. Gemmill-Herren et al. 2021b, 1; Soil & More 2021). The focus on today's low-cost business models has overlooked the fact that society pays for the hidden destruction since these costs are not yet considered in the food value chain and thus in the corporate accounting of food retail companies (cf. Gołębiowska & Pajewski 2018, 115). Estimates from the Network for Greening the Financial System (NGFS) show that climate change related physical risks such as floods or temperature rise alone could cause a GDP decrease of about 25 per cent by the end of the century if global warming cannot be slowed down (cf. NGFS 2020, 8 f.).

Overall, the external costs of our current food system are estimated at \$12 trillion per year, the result of long-term market failure (cf. de Groot Ruiz 2021, 252; Gemmill-Herren 2021b, 9). In this course, the Interpretive Guide to the UN Guiding Principles as well as the Organisation for Economic Co-operation and Development's (OECD) and The Food and Agriculture Organization of the United Nations (FAO) Guide to Responsible Agricultural Supply Chains indicate the need for companies' scope of responsibility regarding due diligence to be extended beyond their own business activities to their value chain including impacts to which the companies themselves have not directly contributed (cf. OHCHR 2012, 15; OECD & FAO 2016, 21 f.; Öko-Institut & UBA 2019, 43).

## **2.2 System change and sustainable corporate governance**

The need for sustainable development is the most important organisational change companies have faced since the beginning of the last decade (cf. de Matos & Clegg 2013, 383). Especially since 2015, the literature on corporate governance and sustainability has grown considerably (cf. Naciti et al. 2021, 60). Concepts such as Ecological Economics and stakeholder capitalism are becoming increasingly important, not least due to the European Commission's initiative on corporate sustainability due diligence as well as the increased awareness of business and society for the consequences of traditional economic practices outlined in 2.1 (cf. Sandhu et al. 2021a, 52 f.; Schwab & Vanham 2021, 175 ff.; EC 2022).

Although most companies today still align their corporate activities and strategies with classical CG structures based on the concept of shareholder capitalism, over the past few years the concept of CG has increasingly been applied to a broader form of monitoring corporate activities, including their impact on society and the environment (cf. Schwab & Vanham 2021, 171). This additional aspect regarding corporate sustainability often emerges as a response to stakeholder requirements. As a result, sustainability is increasingly becoming an integral and determining component of corporate strategies while also shaping companies' relationships with various partners in the value chain (cf. Naciti et al. 2021, 56).

In the process, the concept of sustainability has evolved over time. Until a few years ago, the consideration of environmental impacts was seen as part of a company's social responsibility, with purely legal or in some cases ethical and moral implications, detached from the company's business model and market expectations. In recent years, however, various factors have led

companies to readjust their approach and invest more in sustainability practices (cf. Naciti et al. 2021, 56). These factors include, above all, developments external to the company, such as legislative regulations and increasing consumer sensitivity to the social and environmental impacts of corporate practices. At the same time, the sustainable goals of the companies themselves, the enhancement of image and reputation, the minimisation of risks, the reduction of production costs combined with an increase in product quality, the recruitment of skilled employees and finally new market opportunities all play a relevant role (cf. Chen & Chen 2019, 623 ff.; Naciti et al. 2021, 56). Due to the increased awareness in companies of the growing connection between socially and environmentally friendly practices and economic success, sustainability is increasingly being integrated into companies' business models (cf. Naciti et al. 2021, 56). This development outlines the beginning of the transition from shareholder capitalism to stakeholder capitalism, in which the interests of all stakeholders of a company are considered (cf. Schwab & Vanham 2021, 171). Thereby, a company's purpose is to engage all its stakeholders, such as employees, suppliers, customers, society, and the natural environment in shared and sustained value creation (cf. Schwab & Vanham 2021, 191). The company does not focus on short-term profits, but on creating long-term added value on an economic, ecological, and social level. Within this system, governments have the task of ensuring equal opportunities and creating a level playing field through legislative measures (cf. Schwab & Vanham 2021, 174 f.).

This transition away from classical CG towards sustainable corporate governance (SCG) goes in line with the need for organisational change, not least in the companies of the food and land use system. Following the systems model of organisational change by Maes and van Hootegem (2019), organisational change is characterised by the change object, the change process, the effects of change and the context in which the change takes place (cf. Maes & van Hootegem 2019, 733). Figure 2 illustrates the systems model of organisational change.

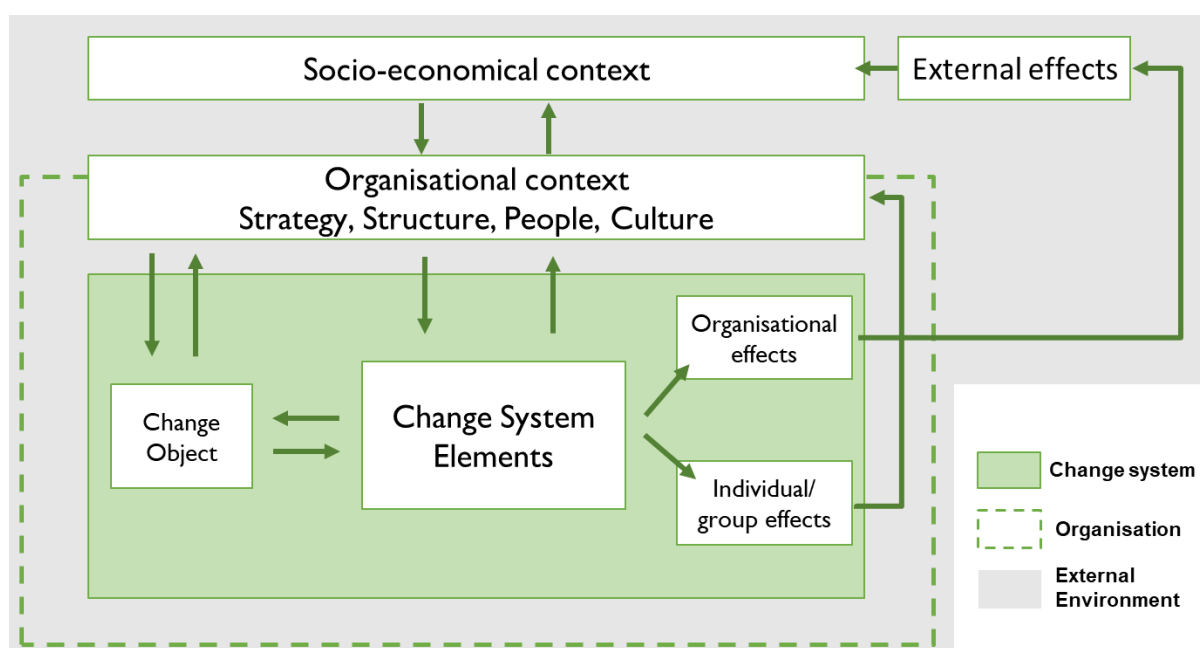


Figure 2 - Systems model of organisation change based on Maes & van Hootegem 2019, 733

Here, the reason for change lies outside the change system itself, either in the organisation or in its external environment. If the organisation responds to the need for change, one or more elements of the organisational context are transferred as input to the change system. These elements are thus changed by the change elements of the change system. The resulting changes have effects on the organisation as well as individual and social effects, which in turn have effects on the organisation's environment (cf. Maes & van Hootehem 2019, 734).

As outlined above, there are both external and internal reasons for the shift away from classical CG towards SCG regarding companies of the food and land use system. (cf. Chen & Chen 2019, 623 ff.; Naciti et al. 2021, 56). In line with the concept of open innovation according to Chesbrough (2011), a flow of knowledge takes place both from the outside into the organisation and from the organisation to the outside, e.g., in the context of sector initiatives, stakeholder dialogues or research projects (cf. Chesbrough 2011; Gangi et al. 2021, 614). According to Gangi et al. (2021), effective knowledge management enables knowledge sharing between the company and its stakeholders to complement internal knowledge with external resources. In line with the concept of stakeholder capitalism, these knowledge resources can contribute to corporate value creation (cf. Gangi et al. 2021, 614).

To assess the environmental, social, and economic sustainability performance of a company in the course of organisational change towards more SCG, the concept of stakeholder capitalism can be closely linked to the concept of ecological economics (cf. Sandhu et al. 2021a, 53; Schwab & Vanham 2021, 191). In contrast to the current widespread method of measuring a country's prosperity, the GDP, the concept of ecological economics focuses on capturing social, ecological, and economic sustainability based on global environmental limits and social well-being. This also includes measuring the external environmental and social costs arising from corporate activity (cf. Sandhu et al. 2021a, 53). In the context of this development, new accounting approaches for the assessment of corporate sustainability performance have been developed in recent years, building on the principles of ecological economics (cf. Sandhu et al. 2021a, 53 ff.).

### **2.3 Methods and frameworks to capture external effects**

There are numerous methods, approaches, and models for capturing social and environmental costs in a business context. These methods of social and environmental accounting (SEA) have been developed over the past decades and include various approaches such as environmental cost accounting, full cost accounting or the environmental balanced scorecard (cf. Sandhu et al. 2021a, 59). Environmental cost accounting includes various cost management methods such as life cycle costing, process-oriented costing, and material flow calculation, all aiming to capture the direct internal and external environmental costs of a product or process (cf. Sanhu et al. 2021, 61). In contrast, full cost accounting aims to capture not only the direct but also the indirect costs and benefits of products or services. In addition to environmental costs, social costs are taken into account. The ecological balanced scorecard is used to evaluate the social, ecological, and economic financial and non-financial performance of an organisation. Business activities are looked at from five perspectives: Economy, Society, Internal Business, Learning, Growth, and the Environment (cf. Sandhu et al. 2021a, 62).



Recently, a relatively new transdisciplinary accounting approach to identify costs and benefits associated with the food and land use system has been introduced including costs not yet captured in general accounting frameworks – True Cost Accounting. Designed as a systems approach, TCA encompasses environmental, social, and health-related costs as well as benefits (cf. Sandhu et al. 2021a, 57 ff.).

Table 2 presents the currently most relevant SEA approaches and compares them with the TCA method in terms of the cost types considered.

Accounting Approaches \ Cost types	Traditional Cost Accounting	Environmental Cost Accounting	Full Cost Accounting	Environmental Balanced Scorecard	True Cost Accounting
<b>Direct costs</b>					
Operational costs	✓	✓	✓	✓	✓
Production costs	✓	✓	✓	✓	✓
<b>Indirect costs</b>					
Environmental costs		✓	✓	✓	✓
Social costs			✓	✓	✓
Human costs					✓
Health costs					✓

**Table 2 - Scope of social and environmental accounting approaches (cf. EPA 1995, Sandhu et al. 2021a, 51 ff.)**

Compared to current social and environmental accounting approaches, the TCA approach has a much broader scope in terms of the indirect, external costs considered. In addition to operational and product-related costs, TCA includes all environmental and social costs and benefits of the food and land use system, including human and health costs (cf. Sandhu et al. 2021a, 59). In the following paragraphs, the TCA method is analysed regarding its measurement and metrics as well as its potential and current limitations with regard to the food and land use system.

## 2.4 True Cost Accounting

### 2.4.1 Holistic framing

The TCA method provides a framework for systemic change in food systems building on the existing environmental cost accounting framework (cf. Sandhu et al. 2021a, 64). It is based on the theoretical and conceptual foundation for TCA as provided by the TEEBAgriFood Evaluation Framework (cf. TEEB 2018b, 215). To highlight the interconnectedness of natural, human, social, and produced capital in ecological agriculture and food systems, this methodology promotes a holistic capital-based systems approach (cf. TCI et al. 2022, 13). Natural capital includes the Earth's physical and biological resources, human capital refers to all aspects related to human wellbeing with regard to productive work, social capital includes social structures,

institutions and guidelines that facilitate cooperation within and between groups and produced capital refers to all material goods, as well as financial and intellectual capital (cf. TEEB 2018b, 215). The TCA methodology focuses on the first three forms of capital, as these contain the externalities of agricultural products. However, productive capital represents the costs of production, which are captured by traditional accounting standards and are already reflected in current food prices (cf. TCI et al. 2022, 14). On this basis, TCA aims to take into account all the positive and negative externalities of the food value chain (cf. TEEB 2018b, 255). By integrating these external costs into the product price of agricultural products, conventionally produced goods would become more expensive, while more sustainably produced ones could be offered at a lower price, which could induce food retailers as well as consumers to change their purchasing and consumption behaviour. (cf. Lóránt & Allen 2019, 36; WBGU 2020, 201 f.).

### **2.4.2 Measurement and Metrics**

The TCA method assigns the estimated true costs to a product. For better comparability, the impact of a given agricultural product is expressed in true costs per unit of mass or volume (cf. TCI 2022, 20). To capture these true costs of a company's business activities, regarding TCA, several tools and methodologies have emerged recently, including impact frameworks, footprint calculations, capital change, valuation factor databases and ecosystem models. However, to date, there is a lack of a standard scheme of food system footprints, comparable metrics, and monetary valuation (cf. Holden & Jones 2021, 86 f.).

Therefore, El-Hage Scialabba & Obst (2021) have defined some key criteria for a TCA tool to work. These include:

- Mapping of all upstream and downstream stages of the value chain from a system's perspective
- Applicability across the whole variety of socio-economic and environmental contexts existing in the food and land use system worldwide
- Integration of the triple-bottom-line
- Mapping of all relevant indicators from result to process indicators including quantitative, qualitative, and monetary evaluation

Based on these criteria, the need for standardisation of frameworks, databases, metrics, indicators as well as evaluation and reporting schemes can be derived (cf. El-Hage Scialabba & Obst 2021, 16 ff.).

In its Sustainability Assessment of Food and Agriculture (SAFA)-Guidelines developed to assess the impact of the food and land use systems on society and the environment, the FAO (2014) brings together the multitude of sustainability instruments that already exist in the food and land use system: reporting frameworks like the Global Reporting Initiative (GRI), directories as the Ecolabel Index, standards like GLOBALG.A.P., Fairtrade, and Forest Stewardship Council (FSC) and Assessments such as the Response-Inducing Sustainability Evaluation (RISE) (cf. FAO 2014, 9). The framework is aimed at decision-makers from food and agricultural enterprises as well as at policymakers, among others.

Since food production has a direct impact on at least seven of the United Nations Sustainable Development Goals (UN SDG) namely 'Zero Hunger', 'Good Health & Well-Being', 'Clean Water and Sanitation', 'Responsible Consumption and Production', 'Climate Action', 'Life Below Water' and 'Life on Land' (cf. UN 2015, 14) a comparison between the 116 sustainability indicators defined in the SAFA Guidelines with the indicators of the UN SDGs was conducted. This comparison showed a high degree of coherence between SAFA and the UN SDGs (cf. El-Hage Scialabba et al. 2016, 30). Thus, based on the theory of ecological economics, the TEEBAgriFood Evaluation Framework, the SAFA guidelines and the United Nations SDGs, TCA Key Performance Indicators (KPIs) can be identified that reflect the relevant themes and impacts of agriculture (cf. FAO 2014, 9; UN 2015; TEEB 2018b, 47; El-Hage Scialabba & Obst 2021, 18; TCI 2022, 17 ff.).

