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Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature

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ABSTRACT

Sustainable Supply Chain Management (SSCM) and Dynamic Capabilities (DCs) are both relatively young research fields examining dynamically changing corporate environments and industries. The food industry is an example of such a dynamic environment. Customers have high expectations for food safety and a growing demand for sustainably produced food. Companies fulfilling these demands target a customer base with high awareness of all three dimensions of sustainability, i.e., the economical, ecological, and social, circumstances in which food is produced and offered. This paper aims at describing how SSCM practices allow companies to maintain control over their supply chain and achieve a competitive advantage with the implementation of dynamic capabilities. Previously identified practices in SSCM are related to DC theory by identifying them as basic routines that form specific DCs. We conduct a literature review, including content analysis, examining publications (52 articles) on sustainable food supply chains published in English, peer-reviewed journals. We form the link between SSCM and DCs by integrating them into the same conceptual context. Specific DCs in the supply chain of a sustainability-oriented industry are also identified, such as knowledge sharing and re-conceptualizing the supply chain. Thereafter, we scrutinize the food industry according to SSCM and DC criteria and offer insights into the strategies used in that business market. The results show that sustainability practices and DCs in the supply chain are used among others to enhance traceability and tracking and to fulfill customer demands. Further research is needed to extend the operationalization of the existing conceptual frameworks.

1. Introduction

Supply Chain Management (SCM) is a broad topic and has been examined by researchers from different angles in the last years. One prominent research field is sustainability in SCM, namely Sustainable Supply Chain Management (SSCM). Both research and practical implementation have been growing steadily in the last decade in this specific area (Seuring and Müller, 2008a; Carter and Easton, 2011; Ahi and Searcy, 2013). Among others SSCM allows companies to implement corporate responsibility practices and achieve a higher efficiency in logistics performance and resource usage (e.g., Gold et al., 2010; Carter and Easton, 2011) while pursuing the three dimensions of sustainability, i.e., economic, social and environment goals. One driver for such corporate action is constant changes in supply chain configurations, which have raised concerns about how and whether this could contribute to sustainability (Halldorsson et al., 2009) and demanding strategic actions being taken. This offers a link into another young field of management research, i.e., the dynamic capabilities approach. They were first introduced by Teece and Pisano (1994) to explain firm performance in dynamic business environments, focusing on the capabilities that firms employ to reach a competitive advantage. A first conceptual linkage between the two domains of research has been presented in the paper by Beske (2012); however, this remains at the conceptual level and lacks (any) empirical research. Both theories aim to explain the achievement of a competitive advantage in dynamic business environments. For our study we choose the food industry which fulfills the requirements for such a dynamic business environment (van der Vorst and Beulens, 2002). First, it is under constant scrutiny of the public attention (Faerne et al., 2001; Manning et al., 2006). Food safety is a concern of almost every consumer, and governments are closely observing practices and products of companies in the food industry. Secondly, environmental issues like deforestation or social problems, e.g., in the form of fair wages for farmers, are reported frequently by governmental agencies or Non-Governmental

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Organizations (NGOs) (e.g., Hassini et al., 2012). This forms another link to SSCM since several companies are trying to counter these problems by adopting sustainable SCM practices (Maloni and Brown, 2006; Wiengarten and Pagell, 2012). Markets that target customers with high awareness of all three dimensions of sustainability like the sustainable food industry are exposed to dynamic changes in customer perceptions and expectations. In such markets, both strategic management theories, SSCM and DCs, can help companies in reaching a high performance.

The objective of the paper is to assess SSCM practices and their interlinks to DCs in the food industry. While this has already been argued for on a theoretical basis (Beske, 2012), we extend the objective and provide an empirical validation based on a systematic assessment of peer-reviewed papers on SSCM in the food industry. We hereby aim to integrate the theories of SSCM and Dynamic Capabilities with the example of the food industry, which has rarely been done for SSCM and to our best knowledge only once for DC theory (Marcus and Anderson, 2006).

The paper is structured as follows: a brief introduction covers the basic terminology of SCM, sustainability, SSCM, and DC theory. In the same section, an overview of food supply chain management and related sustainability issues is given. The next chapter introduces the research method and selected papers for the review. Next, the underlying frameworks for SSCM practices and DCs in SSCM are described. In the results section, insights into actual SSCM practices and DCs in the sustainable food industry are revealed. The discussion highlights the contribution of the paper, while the conclusion summarizes the findings of the paper.

2. Literature review and conceptual framework

2.1. SSCM practices

According to the definition given by Seuring and Müller (2008a), SSCM can be defined as "the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements." Several points stand out in this definition. First of all, it specifically calls for cooperation of the partners in the chain. This is in line with other researchers who put an emphasis on strengthened relationships in SSCM (e.g., Sharfman et al., 2009). Furthermore, the equal consideration of all three dimensions of sustainability is suggested, something that Elkington (1997) has termed as the Triple Bottom Line (TBL) approach (Gimenez et al., 2012). Finally, the definition draws special attention to the stakeholders of a supply chain, which have to be recognized as having legitimate requirements to the supply chains' activities (Müller et al., 2009a). This not only includes the customers, but also NGOs, suppliers or legal authorities (Emmehainz and Adams, 1999; Seuring and Müller, 2008a). In addition to this, we separate the stakeholders into two groups depending on their actual power to harm or support the organization (Madsen and Ulhøi, 2001; Buysse and Verbeke, 2003). Since the resources to engage stakeholders are limited, organizations usually concentrate more on those stakeholders that actually can exert a certain amount of pressure (Polonsky and Scott, 2005). Accordingly, we termed these pressure groups. At the same time, especially for companies following a sustainability strategy, the majority of stakeholders need to be taken into account as well; therefore, we include them in the framework as more generalized stakeholder groups.

This leads to the question of which practices are commonly applied in SSCM, which is a widely discussed topic in related literature (Zhu and Sarkis, 2004). While we introduce overarching categories and the single practices only briefly, we would argue that they form a sound conceptualization against the body of literature enfolded in SSCM (see e.g., the reviews in Seuring and Müller, 2008a; Gold et al., 2010; Carter and Easton, 2011) covering strategic as well as operations aspects. The single categories and practices are discriminant to each other, each describing a different aspect of SSCM. Furthermore, all points taken together outline aspects that can be used for comprehending SSCM, thereby fulfilling the criteria of completeness that such a framework should offer (Wacker, 1998). In the following, the categories in which SSCM practice s can be structured are introduced. We concentrate here on those practices that are relevant for our conceptualization of sustainable supply chain management and focus on practices that e.g., enhance relationships between the partners, the flow of goods and information or issues of sustainability, taken from the aforementioned definitions or SCM and SSCM conceptualizations. Of course, a comprehensive list would have to include aspects of SCM, such as benchmarking or financial performance measurement.

