Sustainable global agrifood supply chains – exploring the barriers

Journal of Industrial Ecology

DOI: 10.1111/jiec.12440

http://onlinelibrary.wiley.com/doi/10.1111/jiec.12440/abstract

Summary

The article investigates the factors that make businesses postpone integrating the performance dimension of sustainability in global agrifood supply chains. Based on literature-based conceptual reasoning, the article conceptualizes a double company lens distinguishing between substantial supply chain management and mere public relations endeavors as a major obstacle for businesses pursuing comprehensive supply chain performance in global agrifood chains. We point out that many supply chain performance attributes represent in fact credence attributes that cannot be verified by the consumer, hence entailing an information asymmetry between the company and its consumers. Rational business responses to this situation tend to focus on symbolic actions and communication efforts by means of sustainability reports and other brand-enhancing marketing tools that may be decoupled from substantial operations and supply chain improvements. The research propositions developed have partly been corroborated by a content analysis of annual and sustainability reports of four major agrifood companies (Nestlé, PepsiCo, Unilever, Mondelez International). The conceptual arguments and empirical analysis presented in the article may serve as the basis for managers and academics to develop innovative inter- and intra-organizational business processes that reconcile tradeoffs between various agrifood supply chain performance dimensions, thus pushing the performance frontier outwards; and that provide the necessary transparency for overcoming the currently adverse setting of incentives inherent in the food production, processing, retailing, and consumption system.

Keywords

Supply chain management, global agrifood chains, sustainability, multi-dimensional performance, information asymmetry.

<heading level 1> Introduction

The constant increase in the world population together with the rising buying power of consumers has led to an increasing and differentiating demand for food products, in fresh and processed form (Duchin 2008). Despite persisting protectionist tendencies in European and Northern American domestic agricultural markets, food production and processing have encountered the globalization trend similar to many other industry sectors such as electronic equipment and textiles. Furthermore, after the 2009 crises agricultural area in particular in Africa and Latin America has increasingly become the target of financial investors, and speculation with agricultural products has been intensified. This globalization trend has been driven for the last few decades by largely facilitated international trade through the lowering of tariffs and protective subsidies (Trienekens 2011). In Europe, employment in agriculture has been constantly declining for the last decade: in Germany, for example, from 2.8% in 1980 to 0.9% of total working age population in 2012, and in France from 5.6% in 1980 to 1.5% of total working age population in 2012 (BLS 2013). In contrast, in developing countries the ratio of agriculture in total employment is around 50% and in Sub-Saharan Africa even 60% (Meijerink and Roza 2007), which demonstrates the outstanding importance of agricultural production for societal prosperity and welfare in those countries.

When framing agrifood chains, two principal types can be distinguished: (1) agrifood chains for fresh products that leave raw produce untouched and (2) agrifood chains for processed food products that add value by conserving, portioning, and further processing (Van der Vorst 2000). In general, agrifood chains have typical features such as perishability, long production cycles, seasonality, uncertainties on the supply (e.g., plant diseases) and demand side (e.g., food scandals with respective psychological effects in case of media coverage), and variability in quality and quantity of supply (Van der Vorst 2000). Regarding global agrifood chains specifically, further characteristics may be added such as consumers'

growing criticism of the globalization of food production, although this is limited to highly aware consumers in sensitized industrialized countries; further, variability in transportation costs contingent on the volatility of fuel prices; or unstable political environments that impact prices, as exemplified by the cocoa price rise during the political crisis in the Ivory Coast (Constant and Tien 2011).

When food products are passed along global supply chains from developing countries to end consumer markets in industrialized nations, the products transit zones with strongly different economic and socio-cultural conditions. Trienekens (2011) stated that these supply chains are largely characterized by asymmetric power relations in favor of Western retailers and industries that adversely affect the distribution equity of risks and rewards along the supply chain (see also Touboulic et al. 2014). The activities that add the most value are often kept in Western countries (Trienekens 2011), as is the case for roasting in the coffee chain. Even for fair-trade coffee, the roaster and importer capture the large share of value added. In the Nicaraguan case investigated by Johannessen and Wilhite (2010) importer and roaster of fair-trade coffee beans earn around 60% of the retail value, whereas the producer at the farm receives merely 13% of sales revenue. This situation is not restricted to developing countries, since even in Europe and the United States the primary producers and employees receive only a small fraction of the whole pie of sales revenue. There is evidence that based on the pressure on agrifood chains, in particular for processed food products, to compete on low prices, working conditions and salaries are decreasing dramatically within the whole supply chain even in developed countries (Maloni and Brown 2006; ARD 2013). Furthermore, the literature emphasizes the particular challenges of smallholder farmers in accessing these global chains at all because of market restrictions (e.g., by specific quality and safety requirements as for instance postulated by labeling schemes), deficient infrastructures (e.g., for physical distribution and communication), lack of resources (e.g., knowledge, technology,

workforce), and institutional voids particularly regarding regulative institutions such as government legislation and policies (Trienekens 2011; Silvestre 2015).

Although supply chain management (SCM) points to the perspective of seeing the whole supply chain as one system (Mentzer et al. 2001), the currently prevalent discussions on how to improve the position of agrifood actors from developing countries—so-called upgrading—is centered on single actors and often takes the direction of "empowerment" from development politics terminology. Principally, supply chains can be upgraded (1) by adding market value through novel products, processes, and product functions, (2) by finding markets valuing and paying for these aspects, and (3) by vertical and horizontal organizational arrangements that ensure a fair share of the price received from the consumer (Trienekens 2011). For example, fair trade-labeled products, based on the standards developed by the Fairtrade Labelling Organizations International, use all three of these upgrading options, offering ethically benign products for sensitized consumers in the industrialized world, while engaging in close horizontal and vertical interaction within the supply chain and with the labeling organization. One major shortcoming of these initiatives, however, is the restricted market outlet. Despite the growing sustainability communication, particularly of food processors and retailers in sensitized industrialized countries, comprehensive performance dimensions have not been thoroughly integrated on the—mainstream—business side. Moreover, even if agrifood firms are determined to proactively make their chains sustainable, the firms do not know how. Focal firms in supply chains often content themselves with ensuring minimum requirements that are supposed to prevent reputational risks due to stakeholder campaigns and respective adverse consumer reactions (Wolf 2014)—for notable exceptions see for example the Base of the Pyramid food projects presented by Gold et al. (2013). Existing international standards either aim for ensuring such minimum standards (e.g., GlobalGAP, developed by European supermarket chains and their major suppliers) or those standards focus on food quality and safety issues (e.g., codex alimentarius, established by the

Food and Agriculture Organization of the United Nations and the World Health Organization). Müller et al. (2009) note that these agrifood standards reflect stakeholder concerns in the northern hemisphere which are sometimes largely detached from realities on the ground in developing and emerging countries (see also Lund-Thomsen and Lindgreen 2014). In any case, it may be concluded that in-depth knowledge of workable methods for creating supply chain wide understanding and practice of sustainability and of existing pitfalls on this way is lacking. The extant article aims at furthering understanding regarding this issue by asking the following research question: What incentives undermine striving for comprehensive supply chain performance in global agrifood chains?