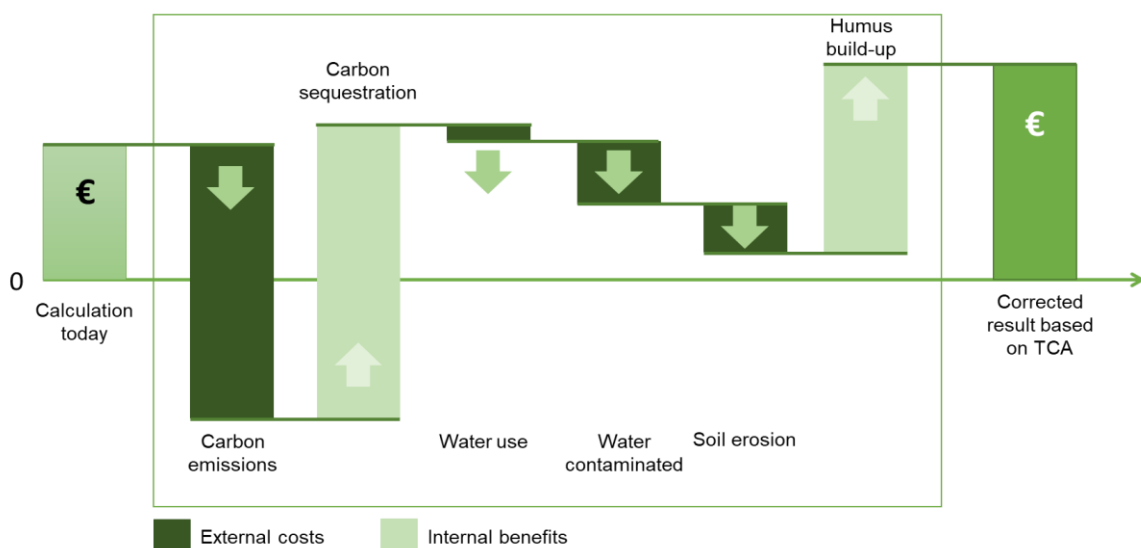
The next step is to collect appropriate data and define evaluation methods. The choice of data and evaluation methods used depends on the purpose of the evaluation, the spatial scale, and the scope of the value chain, which in turn depends on the expected application. In addition, data quality, evaluation factors, evaluation systems, and time and budget constraints influence accuracy, data correctness, compatibility, usability, and transparency (cf. El-Hage Scialabba & Obst 2021, 19). On the one hand, relevant data can be gained by collecting primary data available through existing audits, such as organic, Fairtrade, Rainforest/UTZ or financial accounts. To maximise comparability and acceptance in the food and agricultural market, commonly used impact assessment models, reference values and monetisation factors should be applied (cf. Bandel et al. 2021, 210). Here, various already existing databases and models can be used such as the Revised Universal Soil Loss Equation (RUSLE) to predict soil erosion (cf. Renard et al. 1997), the Cool Farm Tool to capture GHG emissions caused by Agriculture (cf. CFA 2019a; CFA 2019b), the Aqueduct Maps to capture global water risk indicators (Gassert et al. 2015); CROPWAT to gain agroclimatic data worldwide (cf. Muñoz & Grieser 2006), 'eco-matters' to quantify and monetise environmental impacts along the product value chain (cf. van Maurik et al. 2018) or the Global Emission Model for Integrated Systems (GEMIS) a life-cycle and material flow analysis model (cf. IINAS 2021) among others.

In 2021 an initial list of KPIs was developed by El-Hage Scialabba & Obst (2021) based on the above frameworks and metrics in combination with the models presented (cf. El-Hage Scialabba & Obst 2021, 19). Additional indicators were put forward by TCI (2022) and Sandhu et al. (2021b). From these three sources, I developed a combined perspective of TCA KPIs which is presented in Table 3. According to TCI (2022), TCA indicators meet the requirements of double materiality. On the one hand, the indicators measure the impacts of companies on the environment and society (inside-out). On the other hand, dependencies and thus risks for companies can be derived from these impacts (outside-in), which can be taken into account in business decisions (TCI 2022, 21). Yet, only two factors, namely "carbon stock and soil organic matter build-up" (TCI 2022, 16) are considered positive externalities. For the majority of the indicators shown, positive impacts are not considered because they are either not present (e.g., water stress - uncontaminated, clean water is the baseline and cannot be further improved; Occupational health and safety - full health is the basis and cannot be enhanced) or

do not occur for the same person (e.g., forced labour - the consensual employment of a person does not improve the situation of the person who is forced) (cf. TCI 2022, 16 f.).

	Produced capital	Natural capital	Human capital	Social capital
Air & Climate		<ul style="list-style-type: none"> <li>GHG Emissions</li> <li>Air pollutants</li> <li>Carbon stock</li> </ul>		
Soil		<ul style="list-style-type: none"> <li>Soil erosion</li> <li>Soil occupation</li> <li>Soil organic carbon build-up</li> <li>Biodiversity</li> </ul>		
Water		<ul style="list-style-type: none"> <li>Water stress</li> <li>Water pollution</li> </ul>		
Ecosystem	<ul style="list-style-type: none"> <li>Plant &amp; crop health</li> <li>Pest &amp; disease management</li> <li>Nutritional quality of soil and plants</li> </ul>	<ul style="list-style-type: none"> <li>Acidification</li> <li>Eutrophication</li> <li>Eco-toxicity</li> <li>Land use change</li> <li>Regulation</li> <li>Raw materials</li> <li>Energy provisioning</li> </ul>		
Biodiversity	<ul style="list-style-type: none"> <li>Animal welfare</li> <li>Animal feed source</li> <li>Livestock management system</li> </ul>	<ul style="list-style-type: none"> <li>Crop diversity on farm</li> <li>Animal biodiversity on farm</li> <li>Landscape</li> </ul>		
Energy and resource use	<ul style="list-style-type: none"> <li>Energy usage/ mix</li> <li>Resource use efficiency</li> <li>Waste/ recycled material</li> </ul>			
Human health	<ul style="list-style-type: none"> <li>Livelihoods</li> </ul>		<ul style="list-style-type: none"> <li>Human toxicity</li> </ul>	
Worker remuneration	<ul style="list-style-type: none"> <li>Wages</li> </ul>		<ul style="list-style-type: none"> <li>Living wage gap</li> </ul>	
Working conditions	<ul style="list-style-type: none"> <li>Transparency</li> </ul>		<ul style="list-style-type: none"> <li>Occupational health and safety</li> <li>Excessive working hours</li> <li>Education, skills and knowledge</li> <li>Fair treatment of workers</li> </ul>	<ul style="list-style-type: none"> <li>Provision of infrastructure and technology</li> <li>Corruption</li> <li>Nutrition and food security</li> </ul>
Gender inequality				<ul style="list-style-type: none"> <li>Gender pay gap</li> </ul>
Human rights violation				<ul style="list-style-type: none"> <li>Forced labour</li> <li>Child labour</li> </ul>
Economy	<ul style="list-style-type: none"> <li>Profits</li> <li>Taxes</li> <li>Investments</li> </ul>			

**Table 3 - Potential Core TCA Key Performance Indicators per capital type based on TCI 2022, 23 ff. El-Hage Sialabba & Obst 2021, 19; Sandhu et al. 2021b, 5 ff.**



**Figure 3 - Example calculation True Cost Accounting based on Bandel et al. 2021, 211 ff.**

Derived from the preceding analysis, Figure 3 shows an example calculation of TCA for crops, considering both positive and negative externalities. It emerges that the benefits of sustainable agricultural practices have the potential to outweigh their costs for the environment and society.

### 2.4.3 Potential and limitations

The preceding analysis has shown that TCA enables the aggregation of information on affected economies and the entire food supply chain (production, processing, distribution, retail) (cf. El-Hage Scialabba et al. 2021, 265). Thus, TCA enables the identification and optimisation of negative impacts on human, social and natural capital in food and land use systems in general and in the food value chain of food retail companies in particular (cf. TCI 2022, 14 f.). Likewise, positive contributions to the environment and society can be identified and monetised. Thus, the approach aims to create transparency for regulatory decisions that can steer subsidies in a more balanced direction and provide clarity for all actors in the food value chain (cf. Gemmill-Herren et al. 2021b, 2; TCI 2022, 11). Moreover, this method provides a framework for the further development of traditional accounting standards currently used (cf. TCI 2022, 11). By promoting land use practices that have a positive impact on the environment, health and society, TCA enables broad engagement from farmers to consumers and links practice and policy. The approach thus makes an important contribution to the protection of traditional land use systems and the promotion of biodiversity, which has a positive impact on the achievement of the UN SDGs (cf. Sandhu et al. 2021a, 62).

However, the implementation of the TCA approach is also accompanied by challenges.

One of the biggest challenges in the application of TCA is the availability and collection of data. As outlined in 2.4.2, there is currently a lack of standards at local, regional, and global levels that need to be created. These standards should not only relate to data collection but to the application of the TCA approach as a whole (cf. Sandhu et al. 2021a, 62 f.; El-Hage Scialabba & Obst 2021, 17 f.). Moreover, the complexity and diversity of food value chains make it difficult to capture positive and negative externalities along the entire chain. Existing concepts for impact assessment mostly concentrate on the estimation of environmental impact costs with a focus on the reduction of GHG emissions (cf. Sandhu et al. 2021a, 63). However, impacts on biodiversity, water, soil, human health and working conditions must also be assessed (cf. TCI 2022, 19). Following TEEB (2018b) and TCI (2022), Table 4 shows which stages of the food value chain are already captured or not captured by the real cost indicators developed by the two initiatives. It shows that a large part of the food value chain cannot yet be covered by TCA indicators (cf. TCI 2022, 18 f.).

In addition to meaningful indicators, there is a lack of uniform international standards. According to Sandhu et al. (2021a), this creates the risk that companies misuse TCA to highlight positive practices, while the negative effects of business activities remain unchanged (cf. Sandhu et al. 2021a, 63). Yet, incentives for farms and retail companies to use TCA and to address this issue are missing, also due to a lack of policy guidelines. Moreover, there is currently no existing legal framework, for the use and implementation of TCA in the value chain of individual agricultural and food products (cf. Sandhu et al. 2021a, 63 f.; TCI 2022, 12).

Food value chain stages / Impact category	Input industry	Primary production	Food Processing & Packaging	Transport/ Logistics	Retail	Food Consumption	Waste/ Disposal
GHG Emissions							
Carbon stock							
Soil erosion & Soil organic build-up							
Water stress & Water pollution							
Acidification, Eutrophication & Ecotoxicity							
Human toxicity							
Occupational health and safety, Excessive working hours							
Gender pay gap, Forced labour & Child labour							

**Table 4 - Stages of the food value chain already covered (green) or not covered (grey) by true cost indicators based on TCI 2022, 19**

On the consumer side, there is often a lack of knowledge about food value chains and their impacts (cf. Sandhu et al. 2021a, 64; UNEP 2021, 55). As mentioned above, TCA aims to capture the environmental and social costs incurred and internalise them into the market price of food. According to the market mechanisms between supply and demand, a price increase leads to a reduction in demand for so-called 'normal goods', including food (cf. Michalke et al. 2020, 2; Sandhu et al. 2021a, 64). A price increase that corresponds to the environmental and social impacts of the respective food would thus have a steering effect that raises consumers' awareness and creates incentives to change their consumption towards more sustainable alternatives (cf. TEEB 2018b, 363). In the medium and long term, this offers the opportunity to further develop the production landscape towards sustainability in line with the adjusted demand and to reduce emissions at the same time (cf. Michalke et al, 2020, 2).

In summary, the analysis shows that TCA can support food retailers and other actors in the food value chain to make more sustainable purchasing and consumption decisions. Due to their high market power and their ability to collect information along the entire value chain and process it both internally and towards consumers, food retail companies are a suitable instance to apply TCA (cf. UNEP 2021, 53 ff.). However, there are currently still some hurdles, such as the lack of international standards and political measures to create market incentives through national agricultural policies or meaningful indicators to measure external effects, among others, that hinder the standardised use of TCA. These will be examined in more detail in the further course of the thesis and are an essential part of the qualitative research conducted and the recommendations for action developed in the context of this paper.

To illustrate how TCA can be applied in practice by food retailers, the pilot project of PENNY is presented in the following. The project, which was carried out in cooperation with the University of Augsburg, shows the opportunities and limitations of TCA from a practical point of view, also by means of a customer survey presented in the course of the section. PENNY, part of the German REWE Group, is one of the first food retailers to use TCA to make customers aware of the true prices of food at the point of sale, thereby combining the perspectives of science, retail, and customers on the topic (cf. PENNY 2020b, 1 f.).

### 3 CASE STUDY PENNY MARKT GMBH

#### 3.1 Project background and design

In September 2020, the German food discounter PENNY opened its first sustainability experience store. The concept of the store includes 20 stations distributed throughout the store, which make the company's most important sustainability milestones interactively visible and tangible for customers (PENNY 2020b, 1). Since according to PENNY (2020b) sustainability is a continuous process, a station on the topic of true costs was integrated into the store concept to create transparency about the follow-up costs of consumption, thus adding an aspect to the discussion about the costs of food production (cf. PENNY 2020b, 1; PENNY 2020c, 1).

The project to determine the true costs of selected own-brand products was carried out in cooperation with the Institute for Materials Resource Management at the University of Augsburg as part of the 'Markets for Mankind' research network (cf. PENNY 2020a, 2; PENNY 2020c 3). Eight PENNY products from conventional and organic production were considered including apples, bananas, potatoes, tomatoes, mozzarella, gouda, milk, and mixed meat. The researchers analysed and monetised the impacts of the use of reactive nitrogen, GHG emissions, energy consumption, and land use changes throughout the entire supply chain of these products. The selected products are representative of a broad spectrum of consumed foods (cf. Michalke et al. 2020, 3). Except for the banana, the calculation of the true costs assumed that the food products examined are produced or processed in Germany. For the banana, the Dominican Republic was assumed. Both emissions and external costs were quantified and monetised per kilogram of product. The 'ProBas' database of the German Federal Environment Agency (UBA) and the International Institute for Sustainability Analysis and Strategies (IINAS) was used as the data basis for determining the emissions of conventional foods. In addition, life cycle assessments were used to distinguish between 'organic' and 'conventional' farming practices (cf. UBA 2021; Michalke et al. 2020, 4).

Michalke et al. (2020) concluded that the price premiums needed to internalise environmental damage are significantly lower for plant products than for animal foods, with meat having the highest external costs. Of the four factors considered, GHG emissions account for the highest percentage of plant foods, while nitrogen derivatives account for the highest percentage of animal food emissions (cf. Michalke et al. 2020, 6 ff.). Results show that the sales price for organic food would have to increase by 35 per cent on average, while the price for conventionally produced products would have to increase by 62 per cent. Due to the lower price level, the absolute price surcharges for conventional products would have a much greater impact in percentage terms than on organic products. This leads to a reduction in the price difference between the two forms of production in favour of organic products (cf. Michalke et al. 2020, 8 f.; PENNY 2020c 2 ff.). Thus, food produced according to EU organic standards reflects environmental impact costs better than conventional food. Transferred to the current PENNY sales prices of the eight food products considered, this means an average price increase of €2.30 per kilogram for conventional products and a plus of €2.28 per kilogram for organic products.

The price differences between the current sales price and the true product price were made

visible to customers using a double-price display on the shelf (cf. PENNY 2020a, 2).