- *Strategic orientation:* The first category encompasses the strategic orientation of a company. Here the company's strategic values are addressed. Companies following a sustainability strategy are usually guided by the Triple Bottom Line (TBL) (Dyllick and Hockerts, 2002; Nikolaou et al., 2011; Gimenez et al., 2012), i.e., placing equal importance on all three dimensions of sustainability for their decision making. Furthermore, including the supply chain, i.e., a SCM orientation, in all decisions, even those not directly affecting the supply chain, is important for successful management of the supply chain (Seuring and Müller, 2008a; Pagell and Wu, 2009). This second part is a strong link to 'conventional' supply chain thinking as it is seen as one of the underpinning aspects of SCM.
- *Continuity:* The second category of the framework is concerned with the structure of the supply network. This concerns the way the SC partners interact on a permanent level. Consequently, practices used to build long-term relationships, the development of SC partners, and the selection of qualified partners are found here (Pagell and Wu, 2009; Gold et al., 2010). These practices are summed up under the category of continuity, the successful long-term competitiveness of the supply chain (Ziggers and Trienekens, 1999; Ashby et al., 2012; Miemczyk et al., 2012).
- *Collaboration:* Collaboration links structural aspects to businesses processes (Vlajic et al., 2012). On the one hand, structural decisions regarding how to technically and logistically integrate the partners in the supply chain and the quality of shared information are made (Vachon and Klassen, 2008). Joint development aims to collaboratively develop new technologies, processes, and products. On the other hand, the more operational organization can be linked to the *processes* level of SSCM. Sustainable supply chains face high risks due to high pressure group demands or a relatively small supplier base and the related disruption risk (Walker et al., 2008; Seuring and Müller, 2008b).
- *Risk management:* This leads companies to the adoption of various practices of risk management to mitigate these risks (Seuring and Müller, 2008a; Holt and Ghobadian, 2009). Individual monitoring of specific suppliers is a practice which can be observed in SSCM. Often own auditors or company employees are sent out to individual partners to identify their needs and progress towards specific goals (Koplin et al., 2007). Standards and certifications are usually more generalized, like the ISO 14001 or EMAS, and target a broad range of companies. At the same time, they can be handled by third-party auditors

and retain high credibility (Müller et al., 2009b). Pressure groups engage in activities that can have a destabilizing impact on a company and can actually harm the reputation or performance (Klassen and Vereecke, 2012). In terms of stakeholder management they would not only have to be monitored but actively engaged and managed (Seuring and Müller, 2008b). By adopting specific business practices, companies respond to these pressures.

- *Pro-activity (for sustainability):* The wider set of stakeholders is found in the pro-activity category of SSCM. By actively engaging stakeholders like consumers, companies are able to counter further pressure and benefit from stakeholder knowledge (Pagell and Wu, 2009). Learning, e.g., from partners and other sources, is another important practice. Furthermore, the pro-activity regard of a product's life cycle already in the development stages and throughout the whole life cycle is important when pursuing a sustainability strategy (Seuring, 2011). Finally, the general ability to be innovative as a company is necessary in the dynamic environments of sustainable markets. Innovation has been discussed as being especially important for sustainable supply chains (Klassen and Vereecke, 2012).

Table 1
SSCM practices.

SSCM Practices	Acronym
Orientation	
Supply chain management	SCM
Triple bottom line	TBL
Supply chain continuity	
Long-term relationships	LTR
Partner development	PD
Partner selection	SEL
Collaboration	
Joint development	JD
Technical integration	TI
Logistical integration	LI
Enhanced communication	EC
Risk management	
Individual monitoring	IM
Pressure group management	PRG
Standards and certification	CER
Pro-activity	
Learning	LEA
Stakeholder management	STM
Innovation	INN
Life cycle assessment	LCA

The arguments given in this section can only summarize some of the core points. Table 1 summarizes the SSCM categories and practices as just outlined. These practices will be linked to dynamic capabilities as the core theoretical contribution of this paper, extending previous research. Therefore, it is necessary to introduce dynamic capabilities and related supply chain research.

2.2. Dynamic capabilities

Dynamic Capabilities were first put forward by Teece et al. (1997) to explain competitive advantage and performance on high velocity and dynamically changing markets (see also Eisenhardt and Martin, 2000; Easterby-Smith et al., 2009). Helfat et al. (2007) define Dynamic Capabilities as "the capacity of an organization to purposefully create, extend, or modify its resource base" and as such to reach a higher economic value than their competitors. The economic value is linked to the benefits for the customer (Peteraf and Barney, 2003) and thus is not limited to economic performance but can be gained in other performance areas as well, in the case of SSCM within the other two dimensions of sustainability. Eisenhardt and Martin (2000) state that DCs are the "[…] firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations […]." As such, DCs can be understood as bundles of capabilities and not only single processes.

Following the definitions of Helfat et al. (2007) for a dynamic capability, the proposed practices of the SSCM form the basis for the dynamic capabilities as the capacities to reconfigure the resource base, and they are the bundles of practices that make up specific DCs (see Fig. 1).

Often DCs are discussed as firm-centered capabilities to enhance the performance of one single company (Ambrosini and Bowman, 2009; Easterby-Smith et al., 2009). So far only few researchers have linked the dynamic capabilities approach with SCM. Defee and Fugate (2010) present a framework for *Dynamic*

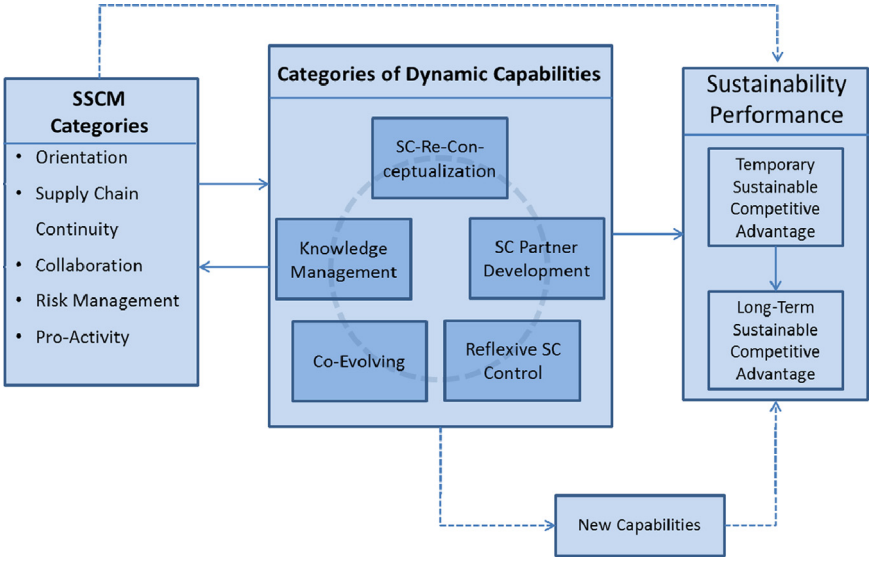

Fig. 1. Dynamic Capabilities in SSCM (based on Beske, 2012, p. 380).

Table 2
Description of DCs.