The article is structured as follows. First, we propose an example of dimensions and indicators of comprehensive agrifood supply chain performance. Subsequently, we elaborate on the current situation of adverse incentive setting that makes companies delay integrating sustainability and other performance dimensions in global agrifood supply chains. Then we derive two research propositions, of which one is corroborated by a qualitative content analysis of annual reports and sustainability reports of four major food production companies. We discuss the contribution of our study and conclude the article by pointing to its limitations and to directions for future research.

<heading level 1> Agrifood supply chain performance

Companies are realizing the importance of defining organizational and supply chain performance in a comprehensive way; the agrifood sector has not been left out (Heikkurinen and Forsman-Hugg 2011). Bigliardi and Bottani (2010) predict that designing and operating food supply chains will be subject to more stringent regulation and closer monitoring. This is also due to the specificities that set agrifood supply chains apart from other types of supply chains, for example, shelf life constraints and perishability of products, long throughput times, and seasonality in production (Aramyan 2007). Together with the outstanding relevance and

materiality (GRI 2013) of social and environmental issues within the agrifood sector of emerging and developing countries (cf. Müller et al. 2009), these specificities make it necessary to adapt performance dimensions and indicators to specific conditions of global agrifood chains.

Aramyan (2007) proposed four main categories of performance dimensions, namely efficiency, flexibility, responsiveness, and food quality. Her performance model has been widely used (e.g., Bourlakis et al. 2014) and is well adapted to agrifood chains as it captures specific food quality characteristics. Furthermore, it uses financial and non-financial indicators, as recommended by Gunasekaran et al. (2004) and Shepherd and Günter (2006). Borrowing from Aramyan's (2007) model (see also Aramyan et al. 2007), we conceive supply chain performance in global agrifood chains along the categories of *Responsiveness & agility*, *Cost & efficiency*, and *Food quality*. In addition, a category covering the wide range of complementary critical aspects reflecting the social and environmental dimension of *Sustainability* is added (Varsai et al. 2014). Referring to Preuss' (2009) research on ethical sourcing and Jansa's et al. (2010) study on long-term sustainability of global food production, we specify the dimension of *Sustainability* by the indicators local living conditions, labor rights, land rights, food security, end-of-life valorization through biomass recycling, and environmental issues. The indicators listed here exemplify the different performance dimensions rather than covering the whole range of their content. Table 1 summarizes dimensions and indicators that we suggest to be included in a holistic agrifood supply chain performance model. In the following, we will use this model for explaining the factors that make businesses postpone integrating the performance dimension of sustainability in global agrifood supply chains. It needs to be noted that this conceptualization is not unanimously shared among scholars in the field; for instance, Manzini and Accorsi (2013) see food safety as distinct from quality, sustainability and efficiency.

Table 1: Sketching dimensions and indicators of agrifood supply chain performance

Responsiveness & agility	**Cost & efficiency**	**Food quality**	**Sustainability**
- Customer response time - Dependability - Speed - Specification to customer demands	- Cost - Return on investment - Inventory efficiency - Transport efficiency	- Sensory qualities - Taste - Nutritional value - Absence of health risks - Type of processing - Ingredients - Toxins	- Local living conditions - Labor rights - Land rights - Food security - End-of-life valorization through reverse logistics (energy, nutrients, etc.) - Other environmental issues (e.g., energy consumption)

<heading level 1> Firm-internal incentives undermining consistent striving for comprehensive supply chain performance

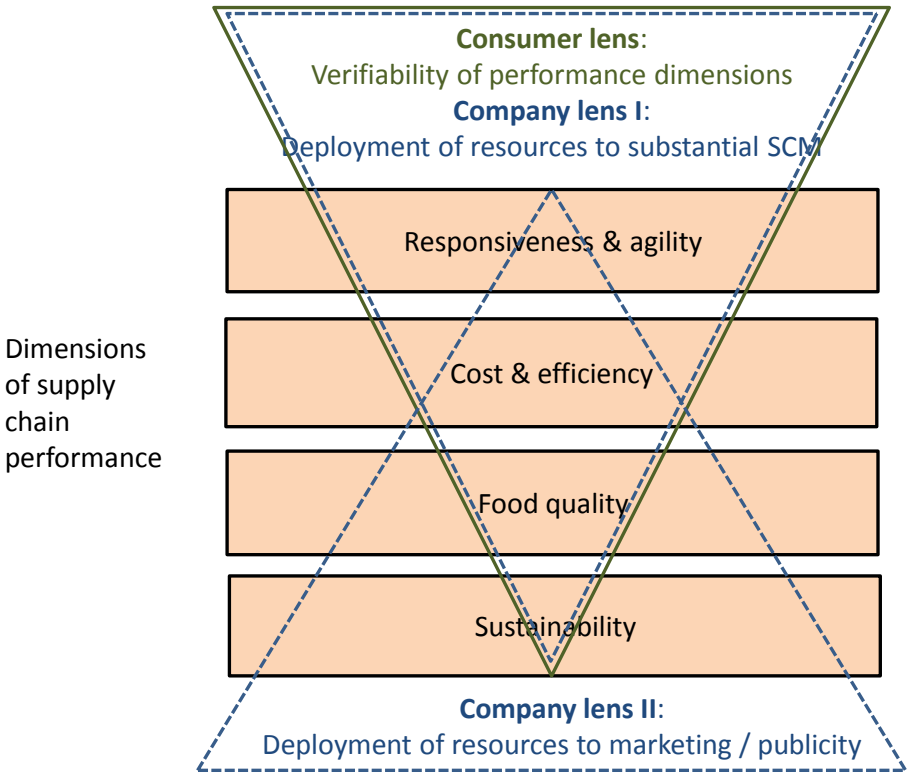
The question arises which factors may impede companies pursuing equally all four dimensions of agrifood supply chain performance and, in particular, what barriers possibly obstruct sustainability performance. Similarly, de Brito and van der Laan (2011) have asked why firms have procrastinated regarding implementing sustainability in mainstream SCM research. In answering this question, de Brito and van der Laan (2011) point to the complexity of holistic sustainability considerations and the conflicting nature of sustainability and operational/financial performance parameters. Let us ask the same question while focusing not on the integration of sustainability in SCM research but in business practices of supply chains, and more specifically, global agrifood supply chains. Responding to this question, one may find important insights when examining the link between the supply chain and the consumer. Regarding the supply chain-consumer interface, many supply chain performance attributes turn out to be in fact credence attributes (Balineau and Dufeu 2010) according to marketing theory. This means that they cannot be verified by the consumer either at the point