Figure 4 - PENNY dual price labelling

### 3.2 Benefits and limitations of the project

According to Stefan Magel, Chief Operating Officer of PENNY, sustainability is increasingly becoming a decisive factor in the choice of where to shop (cf. PENNY 2020b, 1). By displaying the true costs next to the actual product price, the discounter shows what selected products actually cost when certain ecological factors are taken into account thus increasing transparency towards its customers. Moreover, the project shows that the consequential costs of consumption are not fully considered in either organic or conventional farming (cf. PENNY 2020a, 1). According to Michalke et al. (2020) surcharges of just a few cents on the current sales price would be enough to reflect the true production costs. For example, the price of organically produced fruit and vegetables would only have to rise by an average of six per cent to internalise external effects, compared to 12.75 per cent for conventional production (cf. Michalke et al. 2020, 9).

Yet, due to an insufficient data basis, various important external effects could not be considered. These include the use of pesticides and antibiotics in agriculture. The currently existing database does not provide sufficiently differentiated data to be used for TCA (cf. Sandhu et al. 2021a, 62 f.; Michalke et al. 2020, 9). Moreover, only environmental externalities were considered in the project. Social aspects in the supply chains, e.g., in banana cultivation in the Dominican Republic or the employment and remuneration of harvest workers in German agriculture, were not considered. The calculated true costs are thus only an indication (cf. Michalke et al. 2020, 9). Michalke et al. (2020) therefore call for further dialogue between all stakeholder groups involved in production, trade, and consumption as well as politics.

Moreover, even though the higher sales price which includes the calculated externalities is attached to each of the eight products analysed, the customers of the PENNY sustainability experience store in Berlin continue to pay the standard price. The option to pay the higher price voluntarily does not exist. According to PENNY (2020a), this is due to the company operating in a competitive market and is thus itself part of the problem (cf. PENNY 2020a, 2).

### 3.3 Effects on customer behaviour

As part of the PENNY True Cost project, a customer survey was conducted in April 2021. During the survey, 109 customers were asked about their perception and understanding of the true costs presented, as well as their willingness to pay a higher price for certain product groups (cf. Stoll-Kleemann et al. 2021, 1).

For 78 per cent of the respondents, the discounter is the preferred shop for grocery shopping. Asked what is most important to them when shopping, 37 per cent of respondents said that price was their top priority, followed by health, regionality and organic production with about 18 per cent each. While shopping, 56 per cent noticed the dual pricing with the assumed true cost, while 44 per cent did not. Most of the respondents, however, believed that this was the



advertising of a special offer. Only a small proportion said that the additional price tags represented the fair price for producing the products, the social costs, or the costs of producing the products more ecologically. At the same time, 41 per cent of the customers surveyed said that they had already heard about the issue in the media. The PENNY campaign is generally perceived as very positive and interesting (62%) whereas 30 per cent view it sceptically or consider it redundant (cf. Stoll-Kleemann et al. 2021, 2 ff.).

Following this, the consumers were asked to what extent they would be willing to pay the true costs for the specific products. 94 per cent were willing to pay the true price for conventionally produced apples, which is €0.09 higher than the current selling price. This willingness decreased the higher the true costs for a product. Thus, only 43 per cent were willing to pay an additional €1.75 for conventional Gouda. With a TCA surcharge of €4.83 for conventional mixed meat, only 32 per cent were willing to pay, with 22 per cent saying they do not currently eat meat. Overall, most respondents would be willing to reduce their consumption of animal products due to the true costs (61%) and consume more organic products (76%) if prices were to converge (cf. Stoll-Kleemann et al. 2021, 9 ff.).

Concerning the method of TCA, about 93% rate the implementation of TCA as very important to rather important. In this context, 60 per cent are of the opinion that all environmental and social consequential costs of the value chain should be priced into the true costs. The majority sees the responsibility to act on the part of the state (58%), followed by the economy (23%) (cf. Stoll-Kleemann et al. 2021, 18 ff.). A comparison between the importance of implementing TCA from the consumer's perspective and their actual willingness to pay the assumed true costs indicates the existence of the intention-behaviour gap, which describes the inconsistency between behavioural intention and actual behaviour (cf. Fink et al. 2018, 227 f.).

### **3.4 Conclusions from the PENNY study**

The case study of the PENNY true cost project illustrates the application of the TCA approach in practice. It shows both opportunities and limitations of the approach as outlined under 3.2.

From a company perspective, TCA enables the visualisation of positive and negative external effects of the food value chain. However, the competitive market situation for food retailers is seen as an obstacle to the implementation of TCA and the pricing of external effects on the food price (cf. PENNY 2020a, 2). According to the German Federal Statistical Office, the profit margin in food retailing is 24.3 per cent on average (cf. Destatis 2019). However, according to Michalke et al. (2020), an increase in sales prices between an average of 35 per cent for organic and 62 per cent for conventional food is necessary (cf. Michalke et al. 2020, 8 f.).

The customer survey conducted as part of the PENNY project shows that consumers perceive the implementation of TCA as important, considering all external factors. However, the associated increase in sales price is outweighed by consumers' price sensitivity (cf. Stoll-Kleemann et al. 2021).

The insights gained in the case study serve as a basis for the following qualitative research and are used, among other things, to derive assumptions about the research object in the context of qualitative research.

## 4 METHODOLOGY

### 4.1 Qualitative Content Analyses

As the research question of this thesis aims to investigate to what extent the TCA approach is practically suitable for the consideration of external effects in corporate decisions in the food and land use system, with a focus on European food retail groups, a qualitative research approach was selected. Thus, based on the model of an evaluation method, the methodology of the research consists of qualitative content analysis according to Mayring (2010), which enables structured text processing and text analysis of social science research projects. Qualitative content analysis offers the possibility of evaluating large amounts of research material, being qualitatively interpretative as well as taking latent meaning into account (cf. Mayring & Fenzl 2014, 543). Using qualitative content analysis, a theory-guided system of categories is developed that gradually deals with the interview material to be analysed (cf. Mayring 2016, 114 ff.). It is based on a guided content analysis process model and includes the following procedural steps (cf. Mayring 2010, 52 ff.):

#### *Definition of the material*

The first step of the analysis is to determine the evaluation material (cf. Mayring 2010, 52). In this process, the interviewer's problem statement is evaluated in advance and relevant aspects are compiled in an interview guide (cf. Helfferich 2014, 571 f.). In the present study, the problem statement describes the research question: "Is the true-cost approach a suitable method for including positive and negative externalities in entrepreneurial decisions in the food and land use system?".

The basis for the material to be analysed, taking into account all possibilities of open and semi-structured questioning, is the guided expert interview (cf. Helfferich 2014, 566). The interview method is used to let the interviewees themselves have their say and to gain more insight into their views on the suitability of TCA in the context of European food retail groups. The guided expert interview offers the interviewee the opportunity to answer the questions as freely as possible. For this reason, this interview form almost resembles an open conversation (cf. Pfadenhauer 2007, 453).

The sample reflects a part of the population set, which describes a certain number of all possible objects of investigation that could be relevant to answering the research question (cf. Hussy et al. 2013, 118). In qualitative research, the determination of the appropriate sample to answer the research question is defined in advance and can be divided into two possible sampling procedures. Sampling can take place either using the bottom-up or the top-down strategy. Within the bottom-up strategy, sampling occurs during the research process whereas in the top-down strategy it is determined in advance (cf. Hussy et al. 2013, 194 ff.). The aim of this deliberate type of sampling is the detailed description of selected cases. Since the composition of the sample is more important than its size, there are no specifications regarding the size of the sample (cf. Hussy et al. 2013, 194).

The present sample is made up of eleven people. Of the total number of interviewees, six hold relevant positions in sustainability management in the top twenty European food retail groups in terms of turnover for 2021 (cf. Statista 2021). They were assigned the interview codes A1 to A6. Two interviewees are experts in sustainable finance and TCA (Interview codes B1 to B2). Two interviewees hold leading positions in political offices in Germany in the field of food, development, and agricultural policy. And another person is a member of the EU Parliament with a focus on agricultural policy. The political actors were assigned interview codes C1 to C3. Due to their professional background, the individuals selected for the interview all have specific and concentrated knowledge necessary to answer the research question, which qualifies them as experts (cf. Meuser & Nagel 2020, 467 f.). Moreover, the different professional backgrounds of the interviewees ensure that diverse perspectives are represented (cf. Meuser & Nagel 2020, 468).

The sampling in the present study is based on the previously defined top-down strategy. The snowball method was used to obtain the sample (cf. Hussy et al. 2013, 198). The systematic selection of participants ensures that they can contribute as much relevant information as possible to answer the research question based on their professional background, position, and expertise. This sample determination aims to look at the topic of the present study from three different perspectives most relevant to answering the research question and to present as many different perspectives as possible. The duration of the individual interviews is about 19 to 28 minutes, resulting in a total of about 246 minutes of data for the analysis. One interview was conducted in written form, as it was not possible to schedule a personal interview given the interviewee's tight schedule. Due to the diversity of the sample in terms of location, the interviews were conducted digitally. Care was taken to ensure a calm atmosphere. The interviewer and the interviewee were each in a separate closed room during the interview.

Based on the SPSS method according to Helfferich (2014), the interview guide was developed, and eleven interview partners were interviewed using the described interview questionnaire. The sample size of  $N=11$  corresponds to a medium sample size common for the scope of this work (cf. Helfferich 2011, 173).

#### *Analysis of the originating situation*

This step in the process represents a description of the exact situation in which the study was conducted (cf. Mayring 2010, 53). The study focuses on the application of TCA in European food retail groups. To answer the research question, eleven experts defined in the previous section are interviewed. The author of this study herself works as a sustainability manager for an internationally active retail group based in Germany and in this context has a close connection to food retailing. In addition, this study is being prepared as part of the author's master's degree. Due to the time constraints of this thesis, the study focuses on leading food retail companies in Europe according to their annual turnover in 2021 (cf. Statista 2021).

#### *Formal characteristics of the material*

The next step in the analysis involves a precise explanation of the form in which the material to be studied is available (cf. Mayring 2010, 53). The interviews are conducted via the American

software company 'Zoom' and digitally recorded. The spoken interview material is transcribed using the transcription procedure 'Content Semantic Transcription' by Dresing and Pehl (2018, 20) using the computer programme 'MAXQDA'. This transcription procedure enables a quicker reference to the content of the conversation and neglects details of the pronunciation to avoid disturbances in the reading flow (cf. Dresing & Pehl 2018, 20 ff.).

### *The direction of the analysis*

Before starting the analysis, it is necessary to determine its direction and objective (cf. Mayring 2010, 56). The subject of the study includes the suitability of the true cost accounting method for considering positive and negative external effects in corporate decisions in European food retail companies. Through the interviews, the interviewees should be encouraged to report on their previous experiences with the topic of sustainability in the context of food retail groups and to assess the extent to which knowledge of positive and negative externalities can influence future corporate decisions and what political and market conditions are necessary for this to happen. Against the background of the interviews with people from business, finance and politics, recommendations for action can be derived for European food retail companies as well as for political actors in Germany and at the European level. For this reason, the material is analysed for statements relevant to the formulation of recommendations for action and to answering the research question.

### *Theory-based differentiation of the research question*

This step of analysis verifies the linkage of the question to previous research and its continuation (cf. Mayring 2010, 57 f.). The literature on TCA to date emphasises the potential of the method for transforming the food and land use system and speaks of increasing public and scientific debate on TCA and the need to take TCA into account, in policy and decision-making by all stakeholders in the agricultural and food system (cf. Aspenson 2020; El-Hage Scialabba et al. 2021, 263). There are only a few publications on the topic of integrating TCA into corporate decisions in the food and land use system so far (cf. TEEB 2018b; Aspenson 2020; Gemmill-Herren et al. 2021a; TCI 2022). Therefore, I will primarily draw on the publication by Gemmill-Herren et al. (2021a), which summarises the results of several studies in an anthology, as well as the TCA framework by TEEB (2018b) and the TCI handbook (2022), which addresses theoretical and practical principles for the application of TCA in the corporate context.

In the publications of TEEB (2018b), Gemmill-Herren et al. (2021a) and TCI (2022), among other things, the practical application of TCAs in manufacturing companies in the food sector and show the political and market-economic framework conditions for the application of TCAs. On this basis, three main questions arise for the present study:

- Question 1: What are the current sustainability efforts of food retail companies, also regarding the consideration of external effects?
- Question 2: Is TCA already a well-known method in practice and how would knowledge about positive and negative externalities influence corporate decisions?
- Question 3: What political and market framework conditions are needed for the application of TCA in food retailing companies?

### *Determination of the analysis technique and definition of the concrete process model*

Before starting the analysis of a qualitative study, the analysis technique, as well as the specific procedure model, must be determined (cf. Mayring 2010, 63). Qualitative content analysis can be carried out with the following three analysis techniques: summarising, explicating, and structuring (cf. Mayring 2010, 65 f.). The evaluation of the present study is carried out with the help of structuring content analysis and the inductive-deductive evaluation approach. The filtering out and summarising of content-related aspects to answer the questions represents the goal of content structuring (cf. Mayring 2016, 118).

### *Definition of the units of analysis*

In this step of the process, the following three units of analysis are defined: The coding unit determines the smallest evaluable material component that can be assigned to a category. In the present study, this is a word. Furthermore, the context unit specifies the maximum text component that belongs to a category (cf. Mayring 2010, 59). In the present study, this is a complete answer by an interview partner to an interview question. The evaluation unit determines the order and procedure of the evaluation of the text component (cf. Mayring 2010, 59). In the present study, each interview is treated as a separate data point. The answers of the interviewees are considered per question, starting with the first question, and compared with each other.

### *Analysis steps by means of the category system*

The following analysis step describes the previously defined process model for analysing the material (cf. Mayring 2010, 93). For content structuring, the rules of summarised content analysis apply (cf. Mayring 2010, 68 ff.).

The first step of content structuring marks the determination of the units of analysis (cf. Mayring 2010, 93). Subsequently, the content to be extracted from the material is marked by categories developed based on theory (cf. Mayring 2016, 120). The developed categories are mapped in a category system. The categories are first defined, concrete text passages are given as anchor examples per category and coding rules are established (cf. Mayring 2010, 92). In the deductive-inductive approach, primarily the upper categories are developed deductively from the theory. Subcategories can also be developed deductively. Further subcategories can be developed inductively based on the interview material (cf. Vogt & Werner 2014, 54).

After the text has been processed using the category system, the content-bearing text passages from the material are summarised with the help of paraphrasing. The level of abstraction is then determined. This is followed by a first generalisation of the paraphrases using a selection, in which congruent paraphrases are sorted out (cf. Mayring 2010, 68 f.). Subsequently, a second reduction of the congruent paraphrases takes place, in which the related paraphrases are linked together and formulated into new statements (cf. Mayring 2010, 69). After about ten to fifty per cent of the material has been processed, Mayring (2010) recommends checking the steps of the process model regarding their logic. At the end of this process, the resulting categories are condensed into the category system. Based on this category system, the entire material is coded (cf. Vogt & Werner 2014, 62).

### *Re-examination of the category system on theory and material*

The following analysis step includes a renewed examination of the logic of the entire category system (cf. Mayring 2010, 69). Here, a check of the category agreement and the reflection of the theoretical background within the material takes place (cf. Mayring 2016, 117).