Dynamic capability	Acronym
Knowledge assessment	
Knowledge sharing	KS
Common IT system	CIT
Licensing	LIC
Knowledge acquisition and evaluation	KAC
Partner development	
Knowledge sharing (development)	KSD
Partner development programs	PDP
Improving overall performance	IOP
Partner training	PT
SC Re-conceptualization	
Inclusion of NGOs	NGO
Inclusion of neighbors, communities, policy makers	NCP
Co-evolving	
Joint development of products	JDP
Joint development of processes	JPR
Regular meetings	RM
Partner-based synergies	PBS
Reflexive control	
Transparency	TRA
Information sharing for monitoring	ISM
Qualitative partner control/auditing	QPM

Supply Chain Capabilities, which should be implemented in supply chains. Foerstl et al. (2010) focus on the managing of suppliers within dynamically changing environments to reach corporate social responsibility goals. Zhu et al. (2012) concentrate on the path-dependent development of environmental capabilities and the effect of learning and experience. Our work is based on a framework that integrates SSCM and DCs, presented in Fig. 1. Beske (2012) shows the overlapping applicability of SSCM and DC theories. Both strategic management theories aim to explain the achievement of a competitive advantage on globalized, often non-transparent markets, where customer demands are dynamically changing (Beske, 2012). Performance measurement is not limited to financial indicators but indicators derived from customer wishes and perception (Eisenhardt and Martin, 2000).

The framework introduces five categories of dynamic capabilities which take these assumptions into account. These categories are elaborated in the subsequent literature review (for a list of the DCs, see also Table 2 in the findings section), where the prevalence of the underlying theoretical categories in the existing literature is assessed.

- *Supply Chain Re-Conceptualization:* New partners not necessarily directly involved with the business of the SC are integrated into the SC. New partners could be local communities or NGOs (Pagell and Wu, 2009), such as Fairfood (Dutch NGO) or ActionAid (based in the UK), which can provide specific local knowledge and contacts (Müller et al., 2009a).
- *Partner Development:* This category summarizes necessary capabilities for developing the partners to be able to fulfill their respective purposes in the SC or even to be able to follow a sustainability strategy at all (Seuring and Müller, 2008a).
- *Knowledge Management:* All practices that deal with the acquisition of new and the assessment of current knowledge of the partners in the SC are included in this category. Such assessment can be viewed as the capability that enables the understanding of knowledge possessed by supply chain partners (Defee and Fugate, 2010).
- *Co-Evolving:* This refers to the adoption of capabilities "by which managers reconnect webs of collaborations […] to generate new and synergistic resource combinations among businesses" (Eisenhardt and Martin, 2000). Furthermore, the development and implementation of new capabilities is summarized here to enhance the overall performance of partners in the chain (Pagell and Wu, 2009).
- *Reflexive Control:* Here, those capabilities and resources are grouped that allow a company to constantly check and evaluate their business practices and strategy against the requirements of the business environment to maintain its functionality (Seuring, 2006). Applying one or more of such DCs can lead to a temporary competitive advantage (Eisenhardt and Martin, 2000) which in turn may lead to a sustained competitive advantage (Helfat et al., 2007; Teece, 2007). Furthermore, new capabilities might arise that can influence the competitiveness of a company or SC.

2.3. The food industry as a field of application

The food industry is a very dynamic industry with constant changes in customer demands (van der Vorst and Beulens, 2002; Wiengarten et al., 2011; Trienekens et al., 2012). This calls for the ability to quickly adapt strategies and reconfigure resources, exactly the requirements for which the DC concept has been posited (Teece et al., 1997; Barreto, 2010; Foerstl et al., 2010; Zhu et al., 2012). In the modern food industry, processes have become industrialized, characterized by mass production. Furthermore, production, financing, and marketing have become internationally integrated to form global food supply chains (Manning et al., 2005; Roth et al., 2007; Trienekens et al., 2012). Such food supply chains can be defined as "a set of interdependent companies that work closely together to manage the flow of goods and services along the value-added chain of agricultural and food products, in order to realize superior customer value at the lowest possible costs" (Folkerts and Koehorst, 1998). Globalization along with changing marketing techniques, consumption trends, and modern technology has simultaneously raised concerns in regards to the economy, society, and the environment (Yakovleva, 2008; Zanoni and Zavanella, 2012). At the same time, safety and quality is of utmost importance in the food industry, which makes controlling the entire supply chain (Manning et al., 2005), quality assurance (Manning et al., 2006; Brown et al., 2002), and enhanced tracking and tracing practices a special issue in this business (e.g., Wang et al., 2009). A further practice discussed in this respect is the need for collaboration (Matopulos et al., 2007) and coordination also often emphasized for the food industry (Ziggers and Trienekens, 1999). Hence, consumers are becoming more concerned with the products they consume, including their origin, the inputs used during production, the labor standards implemented, e.g., by farmers and food corporations, the treatment of animals, and the environmental impact of production (Trienekens et al., 2012; Cross et al., 2009). Therefore the sustainability, i.e., the ecological, social and, economic impacts of the food industry have been under scrutiny of the public for some time. Especially organic food and fair trade initiatives are of importance in this regard. Our study did not exclusively target these but through the keyword choice includes a large body of articles focusing on such specific food supply chains which seems appropriate when researching SSCM. The relevance of food to all people, the industry dynamics, and the aforementioned consumer demands qualify this industry as a strong focus of research when integrating dynamic capabilities into SSCM.

3. Research method

As the topic is quite abstract, the methodological choices were limited. A single or few case studies would have their limitations

towards generalization, while the topic does not seem sufficiently developed for a large scale survey to be feasible. An alternative approach is analyzing existing publications and treating them as "primary material" (Jauch et al. 1980). This is the typical approach of a literature review, which was combined with a content analysis. This might by now be called an established approach as it has been applied in a number of papers, and the research method is presented as a means in itself (Seuring and Gold, 2012). The single steps of the research process will be explained.

To ensure validity and reliability, a process model proposed by Mayring (2003) was followed (that has been used for similar research objectives before; see e.g., Seuring and Müller, 2008a; Gold et al., 2010). The model contains four steps and is the following: (1) material collection, (2) descriptive analysis, (3) category selection, and (4) material evaluation (see Fig. 2). Material collection involves defining and delimitating the material as well as defining the unit of analysis (i.e., the single paper). In the descriptive analysis, the formal aspects of the material are assessed, such as the number of publications per author, per journal, or per year. Such classification provides the background for further theoretical analysis. The next step, category selection, requires structural dimensions and related analytic categories to be selected. These dimensions are applied to the collected material in the following step of material evaluation. To keep a reliable quality of papers, we opted only to include articles published in English language, peer-reviewed journals which already excluded a number of articles published in the gray literature, i.e., conference proceedings or project reports.

A structured keyword search was conducted in four major electronic databases: Elsevier (www.sciencedirect.com), Emerald (www.emeraldinsight.com), Wiley (www.wiley.com), and Springer (www.springerlink.com). The following keywords were searched to be in the title, abstract, or keywords: "food," "supply chain," and an alternation between "green," "sustainable," and "sustainability." Only publications with a clear link between the food industry and sustainable or green supply chain management were considered. The search began with the year 2011 and continued until 2002, covering a total of a decade of research. This is because the topic of sustainable supply chain management has only gained the attention for increased relevance in recent years. This approach was affirmed during our research as in earlier years only single, if any, papers were published. We included 52 papers in our review. Only 33 of these articles have a strict food industry focus. To broaden the perspective and generalizability of the study we nevertheless opted to include the remaining 19 articles where the food industry was included as one among other researched areas. As this paper is mostly conceptual in nature, we concentrate on this aspect in the results section and do not include all descriptive analysis results from the literature review at this point. Furthermore, we opted to keep the data basis as broad as possible; therefore, no geographical focus was taken during the search for literature.