of sale or after consumption, thus falling in the realm of publicity/marketing. The consumer can access information about *Responsiveness & agility* (i.e., is the food product available when I need it?) and *Cost & efficiency* (i.e., what does the food product cost; is this price a "fair" price for me as consumer?) rather broadly and easily at the point of sale, usually the supermarket. However, issues of *Food quality* (i.e., what are the attributes of the product itself?) and *Sustainability* (i.e., what is the social and environmental impact during the food item's production, distribution and consumption?) are increasingly difficult to grasp for the consumer (Dingwirth and Eichinger 2010). Rational business responses to this situation tend to focus on merely symbolic action and communication efforts by means of sustainability reports and other brand-enhancing marketing tools that are often and easily decoupled from substantial operations and supply chain improvements (Milne et al. 2009; Boiral 2013). Brown and Fraser (2006) underline that sustainability communication predominantly serve the business case, which means that it is seen as a corporate instrument for enhancing reputation, attracting capital as well as talent, etc. Cooper and Owen (2007) conclude that corporate reporting is quite ineffective since the "administrative (reporting) reform is viewed in isolation from any necessary institutional reform which may provide the means for stakeholders to hold company directors accountable for actions affecting their vital interests" (Cooper and Owen 2007, 664). In this respect, Gray (2010) refers to sustainability reporting as "fairy tales to help the children sleep at night" (Gray 2010, 50). Long and Driscoll (2007) call codes of ethics "narratives of legitimacy" and argue that these refer to the cognitive form of legitimacy (that tries to implement existing societal norms) without actively reflecting moral issues of own corporate behavior. At this point, global supply chains face the additional challenge of a lacking sovereign institution to formulate and enforce global norms (Windsor 2004); hence, the question arises for a corporation which of the regionally diversified norms is to be applied. Saying this, we concede that the recently released ISO 26000 indeed provides guidance on ways to integrate socially responsible behavior in companies and other

organizations and thus may be seen as an attempt at establishing an international norm for corporate social responsibility (CSR); however, since ISO 26000 is officially not a management system and not meant for certification purposes, the standard is still far from exerting decisive integrating power (Hahn 2012).

Thus, the credence nature of many supply chain performance attributes implies the propensity of businesses (particularly focal forms that are held responsible for their supply chains by consumers) to engage in hidden action concerning actual supply chain and operations management and conspicuous public relations (cf. Veblen's concept of conspicuous consumption, Veblen [1899] 1994). In this respect, hidden action in operating the supply chain is caused by a lack of appropriate incentives, control mechanisms, and information systems. Figure 1 depicts how the deployment of resources to substantial supply chain and operations management (company lens I) is decreasing in accordance with the consumer lens when passing to the performance dimensions of *Food quality* and *Sustainability*. In contrast, the deployment of resources to marketing/publicity (company lens II) gains importance when it comes to these performance indicators. In marketing, especially *Sustainability* concerns are part of the narrative packaging that should help selling the product and are often rather detached from actual operational and supply chain realities; this gap between communication and substantial action is often referred to as "greenwashing" (Du 2015). Figure 1 illustrates the specific conditions that undermine consistent striving for holistic performance in global agrifood supply chains. Thereby we distinguish the perspectives of the focal company from the perspective of the consumer which arguably constitutes the most important stakeholder of agrifood supply chains being both ultimate income source of these chains and end-user of their products (cf. Maloni and Brown 2006). We acknowledge that there is a variety of other parties holding a stake in agrifood chains who were omitted for accentuating the main message of the model.

Figure 1: The double company lens undermining holistic performance in global agrifood supply chains



We derive the following two research propositions from the aforementioned conceptualization:

- Proposition 1: The less a performance dimension is verifiable by the consumer, the more focal firms/supply chains target these dimensions by deploying organizational resources in marketing/publicity.

- Proposition 2: The less a performance dimension is verifiable by the consumer, the less focal firms/supply chains target these dimensions by deploying organizational resources in substantial SCM.

It can be noted that *Responsiveness & agility* and *Cost & efficiency* are primordial objectives when managing agrifood chains. Dependable delivery of food products according

to the (changing) specifications of supermarkets and consumers has the highest priority in food production (Vlajic et al. 2012). Cost structure and efficiency of production are hidden to the consumer to a varied degree, according to the types of products. While staple food appears to be rather transparent in terms of production costs, luxury goods such as expensive wines or certain types of processed foods are hard to appraise for the consumer. Under conditions of deficient quality information held by consumers, the price is sometimes used to signal high quality (Bagwell and Riordan 1991). *Food quality* gives an ambiguous picture but may be considered to be altogether rather hidden from the consumer; while sensory attributes, taste, and nutritional value are rather easy to evaluate, actual ingredients, way of processing, and toxins such as pesticide residues are usually disguised. Finally, *Sustainability* attributes of food are—compared to the other three dimensions—to the largest extent credence attributes. In the following chapter we have a closer look at the specific consumer requirements regarding food produce and at the role labels can play for designing sustainable food production and consumption systems.

<heading level 1> Zooming into the consumer lens: consumer requirements and labeling

Previous research has acknowledged that investment for substantially improving supply chain management can have a positive impact on competitiveness. Kafetzopoulos et al. (2011) studied the positive impact of effectively implemented quality management systems as well as safety management systems in the agrifood processing supply chains on competitiveness. These results seem contradictory to our second proposition. A more detailed analysis, however, shows that these management systems fulfill the function of risk management, i.e., to develop processes that are “under control” and “capable” related to customer requirement fulfillment. Based on Christopher and Towill (2000), mainly “market qualifiers” are addressed by deploying these organizational resources in SCM, with the aim of avoiding damage to the corporate image due to non-respect of food quality standards, etc. The

question arises of what are the market winners in agrifood supply chains. There are some hints that the choice process of final customers does not any longer depend exclusively on concrete product attributes (price, availability, flavor, label appearance, geographical origin, etc.) but on abstract attributes (manufacturers guarantee, etc.) as well (Barrena and Sánchez 2011). However, Barrena and Sánchez (2011) observed fundamental differences related to choice between, e.g., urban and rural consumers; in particular urban consumers associate ethical food—i.e., faire trade or organic food—with a sense of cultural identification. Nonetheless, attitude does not always lead to the expected action; in particular the price is found to temper the consumer emotion for ethical products (Walley et al. 2009). Therefore, it seems not surprising that food firms/supply chains target these dimensions by deploying organizational resources in marketing/publicity to justify a higher price instead of investing into supply chain innovations for offering large "ethical value" while keeping costs acceptable.

Despite this high price sensitivity of consumers, Tukker et al. (2010) underline the positive potentials of transferring production information to consumers by means of innovative labeling. In this way, labels could help mitigating the situation of information asymmetries hampering informed choice of consumers and could thus be a facilitator of a functioning market for "credence" attributes such as ethics and sustainability, in particular against the backdrop of increasing awareness regarding those issues (O'Rourke 2005). In fact, third-party labeling programs regarding organic, global equity and ecological issues of food production are rising in importance worldwide (Sirieix et al. 2013); nonetheless, the implications of eco-labels on actual consumer purchasing choices have been evaluated as relatively minor so far (Clift et al. 2005). In fact, certifications change product design and serve as benchmark for industries without substantially impacting on consumer behavior; this was stated back then by Salzman (1990) and may be considered to still hold true today. Food labels such as the organic label are often used for food product differentiation on the market