### *Interpretation of the results regarding the main research question*

This step of the analysis presents the results of the qualitative study (cf. Mayring 2010, 93). The presentation and interpretation of the results of this study are done in chapter five, using the category system created in advance.

### *Application of the content-analytical quality criteria*

At the end of a research project, the results are assessed with the help of the quality criteria (cf. Mayring 2016, 140 ff.). The classic quality criteria of quantitative research: validity, reliability, and validity cannot be applied to qualitative research without adaptation (cf. Mayring 2016, 141). For this reason, Mayring (2016, 144 ff.) has developed the following six modified quality criteria: Procedural Documentation, Argumentative Interpretive Assurance, Rule Guidedness, Proximity to the Subject, Communicative Validation, and Triangulation. A detailed review of the six modified quality criteria is provided in chapter 6.1.

## **4.2 Description and implementation**

### **4.2.1 Assumptions**

In contrast to quantitative research, qualitative research is based on the fundamental idea of openness (cf. Srnka 2007, 168). While hypotheses are set up in advance of quantitative research and examined in the further course of the research process, qualitative research focuses on an unbiased and open investigation of the research field (cf. Srnka 2007, 161 ff.). A basic prerequisite of qualitative research is the possibility to react to and adapt the researched results at any time (cf. Mayring 2016, 28). However, the prior knowledge of the researcher is also considered in qualitative research (cf. Mayring 2016, 29 f.). For this reason, no hypotheses are made in advance of this study. Due to the author's professional background, the following assumptions are formulated regarding the research topic of the study:

1. As of today, the TCA approach is not used by any large food retail company, as positive and negative externalities are hardly considered relevant due to the price and competitive war in the market.
2. The knowledge about external costs will become an essential component for food retailers in the future to identify critical hotspots in their supply chain and make it more sustainable also regarding agricultural products.
3. Food retail companies alone will not be able to manage the transformation of the food and land use system, but further political frameworks and multi-stakeholder initiatives are needed to implement TCA.

4. Further development of the TCA approach is needed to increase practicability, e.g., through tools and databases.

The formulated assumptions of the study only show a rough summary, based on the empirical values as well as the theoretical knowledge of the author. These pre-assumptions reflect a component of the interview guide described in the next step.

#### 4.2.2 Deductive category development

Deductive categories reflect the theoretical assumptions regarding the research subject and define what is to be explored in the interview (cf. Vogt & Werner 2014, 27). The exact definition of the categories is essential for the systematic nature of the procedure (cf. Hussy et al. 2013, 256). Deductive categories are used for developing the interview guide and are equally relevant for analysing the interviews (cf. Vogt & Walter 2014, 23).

As outlined in the theoretical foundations, the integration of TCA in corporate decision-making in food retailing companies implies a transformation of previous business and purchasing practices of the companies. In this context, the method of TCA describes a knowledge flow from the outside to the inside of the respective organisation and due to the changes in previous processes and practices indicated by it, requires organisational change management (cf. Chesbrough 2011, 37; Castilleja 2021, XXXIV).

The following deductive categories can be derived from Chesbrough's (2011) open innovation theory and the systems model of organizational change by Maes & Van Hoote gem (2019):

Category	Category description	Category definition
MC 1	Socio-economical context	The external environment of an organisation that directly or indirectly affects the performance, results, and strategy of an organisation, e.g., the current market, legislation, research projects, natural ecological processes, customer demand
MC 2	Organisational context	Statements regarding elements of the organisational context: strategy, structure, people, and culture.
MC 3	Change object	All change objects in the company that are affected by the application of TCA, e.g., procurement process, procurement costs, food value chain, supply chains, communication to stakeholders.
MC 4	Change system element	All general statements on TCA as well as statements regarding basic knowledge and experience
SC 4.1	Relevance	Relevance of applying TCA and knowing external costs for current and future business activities
SC 4.2	Opportunities and advantages	Opportunities and benefits of the application of TCA as seen by the interviewees.
SC 4.3	Challenges and drawbacks	Challenges and disadvantages of the application of TCA as seen by the interviewees.

MC 5	Organisational effects	Influence and consequences of the change process regarding TCA and the food system transformation on food retail companies.
MC 6	Individual effects	Influence and consequences of the change process regarding TCA and the food system transformation on individuals or society
MC 7	External effects	External factors that have direct, possibly also unintended consequences for the organisation e.g., consumer behaviour
MC 8	New market	Market changes and development of a new market with regard to the relevance of sustainability and TCA
SC 8.1	Political conditions	Political conditions necessary for the application of TCA in food retail companies
SC 8.2	Market economy conditions	Market conditions necessary for the application of TCA in food retail companies

**Table 5 - Deductive categories**

Table 5 shows the eight main- and five sub-categories and the corresponding category definitions. Moreover, the deductive-inductive approach allows for further categories to be extracted inductively from the interview material during the research process (cf. Hussy et al. 2013, 257 f.).

#### 4.2.3 Interview guide

The interview guide is a guiding instrument for the respective interview. It offers the possibility to work out the decisive aspects of the object of investigation before conducting the interview (cf. Helfferich 2014, 560). In accordance with the 'SPSS' methodology according to Helfferich (2014), the first step is to draft as many partial aspects of the research interest as possible as questions. Regarding the research interest, the formulated questions are critically examined and only those questions are selected that enable the creation of information-related texts taking into account the categories defined in 4.2.2. (cf. Vogt & Walter 2014, 24). The remaining questions are sorted according to their focus and coherence. Finally, each bundle of questions is assigned a narrative-generating impulse under which the individual aspects are summarised (cf. Helfferich 2014, 567 f.). This approach provides a methodology and flexibility for the interview process. It also ensures that the interview includes all relevant aspects and a certain degree of comparability between the individual interviews (cf. Hussy et al. 2013, 225). Due to the interviews being conducted with people from three different disciplines, three slightly modified interview guides were developed for the present study, each with wording adapted to the target group. These serve as a structural guide for the interview process and are attached in Appendixes A to C. The basis for the development of the interview guidelines is the research question.



## 5 EVALUATION OF THE RESULTS

### 5.1 Analysis of the category system

Following Kuckartz et al. (2008, 43 ff.), the evaluation is presented according to the category titles. The entire category system including definitions, anchor examples and coding rules can be found in Appendix D. The category system is hierarchical. At the top are the deductive categories derived from theory (main categories), which are subdivided into respective sub-categories and in some cases sub-subcategories. The sub-categories are described within each main category. Sub-categories to which sub-sub-categories are assigned are described separately and the sub-sub-categories are listed within the preceding sub-categories. They form the basis for the following recommendations for action for the European food retail sector as well as for policymakers. Within the main categories, reference is made to the individual perspectives of the respondents, and these are deliberately highlighted where relevant for understanding. Otherwise, general statements are used so as not to disrupt the flow of reading.

#### *Socio-economical context*

Food retailing in general and with a special focus on the German market is characterised by a high price and margin pressure, which results from the competitive market situation and leaves little room for proactivity. Both in the purchasing of food retail companies and among customers, the focus is currently mainly on the price factor. Likewise, investors only consider financial KPIs such as profitability and margin.

*“I believe that the competitive pressure is enormous. That the customer expects cheap food, especially in Germany” (Interviewee A5)*

Although the demand for sustainability assessments in food retail companies is increasing, the awareness of TCA and the significance of the method in risk assessment are low. Also, there are no requirements to apply TCA and capture external costs. All interviewees agree that the current economic system prevents the consideration of external costs in purchasing, as this would result in economic risks for the companies, e.g., in the form of sales losses or customer migration due to a lack of customer awareness regarding true prices. Instead, existing system gaps are systematically exploited to buy cheap.

In particular respondents from sustainable finance and politics see the focus on purely financial indicators due to misaligned systemic incentives as the main reason for the failure to capture external costs. It is criticised that the polluter pays principle is not applied. Banks are also part of this systemic problem, as sustainability risks are currently not yet sufficiently integrated into risk management systems. However, food retailers emphasise that no company has such market power to change the market economy. They argue that a switch to TCA by one company alone cannot be justified. It lacks a level playing field and a sectoral approach. A minority of respondents do not even consider it possible to influence external costs, as food production naturally requires resources and causes emissions.

*“[...] the fatal thing [is], the additional costs for sustainable food production are not that much higher, but the traders add a price premium” (Interviewee B2)*

This leads to external costs currently being passed on to the environment and society. Moreover, as there is no uniform understanding of sustainability in society, sustainability and rising costs are not yet linked as a matter of course. Instead, ecological products are currently sold as niche products with premium prices that bear no relation to the additional costs of sustainable food production, but at the same time remain within an acceptable range for customers.

#### *Organisational context*

In European food retail companies, sustainability efforts are increasingly being integrated into the product range strategy, structures, and processes. This development is based on the strategic motives of image building, high market demand and risk minimisation.

*“I would say that we are making, or have made, very great efforts to make our value chain more sustainable and social” (Interviewee A6)*

The importance of sustainability efforts depends on the transparency and complexity of the value chain - most measures focus on fresh products with higher transparency, for raw materials and more complex products higher-level approaches apply - and on market and customer demand and thus also on the sales relevance of the products. As a result, companies with locations in several European countries show a certain diversity in their sustainability efforts, depending on how relevant sustainability is as a purchasing criterion in the respective market. The degree of sustainability efforts in the companies varies from the requirement of market standards and certifications known to customers and established among competitors, to more holistic sustainability strategies. These include measures along the entire value chain with a focus on working conditions, critical raw materials, sustainable consumption, water and biodiversity, own evaluation systems for supplier assessment based on defined sustainability criteria, the presentation of climate and animal protection impacts at a product level or the commitment to the specifications of the Science Based Targets-Initiative (SBTI). Overall, the focus of the companies is currently increasingly on climate protection and the reduction of CO<sub>2</sub> emissions, as there are already more established calculation methods for this. In one company, TCA was used as part of a project to calculate the true costs of selected products for an example. Beyond that, TCA is currently not considered in any of the companies surveyed.

*“[...] food retailers [...] are far less green than they pretend” (Interviewee B2)*

While, according to the food retail companies, some efforts are already being made to make the value chain more sustainable, the interviewees from politics and finance see it purely as a marketing measure to leverage sales and profit potential. In combination with the existing purchasing policy of the companies, which is geared towards the lowest price, this behaviour also increases the price and competitive pressure on organic farms. Moreover, there is a lack of transparency about the actual costs and the consideration of Environmental, Social, and Governance (ESG) criteria. This increases the risk of consumer deception, including through

packaging that suggests sustainability for products that are produced at the expense of environmental and social standards.

This incongruent behaviour leads to negative environmental and social externalities along the entire value chain of food retail companies. In particular monoculture products have high external environmental costs and far-reaching ecological consequences, which are amplified by the price focus. While the retail side argues that taking external costs into account is not compatible with the current corporate strategy, lacks a recognised necessity in relation to the effort that would have to be made to determine the figures and, in addition, the lower the purchasing volume, the smaller the possibilities of exerting influence. In contrast, policymakers see a decisive influence of trading companies on production conditions and believe that the knowledge about external effects in the supply chain is already available in the companies.

### *Change object*

True Cost Accounting provides an incentive for companies to transform themselves and operate more sustainably. Depending on the way it is implemented, the application of TCA has different effects on business processes and the business strategy as a whole.

Thus, TCA can be used to increase cost transparency towards stakeholders, such as the end consumer, e.g., by displaying the true costs on the shelf in the market. Thus, from a competitive perspective, TCA initially offers an option for differentiation through more information.

*“If you think competitively, [...] [TCA] can of course also be a point. That is, you can differentiate yourself through this more information” (Interviewee A1)*

Regarding the purchasing process, transparent external costs can be used as an additional purchasing criterion alongside price and quality, softening the focus on price. In addition, cost transparency within the company increases. Applied consistently, this has a holistic impact on procurement with possible consequences also for the availability of some products.

*“Well, one advantage would definitely be that we gain more transparency about our supply chains. One of the biggest challenges we have in the agricultural sector [...] is the issue of transparency” (Interviewee A5)*

To integrate TCA into corporate procurement processes, the concept needs to be integrated at a normative level into the strategy, mission, and vision of food retail companies.

### *Change system element*

All experts interviewed in the study are familiar with the True Cost Accounting method. Their knowledge of the method ranges from superficial knowledge that the method exists, to the application of the method in the context of projects, to professional expertise including publications on the transformation of the food system by means of TCA. Especially in trade and politics, there is little to no experience with TCA so far. Therefore, the importance of TCA for food retail companies is currently described as low. However, almost all respondents estimate the relevance of TCA for trade, politics, and finance in the future as high to very high. This is especially true against the background of the increasing relevance of real cost indicators in

finance and trade for a more transparent presentation of physical and transitory risks in the areas of natural capital, human capital, and social capital. Only one interviewee assesses the TCA method as not relevant and not appropriate since knowledge about external costs would not add any value or bring about any change, as the costs could not be paid by anyone.

Overall, however, knowledge about the external costs of the food value chain is associated with numerous benefits by food retail companies. As pointed out by the financial side, due to the dual materiality of true cost indicators, they show both a company's sustainability impacts on the environment and society, as well as the risk of companies being affected by external factors. By summarising the risks in a monetary indicator, their comparability and transparency are increased. Thus, hotspots can be identified more easily, and measures can be initiated. This facilitates decisions in terms of sustainability. Moreover, internal stakeholders, as well as external investors and customers, can be made aware of positive and negative external effects. If risks are addressed at an early stage, competitive advantages can be generated, and reputational risks reduced. This results in the opportunity for more stable supply chain structures through lower supply chain risks and more secure, reliable partners, creating an incentive for companies to transform and operate more sustainably. Overall, TCA thus provides an economic basis for the development of sustainable agricultural and food systems. From a financial perspective, knowing the environmental impact of companies and taking TCA into account also reduces the risk of company insolvency and thus the credit default risk for banks.

*"[...] the effects and significance of True Cost Accounting for the financial sector can hardly be underestimated" (Interviewee B1)*

At the same time, however, TCA is associated with various challenges regarding its application and practicability. For example, a widespread application of TCA is currently not possible due to a lack of transparency and technical digital solutions. The high effort for the calculation of external costs and the associated high costs due to the complex data analysis are also cited. In addition, the interdependencies in the supply chain are often difficult to measure and the external costs are often rather assumptions, as a uniform calculation methodology is lacking, and external costs are highly dynamic as well.

*"And in the end, there is simply a lack of data" (Interviewee A1)*

To integrate external costs into corporate decisions in food retail companies in the future, further development of the TCA approach is needed. This includes measures such as the development of a real cost database, digital support by tools, legislative measures, and cooperation between market players. The political side proposes the introduction of True Benefit Accounting to take into account positive externalities in the calculation of true costs and to establish a baseline in the form of an unavoidability level for naturally occurring emissions in agriculture.

#### *Organisational effects*

The change process regarding TCA and the transformation of the food system would have influence and consequences on food retail companies. One opportunity lies in a more stable supply chain structure through lower risks in the supply chain and safer, reliable partners.

*“[...] if you don't buy sustainably you [...] have risks in the supply chain” (Interviewee B2)*

However, it is mainly the negative aspects the interviewees consider. If TCA is applied in food retail companies, transparency about the value chain increases. This knowledge about external costs in turn results in a need for companies to act. This includes investments in the supply chains of the companies as well as in personnel to analyse the data. There is concern that necessary investments will not be available due to the current market situation related to the corona pandemic, resulting in an economic disadvantage for companies to cope with externalities. As a result, rising product prices are feared, which will be passed on to the customer and may have an impact on social factors, as will be discussed in the following point.