The process of content analysis (see also Seuring and Gold, 2012) was conducted by applying the categories of SSCM and DC introduced in the literature review section. As the codes are taken deductively from related literature, construct validity is ensured. Each paper was coded accordingly thereby ensuring internal validity. This also contributes to external validity as the research design is set up in a rigorous manner and transparently described here. A core challenge in such coding is reliability and, particularly, repeatability. The latter one is ensured in the research process by documenting the search criteria and data sources. In the subsequent coding process, the single codes, i.e., the used categories and practices, have to be revealed. This is documented in our literature review section. Reliability would ideally be ensured by joint coding among several researchers. This was done for a test sample among the research team thereby establishing the joint comprehension of the single categories. However, time constraints only allowed a single researcher to code each paper. To minimize the potential bias we discussed controversial cases among the author group; nevertheless, this is a limitation to the research. Overall, the guidelines suggested in extant literature (Mayring, 2003; Seuring and Gold, 2012) were followed.

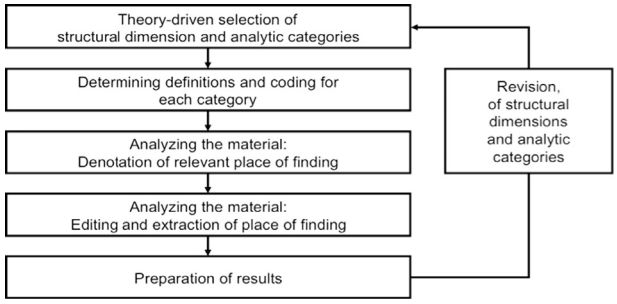

Fig. 2. Research process of a structured content analysis (Mayring, 2003, p. 120).

4. Results

We find that all practices and dynamic capabilities are described in the literature although to different extents. The findings are discussed in detail in the subsequent sections.

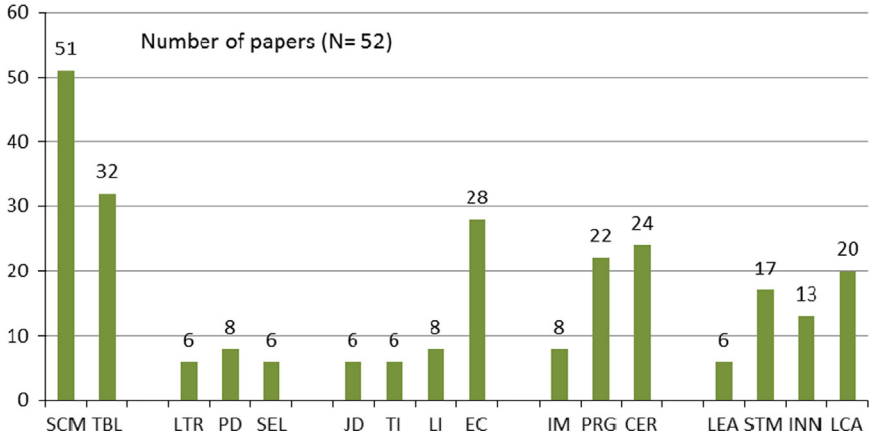

Fig. 3. Distribution of SSCM practices in the literature.

4.1. Sustainable supply chain management practices

The frequency of occurrence of each SSCM practice is presented in Fig. 3 with the respective acronyms described in Table 1. Most articles describe a supply chain with a focal company or at least from the viewpoint of one single company in the supply chain.

4.1.1. Orientation

Orientation consists of a dedication to *SCM* by an organization as well as the orientation towards the *TBL*. After the analysis, the results show that 51 out of all 52 articles place importance on the commitment to SCM. An orientation towards the TBL is exhibited by 32 of the total papers analyzed. The rest of the papers only address two of the three major dimensions of sustainability, namely economic and environment. The social dimension is often neglected. These results show that companies are relying heavily on SCM practices e.g., to ensure food safety and traceability (e.g., Fritz and Schiefer, 2009; Doluschitz et al., 2010). Furthermore, the high count for TBL orientation shows a growing awareness of sustainability issues in the food industry. Motivations for this trend can be seen in the increasing concerns of consumers (e.g., Pullman et al., 2009; Paloviita, 2010), intrinsic motivation of the company (e.g., Sharfman et al., 2009), pressure by NGOs (Müller et al., 2009b) or legal requirements (Liu et al., 2011).

4.1.2. Supply chain continuity

In general, the articles describe cases where companies are interested in stable and fruitful partnership relationships in their supply chain, which reflects *Continuity*. Six articles describe that companies engage in *Long-Term Relationships* with their partners. These relationships are used to build up trust and commitment (Pagell et al., 2010), sometimes starting with few important partners and from there gradually spreading through the chain (Vasileiou and Morris, 2006; Ras et al., 2007). In the majority of their studied cases, including a snack foods business and a local pizza restaurant chain, paying above market prices to suppliers was preferred to provide prosperity across the chain (Pagell et al., 2010). The *Development of Partners* is important in food supply chains and is mentioned in eight articles. Examples for such partner development include assistance and teaching of new farming methods for producers or funding the costs needed to convert to more sustainable farming (Ras et al., 2007). Financial support to farmers, even in developed countries, can be a crucial factor not only in making the greening of the supply chain possible but also in strengthening the relationships among actors, as farmers are often held responsible for costs involved in the conversion of farming practices and distribution to retailers (Ras et al., 2007). With a lower count than expected, six articles report on *Partner Selection*. Partners are selected according to their abilities (Tate et al., 2010) and also according to their willingness to engage in sustainability practices (Wiskerke and Roep, 2007).

4.1.3. Collaboration

In terms of *Collaboration*, the majority of the articles present a mixed picture. Only six articles report a *Technological Integration* of partners, and eight discuss a *Logistical Integration* (e.g., Beamon, 2008). While this might again be partly related to the non-logistical focus of the majority of articles, especially the low count of Technological Integration is surprising. The latter is somewhat mitigated by the fact that 28 articles describe *Enhanced Communication* as an integral and important practice in their dealings with partners. Here the quality of shared information is of high importance even with the goal of a transparent supply chain (Solér et al., 2010; Henningsson et al., 2004; Bergstroem et al., 2005; Kumar and Nigmatullin, 2011). In the food industry, transparency to consumers is critical, especially in regards to food origin, production and processing methods, ingredients or inputs used, etc., (Paloviita, 2010). The collaboration and *Joint Development* is taking place on two general levels. This includes new product development (Chiou and Chan, 2011; Sarkis et al., 2011; Liu et al., 2011) and the general development and enhancement of processes (Schiefer, 2002; Wolfert et al., 2010). Despite the emphasis in previously published articles, only six articles in the sample mention such Joint Development. This can partly be attributed to the fact that relatively powerful focal companies often control such supply chains (Ras et al., 2007) which already have more sophisticated development capabilities than their smaller supply chain partners. Another factor is the concentration on the farm level, where, especially in developing countries, farmers might be asked for experience but not take part in the actual development of new processes.