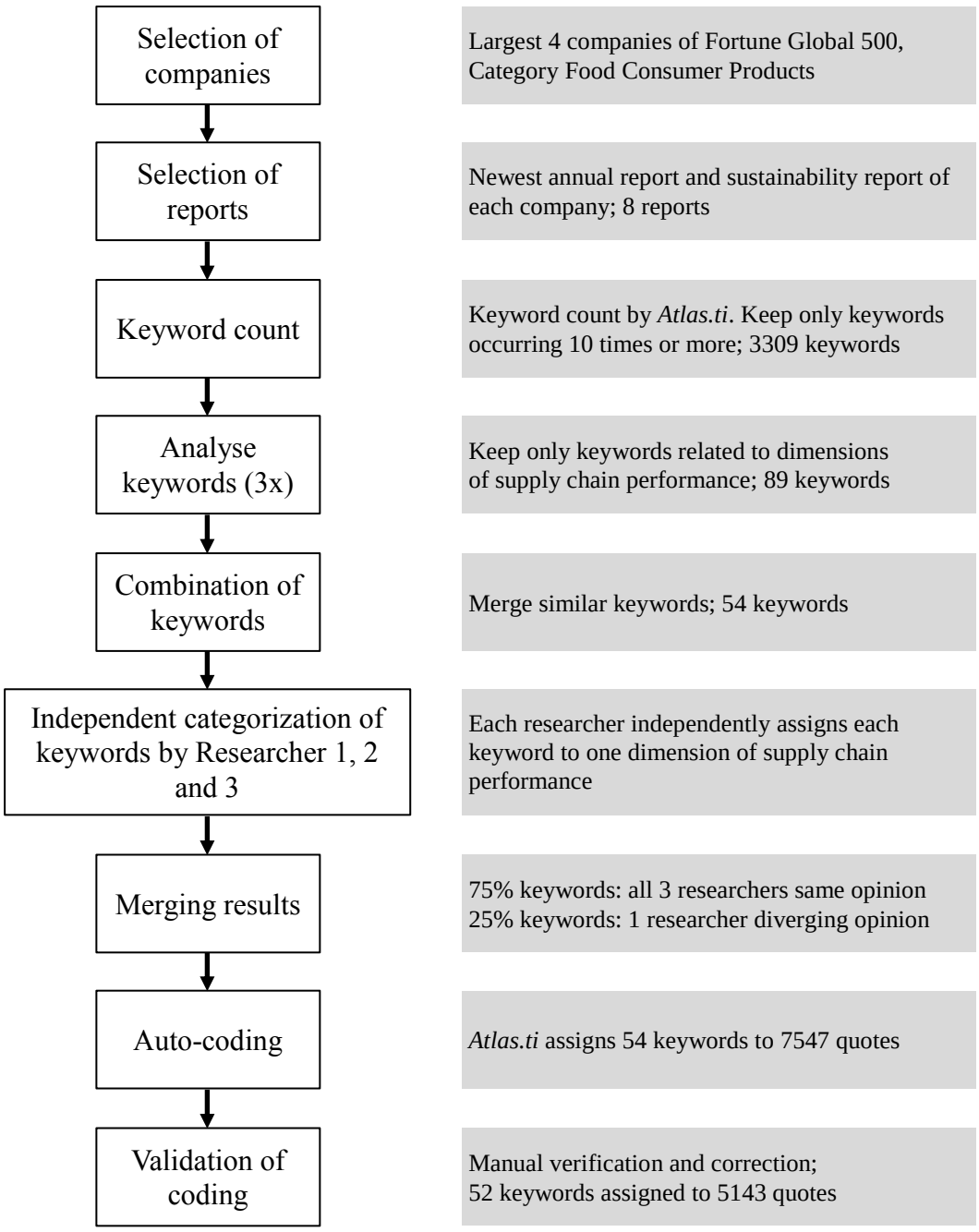
and hence to justify price premium towards the consumers (Bauer et al. 2013). Despite realistic hopes involved in such labeling schemes, food standards are no silver bullets and are confronted with various criticisms. One main aspect thereby is that standards and labels are indeed international trade-barriers. Such barriers are particularly hard to surmount for smallholder farmers in emerging and developing countries with restricted access to capital (Bolwig et al. 2013). If labels feature an exclusive rather than an integrative effect, they reinforce inequities in global food production rather than mitigating these imbalances and are degraded to mere marketing instruments. One may draw the conclusion that, to some extent, labels are similar to corporate brands, as they signal credence attributes to the consumer which cannot be directly evaluated and verified in the same way as physical product availability, price, or sensory qualities of food produce. Therefore, well-known food brands are vigilant to not supersede their brand image with any kinds of labels; it is indeed private brands that profit most from organic labels in comparison to local and global brands as found by Bauer et al. (2013).

<heading level 1> Methodology of qualitative content analysis

In order to corroborate research proposition 1 regarding the deployment of resources in corporate communication and marketing, we performed a content analysis of public documents published by four major agrifood companies. Content analysis is particularly suitable for analyzing text-based data such as those in company reports (Seuring and Gold 2012). The objective of this process was to identify the supply chain performance dimensions that are communicated most often by agrifood companies. By taking the frequency of communication as a proxy for the deployment of resources into merely symbolic actions, public relations and marketing (Cho et al. 2012), we verified if these companies over-emphasize their communication and marketing on performance dimensions that are not easily verifiable by the end customer (Proposition 1).

In terms of sampling, we selected the four most important companies (by yearly revenue) in the category "Food Consumer Products" of the Fortune Global 500 list in year 2014. We included the following companies in our sample: Nestlé (rank 72 in Fortune Global 500 list), PepsiCo (rank 137), Unilever (rank 140) and Mondelez International (ex-Kraft Foods, rank 332). These food producers all own a portfolio of food brands and serve consumers (B2C) worldwide. Together, they generate 90% of the revenues of all food producers in the Fortune Global 500 list. This sector is highly concentrated, and the ten largest food processors cover 28% of the world market shares (Gura and Meienberg 2013). Only four companies for example control 45% of coffee roasting, and three companies control over 80% of world's tea markets (De Schutter 2010). Because the food sector is dominated by such a limited number of companies, we assume that our sample consisting of the four largest companies is representative enough to answer our research question. We acknowledge that there are a large number of small and medium-sized enterprises in the food sector.

Figure 2: Process of content analysis



We analyzed the annual report as well as the sustainability report of each company, representing a sample of eight reports and over 1000 pages. We selected the newest report available at the time we started the research process in 2013 (Table 2). We used the software tool *Atlas.ti* for supporting the content analysis. Figure 2 illustrates the process of content analysis we followed.

Table 2: Reports used for the content analysis (figures in brackets indicate number of pages)

Type of document	Nestlé	PepsiCo	Unilever	Mondelez International
Annual report	Annual Report 2012 *(60 pages)*	2012 Annual Report *(114 pages)*	Annual Report and Accounts 2012 *(153 pages)*	Annual Report 2012 *(565 pages)*
Sustainability report	Corporate Governance Report 2012 *(16 pages)*	Performance with Purpose, Sustainability Summary 2010 *(36 pages)*	Progress Report 2012, Unilever Sustainable Living Plan *(56 pages)*	Our Progress in 2011, Creating a more Delicious World *(12 pages)*

First, we performed a keyword count in all reports and identified 3309 keywords occurring ten times or more. One researcher analyzed these keywords and identified those related to one of the agrifood supply chain performance dimensions described in Table 1 and Figure 1. He repeated this process independently on two other days in order to increase the validity of the identification process. We kept only the keywords that were identified twice or three times, and found a selection of 89 keywords. In order to ensure mutual exclusiveness, we combined similar keywords, for example "track" and "tracking", or "responsible" and "responsibility". Doing so, we reduced our selection to 54 unique keywords.