#### *Individual effects*

The change process regarding TCA and the transformation of the food system would have an impact on and consequences for business stakeholders. Within this context, an opportunity lies in the more sustainable development of the supply chain, also in terms of supply chain actors benefiting from fair prices. In particular, developing countries with a high relevance of agricultural trade benefit from strong social sustainability in this context. Regarding European food retail, TCA has the potential to be a steering element for purchasing decisions towards more sustainable products with low and away from products with high external costs.

However, the internalisation of external costs in the context of TCA carries the risk of price increases and is expected to generate a high potential for resistance on many levels, both internally and externally, as many actors benefit from the current system. At the same time, steadily rising prices are socially unjust and discriminate against poorer customers.

*“[...] affordability for consumers [...] must be ensured” (Interviewee C3)*

Thus, policymakers emphasise that there should be no complete internalisation of external costs. Rather, politics must address social concerns. If necessary, the social issue must also be considered at the expense of sustainability. Another obstacle in the implementation of TCA can be internal company conflicts in food retail companies, among others, due to diverging goals of the purchasing and CSR departments based on the current corporate strategy.

#### *External effects*

The use of TCA can result in external consequences for food retailers that cannot be influenced directly. These can be both positive and negative. The statements assigned to this category originate exclusively from the retail side. Only negative factors were mentioned given the fact that the application of TCA is based on voluntariness and lacks a regulatory approach.

Regarding the internalisation of external costs, retailers fear a loss of turnover and profit due to the price sensitivity of customers, resulting in their migration to competitors who do not apply TCA or do not internalise external costs. This is one of the main obstacles to leaving the comfort zone and taking the initiative regarding TCA. Furthermore, there are concerns about reputational risks. On the one hand, if external costs are not considered, but the issue is known

by customers. On the other hand, if the grievances in the companies' supply chains are exposed by the increase in transparency through TCA.

### *New market*

According to the interviewees, to integrate TCA into the business decisions of food retailers, policy and market changes are needed. If implemented appropriately, this offers the potential for a new way of doing business and thus for a transformation of the food and land use system towards achieving the global sustainability goals.

From a market perspective, a shift away from market and price orientation towards sustainable responsibility in terms of due diligence, accountability and holistic true costing is required for food and agribusiness companies along the entire agricultural supply chain. Within this so-called multi-capital approach, ecological and social values are taken into account alongside economic criteria. To create a level playing field for all market participants, to make external costs comparable and thus make agricultural supply chains more sustainable in the long term, a holistic systemic approach involving policymakers and market actors is needed, including a uniform international legal framework and a comprehensive, cost-efficient, and globally applicable tool for calculating external costs.

*“[...] I think we can only get there with a level playing field, with the same requirements, the same conditions, to change what is going on in the supply chains in the long term and make it more sustainable. I think that True Cost Accounting would also fit in here.” (Interviewee A5)*

In this context, policymakers have a leading role to play. At the EU level, the Farm-to-Fork Strategy and the Supply Chain Act have already laid the foundation for a more sustainable design of global supply chains. To bring about systemic change, these must be implemented consistently in the future. In addition, further regulatory measures are needed. According to the interviewees, fiscal measures such as taxes and levies applied at relevant points in the value chain, e.g., a meat tax, are possible. In a positive sense, sustainably operating companies can be rewarded through tax incentives, whereby according to the political side, a reduction of the political reward system for sustainability should take place with increasing self-evidence. In this context, mandatory reporting for all companies to show the impact of their business model on environmental, social, and educational factors as well as the application of the polluter pays principle to take into account social and environmental external costs along the entire value chain, accompanied by information, education, and awareness-raising campaigns, would be appropriate. By taking all positive and negative externalities into account in reporting, misdirected subsidies could be eliminated. An internalisation of external effects that is fair to those who cause them, e.g., through levies on pesticides and fertilisers, an appropriate CO<sub>2</sub> price and a redistribution of EU subsidies in the direction of true-cost pricing are further necessary levers. In addition to legal obligations, companies also see the option of concluding sectoral agreements or embedding TCA in their corporate code of conduct.

To achieve a behavioural change towards a fairer, more environmentally friendly way of doing business the retail side proposes a TCA roadmap. Here, the first step would be the politically and scientifically supported development of a tool to calculate external costs, which could be tested by selected food retailers. In a second step, findings on the application of the tool could

be exchanged and improved. Subsequently, the tool should be made available to all food retail companies to analyse and address problem areas in their supply chain. The analysed hotspots as well as the initiated measures are to be reported to the government as part of a reporting obligation, which in turn can intervene to eliminate loopholes and accompany a transformation through the above-mentioned political instruments. Due to the global orientation of food value chains, it is considered important to implement the TCA methodology as a global, multilateral approach to address the negative impacts worldwide and not to re-import them by shifting production abroad. In this context, support measures to build up knowledge in developing countries can help to raise the local sustainability potential in these countries, especially regarding production conditions and transport.

From a financial perspective, transparency about external costs offers numerous advantages for companies, financial institutions, and investors. There is already a trend toward more sustainability in the capital markets, as investments in non-sustainable business models increase the risk of default. In the future, the interviewees from the financial sector and politics see a stronger consideration of external effects by capital providers. While the attractiveness of investments involving risks will decrease in the future due to negative external effects and simultaneously increasing restrictions, investments in companies and projects with positive effects will become more attractive. This will lead to a redirection of financial flows into a sustainable economy. However, the influence of external effects on a company's capital investments and capital procurement largely depends on the form of the company. A higher relevance is seen for listed companies than for privately financed companies.

*“To put it briefly, it is simply a more honest way of doing business.” (Interviewee B1)*

Yet, the trend toward more sustainability is not only evident on the capital markets, but also on the sales market. Therefore, the respondents assume that sustainability will become a matter of course in the future. Already today, there is an increasing demand for sustainable products. However, there is currently a transparency deficit due to a lack of consideration of external costs in pricing. In addition, there are currently different sustainability priorities in the EU countries which are important to be taken into account in communication to win consumer interest and to pick up consumers on topics that need to be explained, such as TCA. Properly applied, respondents see great potential for TCA to bring about strong behavioural changes and promote more sustainable consumption. Moreover, the complete internalisation of external costs makes ecologically produced products more competitive than conventional ones. Similarly, companies can benefit from this price advantage in purchasing. In this way, more sustainable business models, such as organic farming, would be promoted.

However, the interviewees emphasise that the social issue must not be forgotten. Healthy, sustainable products may cost a little more, but they must remain affordable for the consumer and at the same time ensure an adequate income for primary producers. Thus, for the interviewees, it would be conceivable as a first step to implement TCA as an internal management and control instrument, combined with a reporting obligation in the direction of politics, e.g., through integration into the European Supply Chain Act. Moreover, analogous to the PENNY project, the true costs could be shown transparently on the product without influencing the product price, or with the option for the customer to pay these costs voluntarily.

## 5.2 Review of the quality criteria

In the following, the validity of the six quality criteria of qualitative research according to Mayring (2016) specified in chapter 4.1 will be checked for the present study.

The first quality criterion to be examined is procedural documentation. The procedural documentation includes detailed documentation of the entire research process to enable the reader to gain an understanding of it (cf. Mayring 2016, 144 f.). This detailed documentation is carried out based on the procedure described in chapter 4.1, using the set of analytical instruments described in chapter 4.2, and the implementation and evaluation of the data collection explained in chapters 4.2 and 5. In addition, the three interview guidelines and the category system are included in the Appendix. The transcription of the interviews will be made available digitally.

The argumentative securing of interpretations represents the second criterion to be reviewed according to Mayring (2016). It includes the assurance, comprehensibility, and structured argumentation check of the interpretations from the respective studies (Mayring 2016, 145). The interpretations of the present study are based on the process model of qualitative structured content analysis according to Mayring (2016, 93 f.). Based on this, the deductively derived main categories described in point 4.2.2 and the attached category system as well as the sub- and sub-subcategories inductively formed from the interview material are applied.

The next quality criterion is rule-governance. This includes the evaluations of qualitative studies in the form of procedural rules as well as a structured process (cf. Mayring 2016, 145 f.). Mayring's process model is based on a strictly rule-governed structure, which is why the quality criterion of rule-governance is adhered to in the present study.

Proximity to the subject is the fourth quality criterion to be tested. This quality criterion focuses on the research being conducted within the familiar environment of the respondents and on achieving a convergence of interests (cf. Mayring 2016, 146). Due to the respective relevant positions of the interviewees in the sustainability management of food retail companies, in sustainable finance as well as in national and European environmental and social politics and since the interviews were conducted in the usual working environment of the interviewees, the quality criterion 'proximity to the topic' is fulfilled for the present study.

The fifth quality criterion is Communicative validation. Communicative validation describes the discussion of the individual results with the respective subjects that takes place after the interviews (cf. Mayring 2016, 147). The results of the study were discussed and evaluated with a representative from the retail sector (interview code A1) as part of the follow-up. The interviewee was able to identify very well with the presentation of the results. However, due to the time constraints of this work, a subsequent uniform discussion with all subjects is not included.

The final quality criterion is triangulation. Triangulation involves the linking of several analytical procedures or approaches to enhance the quality of the respective qualitative research (cf. Mayring 2016, 147 f.). The present study primarily focuses on qualitative content analysis as the model of analysis. In addition, data-reducing coding is used as a method for paraphrasing. Despite this, the study concentrates on one approach at its core and accordingly does not allow any conclusions to be drawn regarding quantitative research.



## 6 DISCUSSION

### 6.1 Conclusions on theory

In the following chapter, the core statements of the present study are compared with the few existing publications on the topic examined. According to Gemmill-Herren et al. (2021), current global economic structures are characterised by a one-sided focus on growth and economic indicators (cf. Gemmill-Herren et al. 2021, 9). Thus, the current economic system primarily focuses on Produced Capital (cf. Crosby et al. 2021, 230). Excluded from this system, the external costs of global production and consumption damage the natural, social, and human capital on which society is based (cf. de Groot Ruiz 2021, 251). According to TEEB (2018b), the resulting loss of biodiversity and ecosystem services is supported by misguided, harmful subsidies (cf. TEEB 2018b, 354; Figeczky 2021, 100). Moreover, Holden & Jones (2021) emphasise the lack of a polluter pays principle for the food and land use system, which governments around the world have so far avoided implementing due to the feared impact on food prices (cf. Holden & Jones 2021, 91). The present study builds on these findings. Almost all interviewees emphasise that the current economic system, the associated price and profit focus and corresponding subsidies are responsible for the lack of consideration of external costs in the food and land use system. Food retailers in particular highlight that due to the absence of uniform regulations, a level playing field and a sectoral approach as well as the non-application of the polluter pays principle, no company will currently take the risk of consistently applying TCA as customer migration and profit losses are feared consequences.

At the same time, TEEB (2018b) emphasises that companies in the food and land use system have made transformational efforts toward sustainability over the past decade (cf. TEEB 2018b, 363). In line with this, TCI (2022) describes that the need to integrate information on non-financial capital into corporate strategies is increasingly being recognised (cf. TCI 2022, 10). At the same time, however, TEEB (2018b) criticises the marketing activities of companies that only serve the goal of profit maximisation and often promote unhealthy products as sustainable (cf. TEEB 2018b, 186). In the present study, especially the interviewees from the food retail sector highlight the increasing consideration of ecological and social sustainability criteria in corporate strategies, structures, and processes. Yet, the efforts of the individual companies are divergent and range from substantial sets of measures to ensuring customary market standards. In contrast, the interviewees from the areas of sustainable finance and politics evaluate the sustainability efforts of the companies mainly as a marketing measure to increase sales and profit. The interviewees' divided view of the sustainability efforts of companies in the food and land use system thus supports the impression of TCI (2022) and TEEB (2018b).

In light of this development, TCA offers an approach to a methodologically supported, sustainable transformation of the food and land use system (cf. TCI 2022, 52). According to de Groot Ruiz (2021), in the first step, the methodology provides holistic transparency for the true costs of the food value chain for companies as well as for consumers and governments (cf. de Groot Ruiz 2021, 256). Here, TCI (2022) emphasises the double materiality of the true cost indicators, whereby on the one hand the impacts of corporate activities on the environment and

society are mapped and on the other hand the corporate dependencies and risks arising from these external impacts. Thus, higher purchasing prices, provisions for probable losses, impairments or necessary investments can be derived from these sustainability aspects, with potential consequences for the balance sheet and the income statement of the companies (cf. TCI 2022, 21 ff.). By applying TCA, companies have the opportunity to identify hotspots in their supply chain and to design their production and purchasing processes in such a way that external costs are avoided, and risks are minimised (cf. de Groot Ruiz 2021, 256 f.; El-Hage Scialabba & Obst 2021, 21). The interviewees arrive at a similar assessment of the TCA methodology. Although most of the interviewees are only superficially familiar with the methodology, the possible positive effects of the increase in transparency for internal purchasing processes as well as towards corporate stakeholders are emphasised. In their view, especially the actors at the beginning of the value chain in the area of primary production, which often takes place in developing countries, benefit from strong social sustainability and fairer prices. By summarising the external effects of business practices in a monetary indicator, their comparability is facilitated. Compared to the theoretical frameworks, the interviewees transfer the advantages perceived through the application of TCA more into practice.

If risks are anticipated at an early stage, the interviewees from the retail sector in particular see the possibility of generating competitive advantages, reducing reputational risks, and creating more stable supply chains. Moreover, the financial side emphasises that TCA can minimise the risk of corporate insolvencies and credit default risk.

However, at the same time, an increase in transparency is associated with various negative effects by the interviewees. In particular, respondents from the food retail sector point out that knowledge about external costs leads to a need to act, which also requires investments in the more sustainable orientation of the supply chain as well as in employees who are responsible for analysing these costs. The interviewees fear that there is no budget for such investments due to the current dynamic market and price development. In contrast, TEEB (2018b) argues that joint investments and efforts by all stakeholders are necessary to advance the radical transformation of the food and land use system that is needed (cf. TEEB 2018b, 101). According to TCI (2022), the food retail sector too benefits from sustainability-related resilience of the supply chain, which can only be achieved through necessary investments (cf. TCI 2022, 57). Furthermore, de Groot Ruiz (2021) suggests that costs that cannot be avoided in the supply chain could be internalised and passed on to consumers (cf. de Groot Ruiz 2021, 256 f.). Given that the application of TCA is voluntary, respondents fear that in addition to negative impacts on sales and profits due to the price sensitivity of customers and their possible migration to competitors, such a pass-through of external costs could also lead to more far-reaching social consequences. They argue that steadily rising prices are socially unjust and discriminate against poorer customers. Moreover, since many actors benefit from the current system, the interviewees assume a high potential for resistance on many levels. The currently prevailing, diverging objectives within the companies also pose a challenge. According to the majority of the interviewees, politics has a key role to play in solving such social issues. El-Hage Scialabba et al. (2021) support this view and emphasise the crucial role of politics regarding the effective implementation of TCA (cf. El-Hage Scialabba et al. 2021, 263).