4.1.4. Risk management

Among *Risk Management* practices, the most prominent is the adoption of *Standards and Certifications* with 24 articles mentioning this approach. Such standards come in the form of Code of Conducts of individual focal companies (e.g., Kolk, 2011) or in the form of general certifications like the ISO 14001 or SA 8000 (Vermeulen, 2010; Bitzer et al., 2008). *Individual Monitoring* by members throughout the entire supply chain is particularly necessary in food supply chains as tracking and tracing are crucial to sustainable food production (Fritz and Schiefer, 2009; Parmigiani et al., 2011). However, this practice is mentioned in eight articles, far less than the more broadly applied standards and certification practice. *Pressure Group Management* shows a similar, differentiated picture. This deals mostly with the pressures by NGOs and their power to harm the reputation of a company (Müller et al., 2009a; Vermeulen, 2010; Miao et al., 2011). Some articles describe that the customer demands for sustainable products have grown to the point where they could be seen as pressures to adopt certain processes or not to sell out to a bigger competitor (Pullman et al., 2009; Sharfman et al., 2009). Government pressure is seen in diverse ways. For more pro-active companies, it is of no or low importance since they already employ higher standards than those enforced by governments (Solér et al., 2010), or it might lead to pro-active implementation of certain sustainability practices (Smit et al., 2008). Governmental interest in a particular supply chain may also correspond to the interest of the chain, which can be seen from a positive perspective. For example, government initiatives may promote sustainable agriculture (e.g., organic production) and assist with the conversion by providing subsidies or allowing for shorter conversion times (Smit et al., 2008). However, the interests often do not align, and the pressure is often seen in a more negative light. Overall, pressure groups have a high importance for companies, and 22 articles describe it.

4.1.5. Pro-activity

For a dynamic, especially with regards to organic or fair trade food, and still relatively young industry like the sustainable food industry *Pro-activity* is a necessity since many new processes and technologies still have to be established. One important practice in this regard is *Learning*. Consequently, this includes the acquisition of new knowledge from NGOs, government development agencies (Ras et al., 2007), and researchers, educators, and partners in the chain (Baecke et al., 2002). Six articles include this practice. Not surprisingly, *Stakeholder Management* is a practice that is commonly mentioned in the literature, namely 17 papers. Already the definition by Seuring and Müller (2008a) lists stakeholder

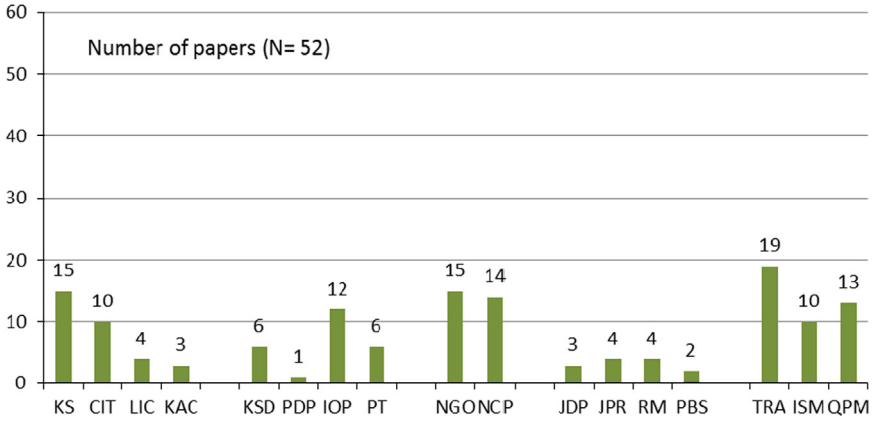

Fig. 4. Distribution of DCs in the literature.

requirements as a necessary influence factor on SSCM. Stakeholders such as NGOs are integrated to benefit from their expertise and contacts, to gain credibility, and use their knowledge for process or product development (Alvarez et al., 2009; Schrader et al., 2011). This is the main difference to Pressure Group Management since stakeholders are not perceived as a threat but as a way to enhance performance, products, and processes. *Innovation* encompasses the possession of capabilities to encourage new idea generation and pursuing new technologies. This practice is mentioned in thirteen papers. Examples are the adoption of new innovative technologies or processes, e.g., using a living lab as an open innovation approach for leveraging both internal and external sources of ideas (Wolfert et al., 2010). *Life Cycle Assessment* is an inter-organizational effort used to measure the environmental impact of production and is often applied in the food industry (Yakovleva, 2008; Apaiah et al., 2006; Virtanen et al., 2011; Dobon et al., 2011; Hall and Howe, 2011; Sonesson and Berlin, 2003). However, without a SCM orientation a LCA is difficult to achieve as the necessary information from the supplier and buyer sides might not be shared with the focal company. The assessment in a food supply chain may involve all on-farm activities, inputs used, transportation, etc. (Peacock et al., 2011). Therefore, joint efforts are needed from all actors in the chain. LCA is described twenty times in the literature sample, making it the most commonly discussed item in the Pro-Activity category.

4.2. Dynamic capabilities

The proposed DCs (see Beske, 2012) have to be understood as categories in which distinctive DCs are formed. The formation of a DC can be understood similar to a matrix organization, where, whenever necessary, whole or parts of routines are recruited to build a dynamic capability for a specific task. Furthermore, as Teece (2007) argues, DCs are not clearly observable, which makes a detailed description impossible. Nevertheless, we identified relevant DCs from the food industry which differ in their exact form and design from company to company. The results are shown in Fig. 4.