In the next step, the three researchers independently assigned each of the 54 keywords to a single dimension of agrifood supply chain performance: *Responsiveness & agility*, *Cost & efficiency*, *Food quality*, *Sustainability*. Involving three researchers increased the reliability of the process. For 75% of the keywords, all three researchers assigned the same performance dimension. For 25% of the keywords, two researchers assigned the same performance dimension. No keyword was assigned three different dimensions.

We ran an auto-coding process on the reports using the qualitative content analysis tool *Atlas.ti*. Auto-coding is a process by which quotes (word or sentence) in a document are coded following a preset rule. In our case, all words corresponding to one of our 54 keywords

were coded. For example, we defined that each time the software finds the word "community" or "communities", it codes it with the keyword "COMMUNITY". Using auto-coding and preset rules increases the reliability of the coding instrument as compared to a manual coding. The auto-coding resulted in 8052 words being coded.

In the last step of the process, we validated the auto-coding by manually verifying all coded words. We removed the codes when a particular word occurred in the footer of a document (thus artificially increasing the occurrence of this word). We also removed codes when a particular word was not used in the context of supply chain performance. The code "PRICE" used in the expression "stock price" was for example removed because it is not related to the product price. The code "QUALITY" was removed in the term "high quality debt". Several similar corrections were done during the validation phase. In this process, we also removed two keywords that we found were never used in relation with supply chain performance. After this time-intensive process, we ended up with 5143 words being coded with one of the remaining 52 keywords.

Based on the supply chain performance dimension that was assigned to each keyword, we were able to define how often each performance dimension was mentioned in the annual and sustainability reports of the four agrifood companies. We present the results of our analysis in the next section.

Following stringently the process of content analysis as outlined in Figure 2, we aimed at ensuring high levels of research quality standards (e.g., Duriau et al. 2007; Seuring and Gold 2012). The detailed documentation of data sources and research procedure facilitates the replication and possibly extension of our research design by follow-up studies. The automatized method of counting keywords within annual and sustainability reports by means of the software tool *Atlas.ti* ensures a highly objective process. The dimensions of agrifood supply chain performance are deductively derived from existing performance concepts, thus ensuring a certain level of internal validity of the findings. Although the identification of

relevant keywords was performed by a single researcher only, three intermittent repetitions of this identification process mitigate to some extent subjectivity and risks to its reliability. Three researchers independently allocating keywords to the different agrifood supply chain performance dimensions indeed enhances reliability of the categorization process, without disposing entirely of some selection bias though. Finally, despite the sample size a certain degree of external validity of results may be assumed for large internationally operating food companies.

Nonetheless, our empirical findings are barely generalizable to the large number of small and medium-sized enterprises (SMEs), which represents one important limitation of our methodological approach. SMEs publish much less frequently annual and sustainability reports (Gallo and Christensen 2011) and hence cannot be easily targeted by our research design. Furthermore, the sample size of only four companies (hence eight company reports, although representing more than 1000 pages) may only claim a certain degree of representativeness; however our approach of purposeful sampling by selecting the four major food companies according to the Fortune Global 500 list means that our analysis covers a large part of market share in the highly concentrated B2C food sector.

<heading level 1> Findings

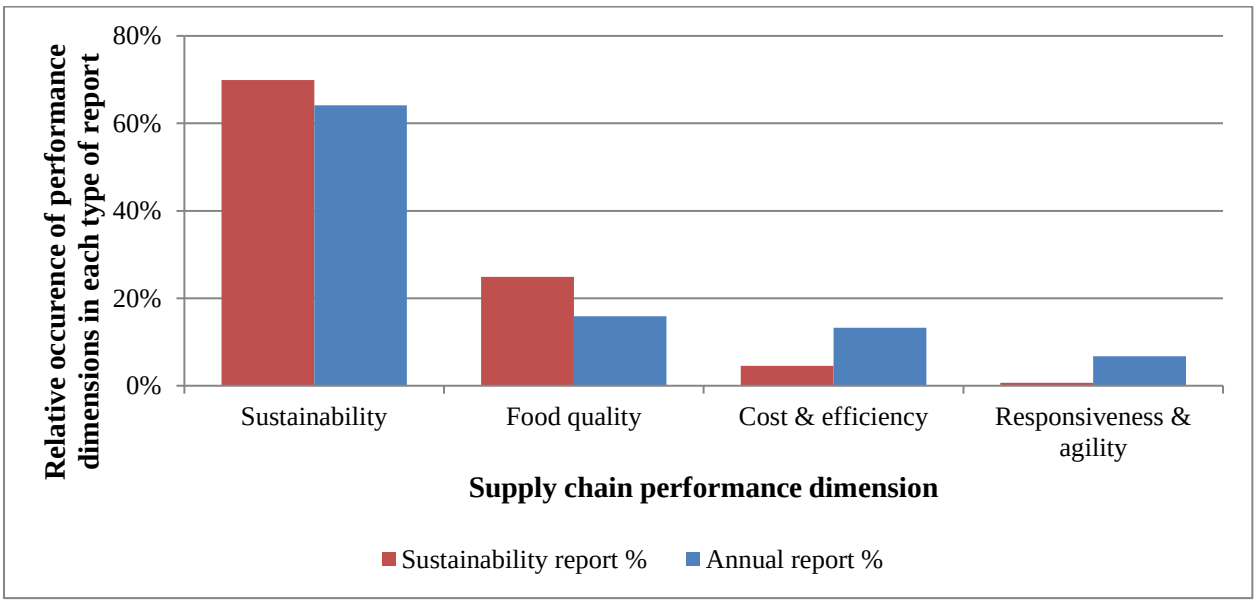
Table 3 shows the keywords assigned to each agrifood supply chain performance dimension and their occurrence in the reports.

Table 3: Keywords and occurrence for each dimension of agrifood supply chain performance

Responsiveness & agility (253)	**Cost & efficiency (547)**	**Food quality (956)**	**Sustainability (3387)**
DELAY (56)	COST (143)	CALORIE (39)	ACCIDENT (18)
DISRUPT (47)	EFFICIENCY (123)	CHEMICAL (3)	CARBON (28)
EFFECTIVENESS (100)	PRICE (281)	DIETARY (12)	CLIMATE (27)
FLEXIBILITY (19)		DISEASE (30)	COMMUNITY (66)
RESPONSIVE (15)		HEALTH (345)	DAMAGE (10)
SPEED (16)		HYGIENE (43)	DEATH (3)
		NUTRITION (225)	DISABLED (25)
		QUALITY (123)	DISPOSAL (21)
		SAFE (53)	EMISSIONS (44)
		TEST (28)	EMPLOYEE (1297)
		TRACEABILITY (18)	EMPLOYMENT (310)
		TRACKING (14)	ENERGY (84)
		WELLNESS (23)	ENVIRONMENT (194)
			EQUITABLE (7)
			ETHICAL (32)
			FAIR (24)
			FOOTPRINT (83)
			GOVERNANCE (166)
			GREEN (61)
			LANDFILL (24)
			NATURE (5)
			NGO (16)
			ORGANIC (51)
			RAINFOREST (21)
			RECYCLE (93)
			RENEWABLE (18)
			SOCIAL (77)
			SUSTAINABLE (433)
			WASTE (133)
			WELFARE (16)

Figure 3 shows the relative occurrence of words from four agrifood supply chain performance dimensions. For more differentiated insights, we separated the occurrences of words in the annual reports from those in the sustainability reports.