Nevertheless, the application of TCA currently still faces several challenges. Hence, both El-Hage Scialabba & Obst (2021) and TCI (2022) emphasise the need for standardisation of TCA assessment methodologies to establish comparability, including standardised reporting of TCA results in companies' annual reports (cf. El-Hage Scialabba & Obst 2021, 22; TCI 2022, 67). Furthermore, the recording of external costs in the food supply chain is currently both cost and time-consuming due to the high complexity of the calculation and the lack of data and indicators (cf. Merrigan 2021, 184; TCI 2022, 19). TEEB (2018b) and El-Hage Scialabba & Obst (2021) stress that to successfully capture and eliminate externalities, global coordination and cooperation between the different market actors are needed, also with regard to the definition of appropriate indicators, which should be developed in close coordination with the scientific community (cf. TEEB 2018b, 353; EL-Hage Scialabba & Obst 2021, 23). The present study supports these remarks from a practical point of view. The interviewees likewise see major challenges in the application of TCA at present due to a lack of metrics, data, and uniform reporting methodologies. Furthermore, the respondents emphasise that interdependencies in the supply chain are often not transparent, which makes it difficult to capture external costs. The need for legislative measures, up-to-date databases and cooperation between political and market actors is highlighted.

While respondents from the food retail sector, in particular, would like to see the development of technical digital solutions to capture external costs easily and efficiently at the product level, TCI (2022) points out that farmers worldwide often have low digital skills due to a high average age. It is therefore unlikely that fully digital and automated data collection can be achieved in the near future (cf. TCI 2022, 60). Theoretically not confirmed is the assumption of one respondent that monetising external costs makes them negotiable. The same applies to the concern that risks in the supply chain might not be addressed due to external costs being too low. As an example, the respondent argues that within a supply chain, the external costs of climate impacts could be higher than those of child labour, thus shifting the focus to reducing climate impacts instead of addressing child labour.

To establish TCA in corporate practice, TCI (2022) calls for the integration of TCA indicators related to natural, social, and human capital in corporate reporting (cf. TCI 2022, 56). According to the initiative, a central prerequisite for meaningful reporting is the standardisation of the calculation of true costs, as this is the only way that TCA can be used as a KPI e.g., for granting loans or subsidies (cf. TCI 2022, 66). El-Hage Scialabba et al. (2021) go one step further and state that without the development of harmonised accounting standards, TCA carries the risk of greenwashing (cf. El-Hage Scialabba et al. 2021, 270). In this context, Holden & Jones (2021) emphasise the need for a holistic transformation of the food system. As external costs of the food and agricultural system are not valued so far, this system is currently more profitable than more sustainable practices (cf. Holden & Jones 2021, 85 f.). For this reason, the authors call for the consistent introduction of the polluter-pays principle and the redistribution of subsidies to promote an honest and transparent market for sustainably produced food (cf. Holden & Jones 2021, 86). De Groot Ruiz (2021) supports this idea and points out that external costs can be taxed by policymakers and sustainably produced food can be subsidised to create incentives for the application of TCA and to enable consumers to buy sustainable products (cf. de Groot Ruiz 2021, 256 f.). El-Hage Scialabba et al. (2021) likewise regard policymakers as

responsible and call for the creation of a legal framework for a TCA standard to create a level playing field for all, prevent fraudulent practices and reduce the costs of supporting various approaches. Furthermore, according to the authors, it is necessary to oblige the highly concentrated agri-food sector to take external costs into account. In this context, regulations related to TCA could reduce incentives for the exploitation of natural and human resources, while paving the way for the introduction of alternative competition and antitrust policies to address oligopolies in agricultural inputs, machinery, insurance, and the food market (cf. El-Hage Scialabba et al. 2021, 270 f.).

The present study builds on these findings. From a market perspective, interviewees in all three sectors see the need to move away from current economic practices toward a multi-capital approach including the assumption of sustainable responsibility in terms of due diligence, accountability, and holistic true pricing along the entire food value chain. In line with the theoretical explanations, the interviewees emphasise that a holistic systemic approach is needed to create a level playing field. In this regard, they also emphasise the role of politics in the creation of an internationally valid legal framework and the development of a globally standardised tool for calculating true costs. To support this, the respondents mention further regulatory measures, such as fiscal instruments, mandatory reporting for companies and the consistent application of the polluter-pays principle. Overall, respondents agree that political regulatory measures are needed for the consequent integration of TCA into business decisions in the food and land use system and thus also in food retail companies. According to the respondents, a mere voluntary approach to integrating TCA into business decisions would not lead to a sustainable transformation of the food and land use system due to the high price, margin and competitive pressure in the food retail sector and the associated business risks.

## 6.2 Derivation of recommendations for action

Based on the results of the study and the theoretical foundations, recommendations for action to take TCA into account in business decisions are presented as follows. I have divided these into recommendations for European food retail companies and recommendations for political actors with reference to environmental and social policy, as both the theory and the interviewees attribute an essential role to politics in the transformation of the food and land use system, including the application of TCA.

At the same time, the present study has shown that a standardisation of the TCA approach is needed for an application of TCA in the food and land use system in general and in European food retail companies as the focus of this work in particular. Consequently, there is a need for standardised procedures so that the results can be easily interpreted and compared. In its Agrifood Handbook, the True Cost Initiative (2022) presented options for calculating true costs in food supply chains and identified relevant TCA KPIs (cf. TCI 2022, 25ff.). However, the limitations outlined in 2.4.3 show that a standardised application of TCA in companies is not yet possible and that a calculation of true costs in business practice is complex and time-consuming. The present recommendations for action, therefore, refer to how European food retail companies can already take external effects into account in business decisions based

on the current status of TCA and how politics can contribute to the further development and implementation of TCA in the food and land use system.

### **6.2.1 For European food retail companies**

#### **Develop an understanding of corporate responsibility and align corporate policies and strategies accordingly**

As a first step, European food retail companies should analyse their corporate governance practised so far and develop an understanding of their environmental and social responsibility. Once the company is aware of its corporate responsibility and has anchored it in its mission statement, corporate policies and strategies must also be adapted to the changing ecological and social challenges.

The analysis has shown that there is currently a high level of diversity among European food retail companies, both in terms of the relevance of sustainability and the type and scope of measures already implemented to address social and environmental challenges in the food supply chain. Besides domestic factors, this is mainly due to the strategic orientation of the companies and the complexity of today's food value chains. Furthermore, the results of the survey showed that there are often divergent objectives between the purchasing and CSR departments. According to the respondents, this often leads to conflicts of interest, with environmental and social goals frequently being subordinated to the focus on price and margin.

This step towards sustainable corporate governance is about defining the role of the company in society and the relationship with the company's stakeholders. In addition, relevant policies, such as the Farm-to-Fork strategy, need to be taken into account. All three factors are to be embedded in the organisation's mission statement. The corresponding alignment of corporate policy and strategy with social and environmental challenges requires organisational change, as can be visualised by the system model of organisational change presented in 2.2 (cf. Maes & van Hootegem 2019, 733). To successfully implement change processes in the company, close support by the top management, the strategy department and the managers of the affected company divisions is necessary. In line with the focus of this work, it is particularly important to involve the purchasing and CSR departments at an early stage. The conflicts prevailing there can be resolved through a corporate policy and purchasing strategy that is aligned with the ecological and social challenges and supported by top management. Finally, appropriate measures must be developed with which the company intends to achieve the goals defined to address the environmental and social challenges beyond the company's boundaries to the upstream and downstream corporate value chains.

#### **Increase supply chain transparency**

To reduce physical and transitory risks in food supply chains, ensure long-term food security and make supply chains more resilient, food retail companies should increase transparency in their supply chains about environmental and social aspects.

Many of the interviewees emphasised that transparency is one of the biggest challenges in the agricultural sector. While the traceability of the supply chains for unprocessed fruit and vegetables is relatively good, the supply chains of processed products are less transparent.

However, transparency also implies knowledge of environmental and social risks along the supply chain, which are currently barely taken into account. This leads to sustainability risks not being considered in procurement. In particular, the interviewees from the areas of sustainable finance and politics highlight that supply chains are therefore not very resilient, which may lead to risks regarding the security of supply in the long term. Moreover, raising capital could become more difficult in the future, as the relevance of sustainability is also increasing in the investment sector.

Due to the high assortment breadth and depth of food retail groups, I recommend prioritising the product groups whose supply chains should be analysed and documented. This can be done by carrying out a hot spot analysis, which allows a company to first address the food value chains with the most serious negative externalities and implement appropriate measures there. Here, the impact categories from Table 4 can be used. Developed by the Wuppertal Institute the hot spot analysis is a recognised tool for measuring and assessing sustainability along the life cycle of a product (cf. Liedtke et al. 2010, 7 ff.). Its main objective is to identify areas of intensive resource use or sustainability problems along the entire value chain quickly, reliably and in a life cycle phase-specific manner, and to highlight fields of action (cf. Schmitt & Hamer 2018, 2). An initial indication of which value chains may contain risk raw materials can be derived, e.g., from the products addressed by Fairtrade under the Fairtrade Standard (cf. Fairtrade 2022b).

Parallel to the hot spot analysis, following the publication of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and the UBA, a supplier questionnaire should be developed to record how the respective supply chains are structured and which actors are involved. The mapping and visualisation of the supply chain provide the company with an overview of the central upstream value creation stages (cf. BMUV & UBA 2017, 12 ff.). Potential questions are:

- What are the upstream supply chain stages of the value chain (products, services)?
- Who are the suppliers - from direct suppliers to raw material producers?
- What activities take place at each stage of the supply chain?
- Where does the production/service take place in each case?
- What preventive measures have been taken to address sustainability risks (e.g., membership in a supply chain initiative, implementation of a management system)?

Using the supplier query, the supply chain can be visualised. This provides a basis for identifying sustainability impacts and risks and for planning and implementing improvement measures as precisely as possible.

### **Establishing sustainable supplier management**

An important lever for reducing sustainability risks and external costs in the food supply chain is the establishment of sustainable supplier management. Companies should therefore build long-term supplier relationships, promote the sustainable development of their suppliers, and expand the pure focus on price and quality in purchasing to include the consideration of sustainability risks at the supplier level.

The analysis of the interviews shows that the focus of food retail companies on price and margin is at the expense of sustainable farming methods. Hence, to remain competitive, suppliers are forced to produce as cheaply as possible. This results in monocultures that are usually not resilient and have negative consequences for people and the environment. In addition, in the countries of cultivation, especially outside the EU, wages are often paid below a living wage, leading to a high poverty rate in these countries. At the same time, however, there is a high dependence of the agricultural sector and thus also of food retail groups on natural, social, and human capital.

When developing sustainable supplier management, a distinction can be made between general and specific measures.

A first step for sustainable supplier management is the development and establishment of a code of conduct that can be implemented regardless of the order volume and market power of a company. Here, requirements on the central sustainability topics can be formulated and contractually recorded for both direct suppliers and sub-suppliers. Contractual sanctions can be defined for violations of the Code of Conduct, which, depending on the severity of the violation, can range from warnings to fines to termination of the cooperation. Compliance with the Code of Conduct can be verified, for example, by setting up audit procedures for direct suppliers.

For the development of more concrete measures, the results of the supplier survey and the impact assessment of the sustainability aspects and impacts of the business activities along the value chain can be used and allocated within the supply chain. Based on this, the recorded sustainability impacts of the company are assessed and prioritised in terms of their environmental and social risks as well as the risks arising for the company's own business (e.g., reputational risks). Subsequently, the suppliers can be assigned to the identified risk groups. Based on the results of the supplier survey regarding the already existing sustainability commitment of the suppliers in the identified risk areas, the development of a supplier ranking, e.g., from A to D, is possible. From the results of the supplier ranking and the assessment of the corporate sustainability impacts, central fields of action can be derived.

Thus, companies can offer training for direct suppliers and subcontractors in which specific risk factors in the supply chain are addressed in a product-specific way. Here I recommend involving external parties, e.g., NGOs or local growers' associations, who are experts in the topics presented and are recognised outside the company. Possible topics include training on enhancing biodiversity, reducing land use, using alternative pesticides and cultivation methods, or improving local working conditions. Another possibility is the preparation and communication of best practice examples, e.g., in the context of supplier dialogues or other events.

The conception and implementation of joint projects between suppliers and retail companies, e.g., in the context of biodiversity projects, also offers opportunities for sustainable supplier development. Furthermore, the sustainability commitment of suppliers, e.g., in the conversion of farms to organic farming, can be supported through purchase guarantees or the extension of contract terms. Further opportunities for individual supplier development are offered by cooperation and networking between companies, suppliers, and experts, e.g., in the area of sustainable water management for water-intensive crops such as avocados.

For a successful implementation of sustainable supplier management, I recommend building long-term supplier relationships, creating a relationship of trust, and developing risk-specific concepts for the sustainable development of suppliers. In this way, companies and suppliers alike benefit from long-term ordering and planning security, based on which investments in more sustainable management methods are worthwhile. Companies should reward this by supplementing the pure focus on quality and price with the factor of managing sustainability risks on the supplier side and not shifting the costs for sustainable development of the supply chain entirely onto the supplier.

### **Initiation of or participation in sector initiatives**

To promote the development and diffusion of the application of TCA and to drive the sustainable transformation of the food and land use system beyond company boundaries, food retail companies should join or establish sector initiatives.

Some retailers participating in the study are already involved in sectoral initiatives such as IDH or SBTi. To introduce TCA in retail companies and to establish it as a well-accepted tool in the market, almost all interviewees emphasise the need for cooperation between market actors, politics, and civil society. In addition, scientific actors are called upon to participate in developing a standardised methodology and improving the development of indicators and the availability of data. There are already several initiatives on the market that address the issue of TCA in the food and land use system, either in part or in its entirety.

The Dutch foundation IDH aims to realise sustainable trade in global value chains (cf. IDH 2022b). The IDH Salary Matrix provides a tool for establishing wage transparency along the supply chain and promotes the elimination of living wage disparities. As IDH is a foundation working with more than 600 companies, financial institutions, governments and civil society, the process involves sharing results, best practices, and user insights on how to reduce the wage gap over time (cf. IDH 2022a). In addition to the IDH Salary Matrix, the initiative published a series of reports on the true price of commodities such as tea from Kenya or cocoa from Côte d'Ivoire in 2016 (cf. True Price & IDH 2016, 9).

In 2021, Bayer AG initiated a decarbonisation programme for agriculture in Europe. The project aims to permanently reduce and offset CO<sub>2</sub> emissions in the agri-food value chain by establishing carbon farming. Currently, the company is working with 27 European farmers. For the application of climate-friendly methods, the farmers receive a payment per hectare of land. Companies from the entire value chain are involved in the project and new project partners are constantly being sought (cf. Bayer AG 2021).

The Futureproof Coffee Collective is a joint project between the CSR network organisation MVO Nederland, the NGO Solidaridad and twenty Dutch coffee SMEs. According to the initiative, farmers in the coffee sector are structurally underpaid and coffee roasters face low-profit margins, high costs and fierce competition. In addition, socio-environmental issues such as carbon emissions, water pollution, soil erosion, deforestation, child labour, and labour migration arise. The initiative aims to identify the true price of coffee and convince companies and consumers to pay this price (cf. MVO Nederland 2022).



Further initiatives and institutions working on the topic of TCA are TCI, TEEB, UK True Cost Accounting Working Group, Global Alliance for the Future of Food (GAFF), International Panel of Experts on Sustainable Food Systems (IPES) and the International Federation of Organic Agriculture Movements (IFOAM) (cf. BZfE 2019).