4.2.1. Knowledge assessment

Knowledge is the basis for several activities observed in the articles. The general sharing of information and knowledge is an important key to achieve a more transparent or even totally transparent supply chain (Vermeulen, 2010). The benefits of such transparency have already been shown related to the "Bullwhip Effect" to react to dynamically changing environments (Lee et al., 1997), but such information systems do not fully meet the definitions of a DC. Here, the information and knowledge needs to be of high quality and often situation specific. Therefore, we argue that for the abilities to develop new products, technologies, and processes, *Knowledge Assessment* is of high importance (Defee and Fugate, 2010). A cornerstone of the knowledge-accessing dynamic capability is an extension from the traditional goals of a learning orientation in that it does not focus solely on acquiring and absorbing more knowledge. Instead, this DC has a more holistic perspective, as the accessing and understanding of capabilities possessed by some supply chain members will benefit the others (Defee and Fugate, 2010). *Knowledge Acquisition and Evaluation* goes a step further and involves acquiring new knowledge, evaluating the information, and applying what is most useful or beneficial. Only three papers directly address the topic of knowledge acquisition and evaluation. Doluschitz et al. (2010) develop an integrated IT system, for example, but they indicate that an independent third party with sufficient industry (e.g., meat) knowledge should be appointed to operate the IT system, revealing also that certain qualifications are demanded to interpret and apply knowledge. Before companies make an effort towards the other categories, like *Common IT Interfaces* and Licensing, they must first decide if they are even willing to embrace *Knowledge Sharing* and, if so, to what extent and by which means (e.g, through technological integration or joint development). Since this is typically a preceding decision or activity to the items to follow, it is not surprising that with 15 papers, the most papers from the capability of knowledge assessment belong to knowledge sharing. In order to ease the transfer and exchange of knowledge, Common IT Interfaces can be developed, which has been highlighted in ten of the papers analyzed. Essentially, such systems can also lead to leaner inventories, lower inventory costs, lower transaction costs, and, in general, better logistics (Marcus and Anderson, 2006). Providing Licensing, e.g., for software, for all chain members certainly enhances the overall transparency. In a study of wine distribution, the use and licensing of a software called CargoScope was introduced, allowing users to collaborate and build a complete supply chain network, including the storage, transportation, and processing parameters for each echelon of the chain (Cholette and Venkat, 2009). Despite the potential benefits, only four papers discuss licensing.

4.2.2. Partner development

Partner development may be pursued because the overall success of a chain can be limited to the performance of the weakest link. The implementation through inter alia *Knowledge Sharing* (in terms of development) can lead to changes within the supply chain. Quite often, focal firms must provide the necessary

knowledge to their suppliers to even make the production of the demanded raw material possible (e.g., organic products), which is revealed in six of the papers analyzed. *Partner Development Programs* and Partner Training are also methods permitting such knowledge sharing (Alvarez et al., 2009; Henningsson et al., 2004; Ciliberti et al., 2008) and are discussed in the papers, one and six times, respectively. A willingness to *Improve the Overall Performance* of the supply chain should be exhibited by all chain members. With the highest number of papers within the capability of partner development (12 papers), the inference may be made that a commitment to improving the overall performance initiates partner development activities (Zhu et al., 2008; Zanoni and Zavanella, 2012). Nonetheless, research shows that, despite the literature and theories on SCM and viewing the chain from a holistic perspective, initiatives in practice usually only focus on chain fragments when aiming to improve the chain′s performance (Ras et al., 2007). This calls for a greater need for a holistic approach in practice.

4.2.3. Supply chain re-conceptualization

Sustainable supply chains are designed differently from conventional ones. Consequently, the need for *Supply Chain Re-Conceptualization*, i.e., to change the old ways of doing business or to differ from the usual way business is done, is described in many articles in the sample. An important capability lies in searching and selecting the right partners for the SC. As shown in Fig. 4, this capability was identified frequently in the sample with counts of 15 and 14 regarding the inclusion of new members. This includes partners that are business related, such as farmers able to produce the necessary organic produce (Ras et al., 2007), or outside agencies like NGOs or even Governmental Bodies/Policy Makers, such as development aid agencies (Wiskerke and Roep, 2007). Other possible candidates might even be neighbors or communities found in the nearby areas of production.

4.2.4. Co-evolving

Co-Evolving is characterized firstly by improved relationships between the different partners in the chain. Supply chains must grow and change together, keeping the interests and visions of each member in alignment. Distinction is given between *Joint Development of Products and Processes* to illustrate the extent to which firms are collaborating. Surprisingly, the collaborative efforts are often not identified hand-in-hand. Three papers identified JDP while four emphasized JPR. Holding meetings on a regular basis allows for enhanced communication, helps partners form relationships, allows for discussion and decision-making on joint projects, and can, therefore, reaffirm that supply chain members are moving forward together in the same direction (Alvarez et al., 2009). With only four papers mentioning the importance of regular meetings, it is revealed that the benefits have yet to be realized by most. *Partner-based Synergies* are new resources and benefits towards a competitive advantage that result from partner collaboration and co-evolution (Eisenhardt and Martin, 2000). Only two articles explicitly address partner-based synergies. An exemplar case is in the article on the construction of a sustainable pork supply chain, where a pork producer forms a partnership with an environmental engineering bureau director who shares similar views on regional farming (Wiskerke and Roep, 2007). Their complementarities are specifically outlined: the producer has a strong network in the primary sector, and the director has strong relations with environmental NGOs and government officials working in subsidy programs for agriculture (Wiskerke and Roep, 2007).

4.2.5. Reflexive control

Strong evidence was found for *Reflexive Control* of the supply chain, which involves comparing and evaluating the functionality of the supply chain to the needs of the supply chain. This is done not only by the analysis of financial data but also through the evaluation of key performance indicators (Seuring and Müller, 2008a), which should be adjusted when deemed necessary. Nineteen papers discuss *Transparency*, referring to both the degree of understanding of and access to product-related information (Wognum et al., 2011; Gadema and Oglethorpe, 2011; Hamprecht et al., 2005). Information Sharing specifically for monitoring purposes was identified in ten articles. In many food supply chains (e.g. cold chains), products are monitored during distribution from the manufacturers or producers to the retailers. Every chain partner visually inspects the products and compares results to the pre-determined acceptance or rejection parameters (Schliephake et al., 2009). Thirteen articles present *Qualitative Partner Control and Auditing* as an important capability. Certification by third parties, auditing, and analysis using written scorecards are all methods in which suppliers can be evaluated. By implementing an effective and efficient partner control system, performance can also be routinely monitored, making it possible for more efficient and accurate long-term contract development in terms of costs and quality specifications (Parmigiani et al., 2011).

4.3. Linking DCs and SSCM

The high number of companies dedicated to SCM is in line with general assumptions that without top-management support, effective (S)SCM is hard to reach. Furthermore, as the number of papers discussing a TBL orientation is less than that of SCM orientation, it could imply that a SCM orientation is also necessary before a chain can commit to the triple-bottom line. Thus, a commitment to incorporating members of a supply chain (i.e., making decisions together, sharing knowledge or the capability to access knowledge, integrating technology and logistics, pursuing partner development, etc.) can be considered a prerequisite to the fulfillment of a commitment to sustainability.

4.3.1. On the nature of dynamic capabilities

DCs in general are a very complex topic and, therefore, are hard to grasp and still heatedly discussed in the scientific community. Teece (2007) argues that they are not observable; otherwise, they would be rather best practices. This is exactly what Eisenhardt and Martin (2000) claim in their work. Winter (2003) even writes of “the mystery and confusion surrounding the concept of dynamic capabilities.” We describe general DCs, which in their specific form and organization will differ from company to company; they will have common features even when implemented in different firms but might be idiosyncratic in their specific form (Foerstl et al., 2010). Furthermore, we identify several practices, or in the terminology of dynamic capabilities, routines (e.g., Teece et al., 1997; Eisenhardt and Martin, 2000; Barreto, 2010) which form the bundle of which the DCs consist. DCs integrate these routines through which managers pool their knowledge and skills to generate new knowledge, solutions, or resource configurations (Eisenhardt and Martin, 2000). They might be common in organizations, but the DC is finally made by what a company wants to achieve with the routines. On the one hand, they can be used for day-to-day business. On the other hand, if bundled together and used in a strategic manner, they can purposefully change the business environment (Helfat et al., 2007) by forming new partnerships, changing the relationships of partners in the chain and through this having anti-competitive purposes as well as performance enhancement purposes. Furthermore, they enable the development of new processes

Table 3
Matrix relation of SSCM practices and SSCM dynamic capabilities.