Figure 3: Relative occurrence of agrifood supply chain performance dimensions in each type of report



Obviously, we find that *Sustainability* is clearly the dimension about which the agrifood companies communicate most in their sustainability reports; 70% of all codes in the sustainability report. But surprisingly, agrifood companies also report mainly about *Sustainability* in their annual report; 64% of all codes in the annual report. Only 16% of the coded words are related to *Food quality*, 13% to *Cost & efficiency* and 7% to *Responsiveness & agility*. Assuming a strong link between frequency of occurrence in reports and general deployment of resources for marketing and public relation purposes, these findings corroborate our assumption that agrifood companies invest most of their communication efforts on *Sustainability*, a performance dimension which the consumer can barely verify. They focus their communication much less on tangible performance dimensions such as *Cost & efficiency* or *Responsiveness & agility*, which the consumer can more easily verify when buying food products in the supermarket. This observation holds true for both sustainability reports as well as annual reports. Hence, our content analysis confirms research proposition 1.

On the other hand, research proposition 2 regarding the deployment of resources for substantial improvements of the various dimensions of agrifood supply chain performance is

more difficult to examine since such investigation cannot rely on publicly available documents but needs to reveal the "true" strategic orientation of these agrifood companies regarding the management of their operations and supply chains. This would require far-reaching access to the agrifood companies and implies significant confidentiality issues; as we could not overcome these issues, we have to leave the testing of research proposition 2 for future research. The assumed misalignment (Figure 1) between symbolic action and respective public relations/communication efforts and substantial deployment of company resources regarding the four supply chain performance dimensions is by its nature not readily detectible through common surveying and interviewing techniques. Investigating this misalignment might require in-depth qualitative investigations within the respective multi-national companies and extended triangulation of results with counter-accounts or shadow accounts from third parties, such as press releases, reports from NGOs or experts, and legal proceedings (Gray 2010; Boiral 2013).

<heading level 1> Discussion

In the quest of finding answers to the question which factors may impede a comprehensive integration of sustainability in global agrifood chains, this paper specifically examines the link between the focal firm/supply chain and the consumer. It conceptually develops a double company lens (Figure 1) and derives two research propositions, of which one is tested by a qualitative content analysis of annual and sustainability reports of four major food production companies. By corroborating the research proposition that focal firms/supply chains deploy marketing/publicity efforts especially for those performance dimensions which are difficult to verify by the consumer, we support earlier arguments that see sustainability communication by companies as instrumental (Brown and Fraser 2006), largely symbolic (Milne et al. 2009) or as "simulacrum", i.e. "an artificial and idealized representation which is disconnected from reality to some extent" (Boiral 2013, 1037).

It may be noted that the specific arrangement of incentives for corporate behavior outlined in this paper represents a dilemma that is not limited to global agrifood supply chains but may be transferred, through slight adaptations, to any other supply chain serving the final consumer. This dilemma may be ascribed to information asymmetry between the company and consumers to the detriment of the consumer side (Dingwirth and Eichinger 2010). This information asymmetry is due to the consumers' relative lack of empirical information for verifying reported attributes of, in particular, *Food quality* and *Sustainability* (Balineau and Dufeu 2010), largely preventing consumers to hold companies accountable for their actions (Cooper and Owen 2007). Advocacy groups confirm this challenge: "Companies are overly secretive about their agricultural supply chains, making claims of 'sustainability' and 'social responsibility' difficult to verify" (Oxfam 2013, 27).

From a business side, this information asymmetry may be mitigated by consistently taking on a perspective of customer orientation as proposed by Mentzer et al. (2001), providing the consumer with in-depth knowledge about the respective production and logistics processes through innovative labeling and other information-oriented measures (Tukker et al. 2010; Sirieix et al. 2013), while staying vigilant regarding possible bias and limitations of those labels and certification schemes (Müller et al. 2009). Further to these communication-focused measures, it seems of utmost importance to acknowledge and adequately reconcile tradeoffs when substantially aiming for the four dimensions of agrifood supply chain performance (Hahn et al. 2010). Companies may thus forbear from a win-win attitude (Brown and Fraser 2006) that too easily glosses over deeply-rooted contradictions between performance objectives as for instance business growth versus ecological carrying capacities (Milne et al. 2009). These tradeoffs are part of strategic and operational considerations of focal companies and their supply chains as soon as the easy wins (Newton and Harte 1997) are exhausted and the sustainability performance frontier is reached. The existence of these tradeoffs may be considered one of the main underlying reasons when

businesses and supply chains follow a reactive approach for satisfying internal and external stakeholder demands (Long and Driscoll 2008) and thus procrastinate regarding pursuing holistic performance objectives.

Given increasing awareness of governments and civil society (O'Rourke 2005) and given growing pro-activity of agrifood firms toward the ethical, societal, and ecological challenges involved in their business (Heikkurinen and Forsman-Hugg 2011), firms are likely to increase their efforts to find pathways toward comprehensive supply chain performance. In this respect, the extant article furthers the understanding of what hampers the implementation of holistic agrifood supply chain performance, which may be seen as a starting point for continually making management practices in global agrifood supply chains more effective and sustainable.

<heading level 1> Conclusion

In conclusion we highlight the limitations of our research design and point to direction for future research. Regarding limitations, first of all, only one of the two research propositions was empirically investigated, based on limited empirical data from eight company reports of four major food companies. This means that only the first research proposition is preliminarily corroborated, stating that agrifood focal firms/supply chains deploy resources towards marketing/publicity in particular regarding those performance dimensions—i.e., sustainability and quality—which are difficult to check by consumers. Thereby, the text part of annual and sustainability reports are taken as a proxy for a food company's marketing and public relations efforts. Including into the analysis non-textual elements within reports such as graphs (Cho et al. 2012) and other means of corporate communications such as press releases or advertisement would give a more complete picture. Similarly no distinction is made between the communications of the focal company and of the entire supply chain, which obviously represents an oversimplification. Moreover, our analysis

considers the mere frequency of communication (i.e., keywords) as a proxy for deployment of resources to public relations and symbolic actions, and thus neglects information about valence—i.e., use in a positive or negative sense—and intensity—i.e., level of emphasis and relevance (Seuring and Gold 2012).

These instances of fuzziness and the limited empirical corroboration of our conceptualization (Figure 1) call for follow-up theory testing and refining empirical research. The most suitable methodological approach for proceeding in this direction may be in-depth qualitative research, for example by means of multiple case studies of revelatory global agrifood supply chains, informed by in-depth interviews or richer qualitative approaches of data collection such as ethnographies that allow for intense data triangulation (see Carter and Easton 2011). Further research into the supply chain-consumer interface may shed additional light into specific information asymmetries between business and consumers and ways of overcoming these, for example by adequate business-to-consumer communication as well as certification and labelling approaches. Thereby the consumer lens may be complemented by additional perspectives of further stakeholders such as governments, civil society organizations, and local communities; likewise the assumed domination and thus alignment of the supply chain by the focal company may be replaced by a more realistic picture of cacophonic agrifood supply chain actors pursuing individual business strategies (Heikkurinen and Forsman-Hugg 2011) and being embedded in individual horizontal settings (Lund-Thomsen and Lindgreen 2014). Investigating several tiers of the supply chain instead of only a single tier (Grimm et al. 2014) offers the chance to get detailed insight into the specificities of supply chain interaction and power relationships along international agrifood supply chains (Touboulic et al. 2014).