Food retail companies that are already members of one of these initiatives can use them to participate in existing projects on TCA or to initiate new ones. Memberships in certification organisations that do not yet deal with the issue of TCA but whose environmental and social standards are applied worldwide, such as GLOBALG.A.P., can also be used to initiate projects in this area. This applies analogously to industry associations.

### **Raising customer awareness**

To make customers aware of the environmental and social externalities in the food and land use system and the associated costs, food retailers should integrate the topic of TCA into their customer communications and make these costs visible to consumers.

TCA currently plays no role in the customer communication of food retail groups. According to the interviewees, the topic is not yet present among customers. As most of the respondents work in retail groups that operate in several European countries, they also emphasise the challenge of different national sustainability levels. The interviewees see TCA as a way to make environmental and social costs transparent for customers in an easily understandable way, as all external effects are summarised in a monetary indicator. Only one company has already made use of this and displayed the true costs of some food products on the shelf.

Even though the methodology of TCA is currently still under development and not all externalities can be monetised yet - for example, there is currently no data on the impact of pesticide and antibiotic use in agriculture - there is already information that can be well integrated into customer communication (cf. Michalke et al. 2020, 10). Thus, food retail companies could point out the advantage of organic products over conventionally produced ones, which have significantly higher external costs (cf. Michalke et al. 2020, 6 ff.). Moreover, the external costs determined in the PENNY study for conventionally and organically produced apples, bananas, potatoes, tomatoes, mozzarella, Gouda, and mixed meat are publicly available. These can thus also be used by other companies and displayed transparently on the shelf (cf. PENNY 2020c).

## **6.2.2 The role of politics in accelerating sustainable agriculture**

In the following, recommendations for action for political actors concerning environmental and social policy are presented. Due to the limitations of this work, these are not exhaustive.

### **Steering taxes and subsidies**

To promote food systems, practices and products that create environmental and social benefits and reduce those that cause environmental damage and promote exploitative practices, policymakers should introduce guiding taxes, levies, and subsidies.

The introduction of guiding taxes and levies and the diversion of harmful subsidies toward the promotion of regenerative agricultural practices are actively proposed by most respondents.

To implement taxes, levies, and subsidies with a steering effect, politics should analyse hot spots in global food supply chains and identify the most harmful practices. To provide a focus, the first step should be to conduct a study at the EU level to quantify the environmental and societal costs, including health costs, associated with the production and consumption of the most consumed foods on the EU market as stated in the Farm to Fork Strategy (cf. EC 2020). In Germany alone, for example, 11,5 billion euros in external costs are incurred through reactive nitrogen surpluses as a result of over-fertilised soils (cf. Gaugler & Michalke 2017, 157). The revenue from the taxes and levies collected can subsequently be used to finance subsidies to promote regenerative practices such as humus-enhancing measures that bind CO<sub>2</sub> in the soil. Moreover, companies that operate sustainably should receive tax incentives.

On the consumer side, politics could further create an incentive system by e.g., exempting healthy products from value-added tax.

### **Implementation of horizontal due diligence**

To oblige food retail companies to pay for socio-ecological costs along their entire food value chain and to reduce these costs in the long term, politics should establish the polluter pays principle by law. This approach is also called for by various study participants, as the polluter-pays principle is currently insufficiently applied in the area of agricultural supply chains.

To establish the polluter pays principle as a horizontal due diligence obligation at the EU level and to transfer it to the national laws of the member states, the principle should be included in the EU Corporate Sustainability Due Diligence Directive. Already in 2004, Directive 2004/35/EC “on environmental liability with regard to the prevention and remedying of environmental damage” (EU 2004) laid down a basis for the application of the polluter pays principle but did not make it a legal requirement (cf. EU 2004). However, only legislation creates a level playing field with equal requirements and conditions for companies to capture and reduce external costs of their supply chain. Within this framework, TCA should be recognised by politics as an appropriate method for calculating external costs and integrated into reporting requirements. Due to the global nature of food value chains, strengthening sustainability requirements in the food system of the EU should be accompanied by policies that contribute towards raising standards globally to avoid the export and externalisation of unsustainable practices.

### **Implementation of policy support measures**

To advance the scientific development of the TCA method and to promote its application in companies linked to the food and land use system, research and development projects, along with pilot schemes on TCA, should be initiated and financially supported by the political sector.

The respondents see a particular need for the promotion of scientific projects to improve the data situation, create a true-cost database and establish a uniform procedure for calculating true costs, including metrics and scope. Moreover, the respondents emphasise the politically supported development of a tool for the efficient calculation of true costs. This will provide the basis needed to compare the true costs of companies' food value chains.

To promote scientific projects on TCA in terms of generating data, defining relevant indicators, and developing a database and a tool, as well as analogously the implementation in practice,

various instruments are available to policymakers. At the European level, the Common Agricultural Policy (CAP) based on the EU Green Deal was adopted in 2021. Between 2021 and 2027, one-third of the EU budget planned for this period is allocated to measures for the sustainable development of EU agriculture (cf. EC 2021b). Scientific and practice-oriented projects on TCA should be included and funded herein. In Germany, funds are available for the promotion of scientific projects within the framework of the 'Federal Programme for Organic Farming and Other Forms of Sustainable Agriculture' (cf. BLE 2022a). Here, too, measures to capture the true costs in the food supply chain through TCA should be included. In addition, pilot, and demonstration projects for the political and scientific accompanied application of TCA in practice should be initiated and financially supported.

### **Political promotion and initiation of multi-stakeholder initiatives**

To promote the development and diffusion of TCA and to advance the sustainable transformation of the food and land use system, the political sector should initiate multi-stakeholder initiatives consisting of political actors working in environmental and social policy, companies representing all stages of the food value chain, representatives of industry associations as well as scientific actors related to TCA.

The interviewees emphasise the relevance of a politically supported exchange of relevant actors from business, science, and civil society, in which the stakeholders can also exchange practical experiences with TCA. Politicians emphasise that compliance with anti-trust law must be ensured. In addition, the respondents believe that global, multilateral exchange platforms should be created to involve the governments of the producing countries and to support the local producers by building up knowledge about sustainability in cultivation.

The need for true pricing of food is embedded in the EU Farm to Fork Strategy (cf. EC 2021c). To facilitate the exchange between relevant stakeholders from science, politics, NGOs and the food value chain, the EU should create an information and exchange platform. Here, the governments of producing countries should also be involved to raise the issue of taxing negative environmental and social impacts in these countries as well.

The interactive dialogue platform of the German Federal Agency for Agriculture and Food (BLE), which organises regular events on topics related to sustainable food systems and apart from lectures also offers room for exchange and discussions, could serve as a model. In March 2021, the BLE organised an online event on how TCA can be implemented in practice. Via the platform, actors from the agricultural and food sector, science, administration, and civil society have the opportunity to network directly and jointly develop solutions for sustainable food systems in Germany, also against the backdrop of global challenges. The results feed into the German government's political work on the 2030 Agenda and the achievement of the 17 SDGs as well as the UN World Summit on Food Systems (UN FSS) (cf. BLE 2022b).

In addition, the Federal Ministry of Food and Agriculture organised a non-public multi-stakeholder exchange on TCA in 2021 as part of the German Recovery and Resilience Plan (DARP) and is currently working with actors from science and practice on whether and how the development of fair prices and sustainability in the food and land-use system can be supported by digital technologies (cf. Täuber, 2021).

## 7 CONCLUSION AND OUTLOOK

According to recent figures, the food and land use sector generates twelve per cent of global GDP and employs forty per cent of the global working population (cf. World Economic Forum 2022). While the sector is dependent on ecosystem services, unsustainable farming practices along food value chains simultaneously threaten biodiversity, critical ecosystems, human health and nutrition, and the livelihoods of billions of people. However, neither our current economic system nor the business management processes applied in companies currently include a mechanism to account for the socio-economic externalities generated by business practices.

At the same time, the relevance of sustainable organisational development is increasing, also driven by political developments such as the EU Green Deal and the Farm to Fork strategy. Hence, concepts such as Ecological Economics and Stakeholder Capitalism are increasingly gaining importance and are driving organisational change processes, including in companies in the food and land use system. Consequently, companies are increasingly seeking to capture their environmental, economic, and social sustainability performance. In the context of this development, True Cost Accounting, a systems-based approach for assessing the sustainability performance of companies, has emerged. In contrast to existing accounting approaches, TCA can be used to record not only economic and social costs but also human and health costs, enabling a full consideration and assessment of corporate sustainability performance.

To answer the research question underlying this thesis, to what extent the True Cost Accounting method is suitable as an approach for considering positive and negative externalities in business decisions in the food and land use system, the topic was examined from different angles. This thesis aimed at developing recommendations for action for European food retail groups and policymakers with regard to environmental and social policy on TCA. To achieve this goal, in addition to the theoretical analysis, a qualitative study was conducted through interviews with sustainability managers from leading European food retail companies, experts from the field of sustainable finance and policymakers related to the food and land use system.

From a theoretical perspective, numerous scientific publications call for the true costs of the production of agricultural products for the environment, climate, human health, and animal welfare to be made visible and integrated into the product price (cf. IRP 2021; Gemmill-Herren 2021; WBGU 2020, 201; Lóránt & Allen 2019). By recording all costs of the food value chain, food retail groups in particular, which due to their interface function and their high market power influence the food value chain to a high degree, receive a decision-making aid for the more sustainable orientation of their product range policy for agricultural products. Furthermore, the identification of positive and negative externalities can help these companies to identify critical hotspots in their supply chains (cf. Bandel et al. 2021, 209). Understanding the links between business, the environment and society can therefore lead to better and more timely decision-making (cf. Natural Capital Coalition 2016, 5). In addition, from a consumer perspective, the integration of negative and positive externalities into the product price of agricultural products can also influence consumer behaviour, as conventionally produced goods would become more expensive, while more sustainably produced ones could be offered at a lower price (cf. WBGU 2020, 201 f.; Lóránt & Allen 2019, 36). This result was also confirmed by the True Cost

Project of the German food discounter PENNY, in which the true price for ten agricultural products was displayed next to the actual sales price on the shelf.

However, while from a theoretical point of view TCA has a high potential for the sustainable alignment of value chains in the food and land use system, the field experts interviewed see some challenges in integrating the methodology into business processes. Due to the current focus on prices, margins, and competition, especially the representatives of European food retail groups interviewed in the context of this study believe that an internalisation of external effects using TCA carries the risk of a decline in sales and profits as well as customer migration. At the same time, almost all respondents agree that the method has a high potential to reflect the growing demands from a social, political, and also financial perspective for a more sustainable orientation of the food value chain, also with regard to the Supply Chain Act. In this context, the respondents regard policymakers as responsible for creating a level playing field through the mandatory application of TCA in food retail companies, for applying the polluter-pays principle to the entire value chain through legislative measures, and for supporting the scientific community in the development of suitable indicators and a TCA database.

Even though a comprehensive calculation of the true costs is currently not easily possible for companies in their day-to-day business due to the lack of standardised methods, data, and indicators, adapting corporate policies and strategies to the changing environmental and social challenges, increasing transparency in the supply chain, and introducing sustainable supplier management are the first steps to actively reducing sustainability risks and lowering external costs in the food value chain in the long term. Moreover, various political, social, and private-sector initiatives are already dedicated to the topic of TCA.

This study has shown that the greatest need for research is in the areas of data availability, measurement, and metrics. To be able to apply TCA in business practice, I also recommended developing a tool for the product-specific determination of true costs, taking into account the production conditions as well as the product origin. Existing tools such as the IDH Salary Matrix can be used as a basis. Besides, this study is limited to the question of whether the TCA methodology is suitable for the accounting of positive and negative externalities in companies of the food and land use system with a focus on European food retail companies. I have confirmed this on a theoretical level and demonstrated the relevance of quantifying and monetising external costs in the food value chain to capture the sustainability performance of companies. Further studies are needed on how exactly the methodology can be applied in companies and which economic and social consequences may result from this.

Given the increasing relevance of corporate due diligence and the associated sustainable orientation of supply chains, which is also underlined by political measures at national and European levels, it is likely that knowledge on the negative external effects of corporate practices will be demanded in the future both by politics and society. TCA offers a suitable approach in this regard. Early engagement with the methodology enables companies to initiate and actively manage change processes at an early stage. This results in the potential for food retail companies to already realign value chains more sustainably, especially for risk raw materials and products, to implement positive external effects through targeted measures, sensitise customers to the topic, promote more sustainable products and thus differentiate against competitors.

## 8 CRITICAL REFLECTION OF THE THESIS

I first became aware of TCA through my second supervisor Bertram Kloss. Bertram works at SYSTEMIQ Ltd., a consultancy specialising in sustainable system change, where he oversees, among other things, a project on land use change. After Bertram suggested that I write my master thesis on TCA in the context of the food and land use system, I did some research. It quickly became clear to me that this should be the topic of my thesis. On the one hand, from the beginning, I had the goal to create added value with my master thesis beyond my MBA degree. On the other hand, as a project manager for sustainable products at REWE Group in Germany, I have several relevant contacts in European food retailing. In addition, as an employee of the group, I was given access to the documents of the PENNY True Cost project, which were not all publicly available at the time and were ideal as a case study for my work.

Together with my two reviewers, I decided to use the research method of qualitative expert interviews for my thesis including not only experts in CSR management of European food retail companies but also people from the field of sustainable finance and national as well as EU politicians related to environmental and social policy to get a broader perspective on the topic.

Besides starting the writing process, I focused on finding potential interview partners from the beginning. Besides activating contacts, I started contacting potential interview partners via LinkedIn. I assumed that I would find ten interview partners rather quickly using my contacts. Instead, I mostly got no response even after several attempts at contact, which I found frustrating. Given the fact that the number of possible interview partners is limited due to the high concentration of the food market and that me working at REWE could act as a deterrent, I was afraid of not finding enough interview partners. During this process, I have learned that patience and persistence pay off and that short enquiries are more likely to bring a response than a detailed description of the background to my enquiry. Out of 39 people I contacted, I ended up getting an interview commitment from eleven, which in retrospect I consider a success.

I started the writing process by creating an outline of my thesis, as a structured approach is very important to me for academic work. However, in the beginning, it was difficult for me to identify and structure the theoretical foundations relevant to the research question. This led to me taking up topics in detail that were only relevant to a limited extent. The regular exchange with my reviewers, their feedback on my theoretical explanations and an intensive literature study helped me to develop a common thread for my work, based on which I restructured the theoretical foundations and completely revised them in the course of the writing process.

In summary, I was not able to keep to the project plan I had drawn up at the beginning of the planning of my thesis. This was mainly due to the evaluation process of the interviews being very extensive, the revision of the theory part taking up some time and the fact that I was tied up in professional projects parallel to the writing process. Given that there were four months between my planned submission and the official deadline, I adjusted my schedule accordingly. For, in the end, it was more important to me to produce high-quality work to provide to Bertram for his project and to my interview partners who expressed great interest in it.

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**APPENDIX**

Appendix A Interview Guide A – Food Retail Companies.....XVII

Appendix B Interview Guide B – Sustainable Finance.....XIX

Appendix C Interview Guide C – Politics.....XXI

Appendix D Category System.....XXIII

## **APPENDIX A – INTERVIEW GUIDE A – FOOD RETAIL COMPANIES**

### **1. Interviewer Introduction (Name, Age, Function)**

My name is Ribanna Jansen. I am a student at Leuphana University in Lüneburg on the MBA Sustainability Management course and work as a sustainability manager at toom Baumarkt GmbH.