SSCM practices	SSCM dynamic capabilities									
	Knowledge management		Partner development	SC Re-conceptualization		Co-evolving		Reflexive control		
	Knowledge assessment	Knowledge acquisition	Ability development	Search, selection, integration	Supply chain link foundation	Product, process development	Relationship management	Transparency	Control and monitoring	Total (9)
SCM orientation		•		•	•	•		•	•	6 67%
TBL orientation			•	•		•			•	4 44%
Long-term relationships	•		•			•	•	•	•	6 67%
Partner development			•	•	•	•	•	•		6 67%
Partner selection	•		•	•	•	•		•	•	7 78%
Technological integration	•	•	•	•	•	•	•	•	•	9 100%
Logistical integration			•	•	•		•	•		5 56%
Joint development		•			•	•				3 33%
Enhanced communication	•	•	•	•		•	•	•	•	8 89%
Individual monitoring			•	•			•	•	•	5 56%
Pressure Group Management	•			•	•	•	•	•		6 67%
Standards and certifications				•			•	•	•	4 44%
Learning	•	•	•	•		•	•	•	•	8 89%
Stakeholder management	•		•	•	•	•	•			6 67%
Innovation	•	•	•		•	•				5 56%
Life cycle assessment	•	•				•		•		4 44%
Total (16)	9 56%	7 44%	11 69%	12 75%	9 56%	13 81%	10 63%	12 75%	9 56%	Average 64%

and products, which alter the way business is carried out among the supply chain partners and in the industry as well.

4.3.2. The link between SSCM practices and dynamic capabilities

Table 3 shows the relationship of SSCM practices and SSCM DCs in the form of a matrix. We derived the distinctive DCs from our observations during the literature review. The matching was done based on the reviewed literature and through experience in the related research fields. Exemplarily, this is described in more detail in the case of the Product and Process Development DC (Sarkis et al. 2011; Wolfert et al., 2010; Schiefer, 2002). This was chosen because similar DCs have been put forward by other researchers as possible candidates for further research (e.g., Eisenhardt and Martin, 2000). Furthermore, it is very complex and covers a wide span of SSCM practices. The orientation towards SCM and the TBL already at the beginning of the development process are necessary to encompass all possible opportunities from the SC partners (Wu and Pagell, 2011). Including the dimensions of sustainability is, of course, a pre-condition if the goal is to produce a sustainable product or have appropriate processes. Long-term relationships have been shown to be beneficial for the collaborative development of products or processes (Vachon and Klassen, 2006), partly because under such conditions trust can evolve and sharing of information is more open (Gold et al., 2010). Also, it allows for the development of specific capabilities in the partners if necessary for the joint success. If this is not possible, Partner Selection is required to identify and integrate a new partner that can fill the gap. Technological Integration fosters the exchange of information and knowledge and has a positive influence on collaboration on various levels (Vachon and Klassen, 2006). The Joint Development Practice speaks for itself, since it contains the routines necessary to be able to carry out such projects jointly. Enhanced Communication, including safe modes of transfer of sensible, high-quality information is another pre-condition to engage in collaborative development (Seuring and Müller, 2008a). Pressure Group Management is

necessary to forecast where a new process or product might collide with the interest of this specific group of stakeholders (Seuring and Müller, 2008a), whereas Stakeholder Management covers the inclusion of general stakeholders, e.g., customers, to incorporate their ideas and desires. To understand dynamically changing requirements and act accordingly is a source of competitive advantage (Foerstl et al., 2010). This information and other sources of knowledge are codified and incorporated into the knowledge pool with the SSCM practice of Learning (Skjoett-Larsen et al., 2003). The Innovation practice permits the development through means of actual willingness and ability to pursue new ways of thought and be innovative in a pro-active manner (Pagell and Wu, 2009). Finally, as stated before, LCA connects to the TBL orientation to have the whole life cycle and related positive and negative impacts of the product or process already in mind while it is actually developed.

4.3.3. Enhanced relationships through dynamic capabilities

In general, the majority of the DCs are very relationship-specific and oriented to improve the relationships among supply chain partners. Six of the proposed nine DCs are directly related to building or maintaining strong and trusting relationships. This includes Ability and Values Development, which influences the basis of the relationship and can be applied to deepen the relationship. This is in line with the definition of Seuring and Müller (2008a) who call for a cooperation of the partners in the chain. Relationship quality has been discussed in other management theories already as well, specifically the relational view (Dyer and Singh, 1998), to improve overall performance.

The next is the search, selection, and integration capability where especially the last item aims to build a relationship. Good relationships are necessary for Product and Process Development, but especially the latter can introduce processes which foster the relationships of supply chain partners. The capability of Relationship Management has as the goal of developing strong relationships between the partners.

Another set of capabilities deals with knowledge and learning. It is assumed that capabilities are most valuable when they allow a learning environment (Foerstl et al., 2010). These are Knowledge Assessment and Knowledge Acquisition. DCs can consist of routines especially for knowledge generation or preservation and use techniques like copy, transfer, and recombination (Eisenhardt and Martin, 2000; Easterby-Smith et al., 2009). Overall it seems that rather pro-active companies pursue such a dedicated and dynamic sustainability strategy (Wiskerke and Roep, 2007; Smit et al., 2008).

Crosslinking SSCM practices and DCs proves quite interesting as Table 3 reveals. While we only do so in a qualitative manner, there are at least five practices linked collectively to each of the nine DCs. The range of 3–9 shows a clear interrelation. This also holds if the links are assessed vice versa, where each DC is linked to 7–13 SSCM practices. Here, it must be noted that the theoretical framework presented in Section 2 only argues for the link from SSCM practices to DCs.

5. Discussion

The contributions of the paper are building both on the theoretical as well as the empirical part of the research. On the theoretical side, we establish a link among supply chain practices and dynamic capabilities in SSCM. Building on the work of Beske (2012), we drive the comprehension of DCs into further detail thereby adding to theory building in SSCM. Different to previous research (e.g., Defee and Fugate, 2010; Zhu et al., 2012), we directly link supply chain practices to DCs. Given the many facets of SSCM, the selection of practices is a critical step, which we only partly justify. Explaining each practice in detail would make up an entire paper, making this certainly a limitation in our research.

Further, the food industry proves quite suitable as the many links identified illustrate (see Table 3). Still, this is a limitation, as we have conducted the research for only one sector thus far. An extension to other sectors would allow identifying similarities and differences among sectors. This, however, points to the empirical research already conducted, which makes up the second major contribution.

While Marcus and Anderson (2006) found that DCs will not result in higher performance of an environmental management system, we argue, however, that the application of DCs for SSCM can result in a better sustainability performance for the overall supply chain, thereby including the environmental performance at least of the focal company and often of the other supply chain partners as well.