Furthermore, a deep theoretical understanding of tradeoffs between the dimensions of agrifood supply chain performance (*Responsiveness & agility, Cost & efficiency, Food quality, Sustainability*) could form a basis for subsequent more detailed investigations through

modeling and simulation approaches (Seuring 2013). System dynamics modelling is one promising tool for addressing distinct managerial decision-making problems within frameworks of multiple performance objectives while keeping the broader context of agrifood supply chains and long-term dynamic interdependencies between actors, parameters, and framework conditions in consideration (Reiner et al. 2015). In conclusion, the arguments presented in this article may incentivize managers and academics to develop innovative inter- and intra-organizational business processes that, step by step, push outwards the overall performance frontier of the agrifood supply chain, thereby maximizing overall consumer and stakeholder value. Proceeding in this direction, indeed, represents the follow-up challenge for management practice and research.

References

Aramyan, L. 2007. Measuring Supply Chain Performance in the Agri-food Sector. PhD thesis, Wageningen University, Wageningen, Netherlands.

Aramyan, L. H., A. G. J. M. O. Lansink, J. G. A. J. Van Der Vorst and O. V. Kooten. 2007. Performance measurement in agri-food supply chains: A case study. *Supply Chain Management: An International Journal* 12(4): 304-315.

ARD, 2013. Wage slaves in Germany (in German: "Lohnsklaven in Deutschland"), documentary, http://www.daserste.de/information/reportage-dokumentation/dokus/sendung/swr/24062013-die-story-im-ersten-lohnsklaven-in-deutschland-100.html (24 June 2013)

Bagwell, K. and M. H. Riordan. 1991. High and declining prices signal product quality. *The American Economic Review* 81(1): 224-239.

Balineau, G. and I. Dufeu. 2010. Are fair trade goods credence goods? A new proposal, with French illustrations. *Journal of Business Ethics* 92(2): 331-345.

Barrena R. and M. Sánchez. 2011. Urban or rural living as a moderator of the effects of consumer emotions and habits on acceptance of food product innovation. *International Journal of Management* 28(4): 321-345.

Bauer, H. H., D. Heinrich and D. B. Schäfer. 2013. The effects of organic labels on global, local, and private brands. More hype than substance? *Journal of Business Research* 66(8): 1035-1043.

Bigliardi, B. and E. Bottani. 2010. Performance measurement in the food supply chain: a balanced scorecard approach. *Facilities* 28(5/6): 249-260.

BLS (U.S. Bureau of Labour Statistics). 2013. *International Comparisons of Annual Labor Force Statistics, 1970-2012*. June 7, 2013.

Boiral, O. 2013. Sustainability reports as simulacra? A counter-account of A and A+ GRI reports. *Accounting, Auditing and Accountability Journal* 26(7): 1036-1071.

Bolwig, S., L. Riisgaard, P. Gibbon and S. Ponte. 2013. Challenges of agro-food standards conformity: Lessons from East Africa and policy implications. *European Journal of Development Research* 25(3): 408-427.

Bourlakis, M., G. Maglaras, E. Aktas, D. Gallear and C. Fotopoulos. 2014. Firm size and sustainable performance in food supply chains: Insights from Greek SMEs. *International Journal of Production Economics* 152: 112-130.

Brown, J. and M. Fraser, M. 2006. Approaches and perspectives in social and environmental accounting: An overview of the conceptual landscape. *Business Strategy and the Environment* 15(2): 103-117.

Carter, C. R. and P. L. Easton. 2011. Sustainable supply chain management: Evolution and future directions. *International Journal of Physical Distribution and Logistics Management* 41(1): 46-62.

Cho, C. H., G. Michelon and D. M. Patten. 2012. Impression management in sustainability reports: An empirical investigation of the use of graphs. *Accounting and the Public Interest* 12(1): 16-37.

Christopher, M. and D. R. Towill. 2000. Supply chain migration from lean and functional to agile and customized. *Supply Chain Management: An International Journal* 5(4): 206-213.

Clift, R., R. Malcolm, H. Baumann, L. Connell and G. Rice. 2005. Eco-labels and electric monks. *Journal of Industrial Ecology* 9(3): 4–7.

Constant, A. F. and B. N. Tien. 2011. Surviving the turbulence is not enough: Can Côte d'Ivoire flourish again?. IZA (Institute for the Study of Labor) Policy Papers no. 30. September 2011.

Cooper, S. and D. Owen. 2007. Corporate social reporting and stakeholder accountability – The missing link. *Accounting, Organizations and Society* 32(7): 649-667.

de Brito, M. P. and E. A. van der Laan. 2010. Supply chain management and sustainability: procrastinating integration in mainstream research. *Sustainability* 2010(2): 859-870.

De Schutter, O. 2010. Addressing Concentration in Food Supply Chains: The Role of Competition Law in Tackling the Abuse of Buyer Power. Briefing note by the Special Rapporteur on the right to food. December 2010.

Dingwerth, K. and M. Eichinger. 2010. Tamed transparency: How information disclosure under the global reporting initiative fails to empower. *Global Environmental Politics* 10(3): 74-96.

Du, X. 2015. How the Market Values Greenwashing? Evidence from China. *Journal of Business Ethics* 128(3): 547-574.

Duchin, F. 2005. Sustainable consumption of food: A framework for analyzing scenarios about changes in diets. *Journal of Industrial Ecology* 9(1-2): 99-114.

Duriau, V. J., R. K. Reger and M. D. Pfarrer. 2007. A content analysis of the content analysis literature in organization studies: research themes, data sources, and methodological refinements. *Organizational Research Methods* 10(1): 5-34.

Gallo, P. J. and L. J. Christensen. 2011. Firm size matters: An empirical investigation of organizational size and ownership on sustainability-related behaviors. *Business and Society* 50(2): 315-349.

Gold, S., R. Hahn and S. Seuring. 2013. Sustainable supply chain management in "Base of the Pyramid"-food projects – A path to triple bottom line approaches for multinationals?. *International Business Review* 22(5): 784-799.

Gray, R. 2010. Is accounting for sustainability actually accounting for sustainability…and how would we know? An exploration of narratives of organisations and the planet. *Accounting, Organizations and Society* 35(1): 47-62.

GRI [Global Reporting Initiative]. 2013. G4 Sustainability Reporting Guidelines: Reporting Principles and Standard Disclosures. Available at: https://www.globalreporting.org/resourcelibrary/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf (accessed 9 September 2014)

Grimm, J. H., J. S. Hofstetter and J. Sarkis. 2014. Critical factors for sub-supplier management: a sustainable food supply chains perspective. *International Journal of Production Economics* 152(1): 159-173.