### **2. Acknowledgement of the interviewee**

First of all, I would like to thank you very much for supporting me with my master's thesis and for taking the time to do so.

### **3. Note on the research objective**

In the context of my master's thesis, I am dealing with the method of True Cost Accounting. True Cost Accounting is a method for recording and evaluating all external impacts (ecological and social) of the food value chain. The aim of my master thesis is to find out to what extent the approach is already known in European food trading companies, in politics and in the financial sector and how it may support a sustainable transformation of the food and land-use system in the future.

### **4. Information on the anonymous treatment of the data**

The audio data of this interview will be recorded, transcribed, anonymised, and aggregated. The results will be processed as part of my master's thesis in the MBA Sustainability Management programme at Leuphana University Lüneburg. The recordings will be deleted from all other end devices after completion of the master's thesis.

### **5. Consent of the interview partner + possibility for open questions**

Do you agree that I record our interview for evaluation purposes? I can assure you that anonymity will be maintained and that it will not be possible to draw any conclusions about you. You are free not to answer any question you do not wish to and to end the interview at any point.

Do you have any unanswered questions before the interview begins? If so, you are welcome to ask them now.

I will now start the recording.



**Question block 1: Introduction**

- 1.1 In my work I deal with the method of true cost accounting, hence full cost accounting for food. Can tell me what you know about true cost accounting, please.

**Question block 2: True Cost Accounting in food retail companies**

- 2.1 How do you assess your company's sustainability efforts regarding the supply chain of agricultural products at the moment?
- 2.2 Where and to what extent can external effects, i.e. environmental and social costs, arise in your company's food supply chain and how are these currently taken into account in your company?
- a. Costs are considered
- Which method do you use to calculate externalities in your food supply chain? (if TCA, continue with 2.4)
- b. Costs are **not** considered
- In your opinion, what are the reasons that externalities in the food value chain are currently not captured in your company?
- 2.3 What advantages do you see for your company in knowing the external environmental and social costs of your supply chain and, in your view, are there also disadvantages that this knowledge brings with it?
- 2.4 How could the knowledge about positive and negative externalities of your business activities influence the procurement of agricultural products in your company and how could this knowledge also affect the value of your company's capital assets?
- 2.5 How important do you assess the consideration of external costs for the more sustainable orientation of your supply chain for agricultural products now and in the years to come?

**Question block 3: Market and political framework conditions**

- 3.1 In your opinion, which market and political framework conditions would have to change from a business perspective for the true cost accounting method to be applied in food retail companies?

Thank you for all this valuable information, is there anything else you would like to add before we stop recording? [Stop recording]

Thank you very much for participating in my interview. If you would like, I will send you a write-up of the results after the study is finished. Are there any other people in your network you think I should talk to?

## **APPENDIX B – INTERVIEW GUIDE B – SUSTAINABLE FINANCE**

### **1. Interviewer Introduction (Name, Age, Function)**

My name is Ribanna Jansen. I am a student at Leuphana University in Lüneburg on the MBA Sustainability Management course and work as a sustainability manager at toom Baumarkt GmbH.

### **2. Acknowledgement of the interviewee**

First of all, I would like to thank you very much for supporting me with my master's thesis and for taking the time to do so.

### **3. Note on the research objective**

In the context of my master's thesis, I am dealing with the method of True Cost Accounting. True Cost Accounting is a method for recording and evaluating all external impacts (ecological and social) of the food value chain. The aim of my master thesis is to find out to what extent the approach is already known in European food trading companies, in politics and in the financial sector and how it can support a sustainable transformation of the food and land-use system in the future.

### **4. Information on the anonymous treatment of the data**

The audio data of this interview will be recorded, transcribed, anonymised, and aggregated. The results will be processed as part of my master's thesis in the MBA Sustainability Management programme at Leuphana University Lüneburg. The recordings will be deleted from all other end devices after completion of the master's thesis.

### **5. Consent of the interview partner + possibility for open questions**

Do you agree that I record our interview for evaluation purposes? I can assure you that anonymity will be maintained and that it will not be possible to draw any conclusions about you. You are free not to answer any question you do not wish to and to end the interview at any point.

Do you have any unanswered questions before the interview begins? If so, you are welcome to ask them now.

I will now start the recording.

**Question block 1: Introduction**

- 1.1 In my work I deal with the method of true cost accounting, hence full cost accounting for food. Can tell me what you know about true cost accounting, please?

**Question block 2: True Cost Accounting in food retail companies**

- 2.1 How do you assess the sustainability efforts of food retail companies regarding the supply chain of agricultural products from at the moment?
- 2.2 Where and to what extent can external effects, i.e., environmental, and social costs, arise in the food supply chain of food trading companies and how do you think they are currently considered in food trading companies?

- a. Costs are **not** considered

In your opinion, what are the reasons that external effects of the food value chain are currently not captured in food retail companies?

- 2.3 From a financial point of view, what advantages do you see in food retail companies knowing the external environmental and social costs of their supply chain and, are there also disadvantages that this knowledge brings for the companies?
- 2.4 How could knowledge about positive and negative externalities in the food value chain of food retail companies influence the procurement of agricultural products from a financial perspective, also regarding the value of the capital assets of these companies?
- 2.5 How important do you assess the consideration of external costs for the more sustainable orientation of the agricultural supply chain of food retail companies from a financial perspective now and in the years to come?

**Question block 3: Market and political framework conditions**

- 3.1 In your opinion, which market and political framework conditions would have to change from a financial perspective for the true cost accounting method to be applied in food retail companies?

Thank you for all this valuable information, is there anything else you would like to add before we stop recording? [Stop recording]

Thank you very much for participating in my interview. If you would like, I will send you a write-up of the results after the study is finished. Are there any other people in your network you think I should talk to?

## **APPENDIX C – INTERVIEW GUIDE C – POLITICS**

### **1. Interviewer Introduction (Name, Age, Function)**

My name is Ribanna Jansen. I am a student at Leuphana University in Lüneburg on the MBA Sustainability Management course and work as a sustainability manager at toom Baumarkt GmbH.

### **2. Acknowledgement of the interviewee**

First, I would like to thank you very much for supporting me with my master's thesis and for taking the time to do so.

### **3. Note on the research objective**

In the context of my master's thesis, I am dealing with the method of True Cost Accounting. True Cost Accounting is a method for recording and evaluating all external impacts (ecological and social) of the food value chain. The aim of my master thesis is to find out to what extent the approach is already known in European food trading companies, in politics and in the financial sector and how it can support a sustainable transformation of the food and land-use system in the future.

### **4. Information on the anonymous treatment of the data**

The audio data of this interview will be recorded, transcribed, anonymised, and aggregated. The results will be processed as part of my master's thesis in the MBA Sustainability Management programme at Leuphana University Lüneburg. The recordings will be deleted from all other end devices after completion of the master's thesis.

### **5. Consent of the interview partner + possibility for open questions**

Do you agree that I record our interview for evaluation purposes? I can assure you that anonymity will be maintained and that it will not be possible to draw any conclusions about you. You are free not to answer any question you do not wish to and to end the interview at any point.

Do you have any unanswered questions before the interview begins? If so, you are welcome to ask them now.

I will now start the recording.

**Question block 1: Introduction**

- 1.1 In my work I deal with the method of true cost accounting, hence full cost accounting for food. Can tell me what you know about true cost accounting, please?

**Question block 2: True Cost Accounting in food retail companies**

- 2.1 How do you assess the sustainability efforts of food retail companies regarding the supply chain of agricultural products from a political perspective at the moment?
- 2.2 Where and to what extent can external effects, i.e., environmental, and social costs, arise in the food supply chain of food retail companies and how do you think they are currently considered in food retail companies?

a. Costs are **not** considered

In your opinion, what are the reasons that external effects of the food value chain are currently not captured in food retail companies?

- 2.3 From a political point of view, what advantages do you see in food trading companies knowing the external environmental and social costs of their supply chain and are there also disadvantages that this knowledge brings for the companies from a political perspective?
- 2.4 How could knowledge about positive and negative externalities in the food value chain of food retail companies influence the procurement of agricultural products from a political perspective, also regarding the value of the capital assets of these companies?
- 2.5 How important do you assess the consideration of external costs for the more sustainable orientation of the agricultural supply chain of food retail companies from a political perspective now and in the years to come?

**Question block 3: Market and political framework conditions**

- 3.1 In your opinion, which market and political framework conditions would have to change from a political perspective for the true cost accounting method to be applied in food retail companies?

Thank you for all this valuable information, is there anything else you would like to add before we stop recording? [Stop recording]

Thank you very much for participating in my interview. If you would like, I will send you a write-up of the results after we have finished.

Are there any other people in your network you think I should talk to?

## APPENDIX D – CATEGORY SYSTEM

Category	Category description	Category definition	Prime example	Coding rule	Subcategories/ Sub-Subcategories
<b>MC 1</b>	Socio-economical context	The external environment of an organisation that directly or indirectly affects the performance, results, and strategy of an organisation, e.g., the current market, legislation, research projects, natural ecological processes, customer demand	“In Germany, we now have the Act on Corporate Due Diligence Obligations for the Prevention of Human Rights Violations in Supply Chains, which is not particularly far-reaching, but it is a first door-opener to say to the business community, "Watch out, there are things you have to comply with". It also leads to reporting obligations and such, which in turn lead to more transparency and that companies deal with this at all.”	Includes political and financial stakeholders' assessment of current sustainability efforts by food retail companies.	<ul style="list-style-type: none"> <li>• Natural conditions</li> <li>• Current market</li> <li>• Legislation</li> </ul>
<b>MC 2</b>	Organisational context	Statements regarding elements of the organisational context: strategy, structure, people, and culture.	“This means that the price pressure is enormously high. If these external costs are known and we assume that we have to pay them, always. Then I can imagine that a company like us would say:	Also includes external effects of the company's current strategy, structure, and culture on its environment	<ul style="list-style-type: none"> <li>• Current sustainability efforts</li> <li>• Organisational structure</li> <li>• Effects of business activity</li> </ul>

			"Hey, okay, then we'll look for a cheaper product that has a lower base price in order to ultimately achieve lower overall costs."	e.g., external effects of the food value chain  Includes political and financial stakeholders' assessment of current sustainability efforts by food retail companies.	<ul style="list-style-type: none"> <li>• Stakeholder's assessment of sustainability efforts of food retailers</li> <li>• Business strategy</li> </ul>
<b>MC 3</b>	Change object	All change objects in the company that are affected by the application of TCA, e.g., procurement process, procurement costs, food value chain, supply chains, communication to stakeholders.	"I would say that if you really monetised the negative externalities, then it would be a great simplification for such cost-benefit analyses to decide what you want to do. I think that would have an influence on procurement."		<ul style="list-style-type: none"> <li>• Procurement process</li> <li>• Business model</li> <li>• Communication to stakeholders</li> </ul>
<b>MC 4</b>	Change system element	All general statements on TCA as well as statements regarding basic knowledge and experience	"[...] you can calculate and apply true cost accounting on an economic level, although from my point of view this has not yet been developed properly. [...] Then there is the business level. So, you can say we apply true cost accounting at the level of a	Also includes ideas for further development of the TCA approach	<ul style="list-style-type: none"> <li>• Attributes</li> <li>• Further development of the TCA approach</li> <li>• Knowledge and experience</li> </ul>

			company and you can say come on, let's break it down to a product.”		
<b>SC 4.1</b>	Relevance	Relevance of applying TCA and knowing external costs for current and future business activities	“And of course, it is a method, an important method, to look at how we can put this on an economic basis by mapping the costs that are not currently mapped in the system.”		<ul style="list-style-type: none"> <li>• High relevance</li> <li>• Scepticism</li> <li>• No relevance of TCA</li> </ul>
<b>SC 4.2</b>	Opportunities and advantages	Opportunities and benefits of the application of TCA as seen by the interviewees.	“So if you monetise all of that and put it into one figure, then you have comparability and that is the charm of True Cost.”		<ul style="list-style-type: none"> <li>• Comparability</li> <li>• Transparency</li> <li>• Economic basis for sustainable agriculture</li> <li>• Sustainability assessment</li> <li>• Awareness</li> <li>• Identification and prioritisation of hotspots</li> <li>• Risk reduction</li> </ul>



<b>SC 4.3</b>	Challenges and drawbacks	Challenges and disadvantages of the application of TCA as seen by the interviewees.	“The application of TCA is very time-consuming, as individual for the value chain”		<ul style="list-style-type: none"> <li>• Effort</li> <li>• Limitations</li> </ul>
<b>MC 5</b>	Organisational effects	Influence and consequences of the change process regarding TCA and the food system transformation on food retail companies.	“And of course, apart from that, it's also a resource issue, which also has to be said, you have to put people like me or sustainability departments in charge of quality managers who go into depth. So, you already have to build up personnel who look at it closely. If you have certificates and (inc.) third-party confirmations, that's not enough.”		<ul style="list-style-type: none"> <li>• Price increase</li> <li>• Rising operational costs</li> <li>• Need to act</li> <li>• Stable supply chains</li> </ul>
<b>MC 6</b>	Individual effects	Influence and consequences of the change process regarding TCA and the food system transformation on individuals or society	“But I would say the impact on the supply chain actors would be very very very very high. So, I think the problems we have today we wouldn't have anymore because of this compensation of these costs.”		<ul style="list-style-type: none"> <li>• Social impact</li> <li>• Stakeholder Resistance</li> </ul>
<b>MC 7</b>	External effects	External factors that have direct, possibly also unintended consequences for	“And I think the fear is that we would lose sales if we were to price in these costs of a social-		<ul style="list-style-type: none"> <li>• Turnover loss</li> <li>• Customer mitigation</li> </ul>

		the organisation e.g., consumer behaviour	ecological nature. Because everyone knows that it is obvious that the product will become more expensive.”		<ul style="list-style-type: none"> <li>• Reputational risks</li> </ul>
<b>MC 8</b>	New market	Market changes and development of a new market with regard to the relevance of sustainability and TCA	“The path of sustainability is that the standard that still applies today, i.e., where something is still considered sustainable today, may no longer be sustainable in ten years' time, but will simply be taken for granted.”		<ul style="list-style-type: none"> <li>• Trends</li> <li>• Transparency increase</li> <li>• Cooperation between political and market actors</li> <li>• Customer</li> <li>• Fair prices</li> <li>• Finance</li> <li>• System change</li> </ul>
<b>SC 8.1</b>	Political conditions	Political conditions necessary for the application of TCA in food retail companies	“On the one hand, we need a different kind of reporting, mandatory reporting. On the other hand, we also need an internalisation of external effects that is appropriate to the causes. So, I need a levy on pesticides, I need a levy on fertiliser, I need a reasonable CO <sub>2</sub> price that really internalises		<ul style="list-style-type: none"> <li>• Legislative measures</li> <li>• Tools</li> </ul>

			the damage costs and then also changes behaviour.”		
<b>SC 8.2</b>	Market economy conditions	Market conditions necessary for the application of TCA in food retail companies	“I could say that the profit-centredness of companies has to give way to not limiting themselves to financial capital, but / We always call it a multi-capitalism approach, a multi-capitalism, where I also focus on other values such as environmental values or human values.”		