Gunasekaran, A., C. Patel and R. E. McGaughey. 2004. A framework for supply chain performance measurement. *International Journal of Production Economics* 87(8): 333-347.

Gura, S. and F. Meienberg. 2013. Agropoly – A handful of corporations control world food production. Berne Declaration, Zurich, Switzerland & Econexus, Oxford, UK. Available at: https://www.bernedeclaration.ch/fileadmin/files/documents/Lebensmittelindustrie/EvB_agropoly_engl_web_klein_2.pdf (accessed 7 August 2015)

Hahn, R. 2012. Standardizing social responsibility? New perspectives on guidance documents and management system standards for sustainable development. *IEEE – Transactions on Engineering Management* 59(4): 717-727.

Hahn, T., F. Figge, J. Pinkse and L. Preuss. 2010. Trade-Offs in Corporate Sustainability: You Can't Have Your Cake and Eat It. *Business Strategy and the Environment* 19(4): 217-229.

Heikkurinen, P. and S. Forsman-Hugg, S. 2011. Strategic corporate responsibility in the food chain. *Corporate Social Responsibility and Environmental Management* 18(5): 306-316.

Jansa, J., E. Frossard, P. Stamp, M. Kreuzer and R. W. Scholz. 2010. Future food production as interplay of natural resources, technology, and human society: A problem yet to solve. *Journal of Industrial Ecology* 14(6): 874-877.

Johannessen, S. and H. Wilhite. 2010. Who really benefits from fairtrade? An analysis of value distribution in fairtrade coffee. *Globalizations* 7(4): 525-544.

Kafetzopoulos, D., K. Gotzamani and E. Psomas. 2011. Quality systems and competitive performance of food companies. *Benchmarking: An International Journal* 20(4): 463-483.

Long, B. S. and C. Driscoll. 2008. Codes of ethics and the pursuit of organizational legitimacy – Theoretical and empirical contributions. *Journal of Business Ethics* 77(2): 173-189.

Lund-Thomsen, P. and A. Lindgreen. 2014. Corporate Social Responsibility in Global Value Chains: Where Are We Now and Where Are We Going?. *Journal of Business Ethics* 123(1): 11-22.

Maloni, M. J. and M. E. Brown. 2006. Corporate social responsibility in the supply chain: An application in the food industry. *Journal of Business Ethics* 68(1): 35-52.

Manzini, R. and R. Accorsi. 2013. The new conceptual framework for food supply chain assessment. *Journal of Food Engineering* 115(2): 251-263.

Meijerink, G. and P. Roza. 2007. The role of agriculture in development. Markets, Chains and Sustainable Development Strategy and Policy Paper no. 5. Wageningen: Stichting DLO. Available at: http://www.boci.wur.nl/UK/Publications/ (accessed 10 January 2012)

Mentzer, J. T., W. DeWitt, J. S. Keebler, S. Min, N. W. Nix, C. D. Smith and Z. G. Zacharia. 2001. Defining supply chain management. *Journal of Business Logistics* 22(2): 1-25.

Milne, M. J., H. Tregidga and S. Walton. 2009. Words not actions! The ideological role of sustainable development reporting. *Accounting, Auditing and Accountability Journal* 22(8): 1211-1257.

Müller, C., W. J. V. Vermeulen and P. Glasbergen. 2009. Perceptions on the demand side and realities on the supply side: A study of the South African table grape export industry. *Sustainable Development* 17(5): 295-310.

Newton, T. and G. Harte. 1997. Green business: technicist kitsch?. *Journal of Management Studies* 34(1): 75-98.

O'Rourke, D. 2005. Market movements: Nongovernmental organization strategies to influence global production and consumption. *Journal of Industrial Ecology* 9(1-2): 115-128.

Oxfam. 2013. Behind the brand: Food justice and the 'Big 10' food and beverage companies. 166 Oxfam Briefing Paper, Oxford, UK. Available at: https://www.oxfam.org/sites/www.oxfam.org/files/bp166-behind-the-brands-260213-en.pdf (accessed 8 August 2015)

Preuss, J. 2009. Ethical sourcing codes of large UK-based corporations: prevalence, content, limitations. *Journal of Business Ethics* 88(4): 737-747.

Reiner, G., S. Gold and R. Hahn. 2015. Wealth and health at the Base of the Pyramid: Modelling trade-offs and complementarities for fast moving dairy product case. International Journal of Production Economics, forthcoming, doi:10.1016/j.ijpe.2015.08.002.

Salzman, J. 1997. Informing the Green Consumer; The debate over the use and abuse of environmental labels. *Journal of Industrial Ecology* 1(2): 11-21

Seuring, S. 2013. A review of modeling approaches for sustainable supply chain management. *Decision Support Systems* 54(4): 1513-1520.

Seuring, S. and S. Gold. 2012. Conducting content-analysis based literature reviews in supply chain management. *Supply Chain Management: An International Journal* 17(5): 544-555.

Shepherd, C. and H. Günter. 2006. Measuring supply chain performance: Current research and future directions. *International Journal of Productivity and Performance Management* 55(3-4): 242-258.

Silvestre, B. S. 2015. Sustainable Supply Chain Management in Emerging Economies: Environmental Turbulence, Institutional Voids and Sustainability Trajectories. *International Journal of Production Economics* 167: 156-169.

Sirieix, L., M. Delanchy, H. Remaud, L. Zepeda and P. Gurviez. 2013. Consumers' perceptions of individual and combined sustainable food labels: A UK pilot investigation. *International Journal of Consumer Studies* 37(2): 143-151.

Touboulic, A., D. Chicksand and H. Walker. 2014. Managing Imbalanced Supply Chain Relationships for Sustainability: A Power Perspective. *Decision Sciences* 45(4): 577-619.

Trienekens, J. H. 2011. Agricultural value chains in developing countries: A framework for analysis. *International Food and Agribusiness Management Review* 14(2): 51-82.

Tukker, A., M. J. Cohen, K. Hubacek and O. Mont. 2010. The impacts of household consumption and options for change. *Journal of Industrial Ecology* 14(1): 13-30.

Van der Vorst, J. G. H. J. 2000. Effective Food Supply Chains: Generating, Modelling and Evaluating Supply Chain Scenarios. PhD Thesis, Wageningen University, Wageningen, Netherlands.

Varsei, M., C. Soosay, B. Fahimnia and J. Sarkis. 2014. Framing sustainability performance of supply chains with multidimensional indicators. *Supply Chain Management: An International Journal* 19(3): 242-257.

Veblen, T. [1899] 1994. *The theory of the leisure class*. New York, N.Y.: Penguin Books.

Vlajic, J. V., J. G. A. J. Van der Vorst and R. Haijema. 2012. A framework for designing robust food supply chains. *International Journal of Production Economics* 137(1): 176-189.

Walley, K., P. Custance, G. Orten and S. Parsons. 2009. Longitudinal attitude surveys on consumer research – a case study from the agrifood sector. *Qualitative Market Research: An International Journal* 12(3): 260-278.

Windsor, D. 2004. The development of international business norms. *Business Ethics Quarterly* 14(4): 729-754.

Wolf, J. 2014. The Relationship between Sustainable Supply Chain Management, Stakeholder Pressure and Corporate Sustainability Performance. *Journal of Business Ethics* 119(3): 317-328.