In addition, using a research method building on analyzing secondary data even allows a much more aggregative perception of related research than any research collecting primary data would be able to achieve. Using peer-reviewed papers as the unit of analysis places the research into the existing body of literature, but moves beyond the single contribution and aims at analyzing somewhat “larger” streams of theory building. The research process applied allows even testing our conceptualization of DCs in SSCM. Staying in line with other researchers on SSCM and DC theory (e.g. Eisenhardt and Martin, 2000; Seuring and Müller, 2008a; Pagell and Wu, 2009; Carter and Easton, 2011) we show the high importance of enhanced relationships between the supply chain partners to achieve high performance in the empirical setting of the food industry.

The top three categories of both SSCM practices and DCs with the highest frequencies of occurrence (i.e., EC, CER, PG, KS, NGO, and NCP; see Figs. 3 and 4) can be considered relevant for relationship management in food supply chains. As knowledge sharing may be critical for ensuring the safety of a product and even improving the shelf life in terms of perishable food products, it is not surprising that enhanced communication is also highly identified in the literature, since improving the means of communication would most likely allow for better knowledge sharing. Meeting certification standards, often a result of addressing pressure groups, helps to achieve trust in partner relationships. Additionally, the re-conceptualization of the supply chain, e.g. to include NGOs, policy makers, etc., may also lead to improved relationships by allowing more involvement of stakeholders. Whether these results hold true only for the food industry would have to be determined through further studies; however, one could presume similarities across other chains where sustainability is a priority.

While the interlinks presented in Table 3 are qualitative, we can establish the relationships in a strong manner. All SC practices are linked to a minimum of three (out of nine) DCs. As we predominantly argue this way (see Fig. 1), we have to be cautious about reversing our arguments. By further analyzing the table and taking into account that each DC is connected to at least seven (out of 16) supply chain practices, there is a sound basis for assuming such a connection also holding. This would be another suggestion for future research, where contingencies among both dimensions of analysis would be computed thereby allowing in-depth, statistically supported insights (see, e.g., Gold et al., 2010, for such an approach). Looking at the SSCM side, transfers or uptakes of theory from other fields of management and even beyond seem quite welcome, thereby contributing to enriching the theoretical foundations often asked for by researchers (Seuring and Müller, 2008a; Halldorsson et al., 2009). Despite the current increase in SSCM related publications, such a further development of SSCM theory is still in demand (Zhu et al., 2011).

There are also practical implications of the research presented here. The food industry was chosen as an example that ensures a

number of dynamic characteristics. Both changing customer demands as well as the strive for more sustainability in related food supply chains will drive the dynamics further. The dynamic capabilities identified offer insights into the opportunities enterprises can build on in actively managing and developing their supply chains in a sustainable manner. Knowledge management and partner development would go hand in hand with each other. Focal companies might aim at offering training for their suppliers in developing their knowledge about environmental issues and ensure sound conduct (Ras et al., 2007; Wiskerke and Roep, 2007). On the social side, this would imply monitoring that codes of conduct are implemented. Yet, a partnership approach (Sharfman et al., 2009) demands a joint learning process (co-evolving). In terms of operations, the transparency created would contribute to tracking and tracing efforts implemented in many food chains in response to food scandals and subsequent legal action. Finally, practitioners might be able to identify practices which they already employ to group them together to form a DC with which they can enhance their competitive advantage.

As already stated, the secondary nature of our database poses a clear limitation for the results. Especially in the case of Dynamic Capabilities, which are difficult to conceptualize and describe, this might limit the significance of the propositions. Nevertheless, since few descriptions and conceptualizations of DCs exist to date, these results provide a valuable step in the consolidation of SSCM and DC research alike. Of course, the practices and DCs have to be further evaluated, ideally starting with empirical case-based, qualitative research. Furthermore, the list of practices and DCs is not comprehensive, but relevant for our research.

This leads over into suggestions for future research. While analyzing papers covering another sector (e.g., more technical, such as the automotive or electronics industry) has already been mentioned, there seems to also be the need for more theory driven analysis. While the dynamic capability approach seems to be rapidly taken up with (S)SCM related literature, it stays in the dark whether DCs can really be argued for in a supply chain environment. The approach has been posited for individual enterprises but not supply chains. Hence, it would have to be assessed whether the assumptions of the DC approach allow this or how they have to be modified accordingly. Further research will identify additional DCs, as existing research already points out practices like benchmarking and performance goals as practices in SSCM which we did not include in our study. Furthermore, as several practices and DCs point towards long-term, trusting relationships and commitment, the power of individual companies diminishes. This is especially relevant for the smaller partners, i.e., the suppliers in the supply chain, since their relative transaction-specific investments will most likely be higher than those of the focal firm (Ras et al., 2007). Since we are by far not the first or only researchers to suggest such relationship quality aspects as important for competitive SSCM, it is surprising that so far research into the willingness and ability of the smaller partners to engage into such partnerships in the SSCM context is rather limited.

6. Conclusion

In this paper, we identified several practices in the SSCM context. In the terminology of Dynamic Capabilities, these practices can be considered as routines which, if combined, form a distinctive DC. We identified several DCs for SSCM in the sustainable food industry and propose them for evaluation. Furthermore, we describe the necessary SSCM practices as the basic routines for the DCs. So far, such a detailed description of DCs in the literature is still scarce. Furthermore, a description of the underlying routines has not been posited for the sustainable food industry or for general SSCM. In total, we propose eight distinctive capabilities based on a literature review. These are: (1) Knowledge Assessment, (2) Knowledge Acquisition, (3) Ability Development, (4) Search, Selection and Integration of Partners, (5) Supply Chain Link Foundation, (6) Product and Process Development, (7) Relationship Management, and (8) Reflexive Control. These capabilities can be applied in a general way. For example, the acquisition and codification of knowledge is a basic function of a company which simply integrates new information into the knowledge pool. But if this information is actively searched for and used to solve a specific challenge, e.g., information about new sustainable production techniques needed to react to a sudden drought, then it becomes dynamic. In other words, if the capabilities are used to change the business environment, the resource base of the supply chain, or to adapt to sudden changes from the outside, then they actually can be considered as a DC. Future case-based empirical research will be necessary to further validate this catalog of Dynamic Capabilities.

Not all practices and DCs have been described in the papers as often as we initially expected. Especially the need to commit to Co-evolvement has been mentioned only a few times. One reason might be that most researchers have examined a process of transforming a supply chain or a relatively young supply chain configuration. The need to jointly develop products and processes or hold regular meetings so that supply chain members can participate is slowly being realized. Another explanation lies in the second hand nature of data coming from a diverse set of research including agriculture, ethics, and strategic management journals. Far from being homogenous, the different research fields require different foci not always consistent with the nature of the strategic management disciplines of Dynamic Capabilities and SSCM. But especially those practices and DCs need to be evaluated in more depth with directed research. Furthermore, the high count for the TBL orientation shows a growing awareness of the consumers and the food industry for sustainability issues. Similar to other literature reviews on SSCM, the smaller representation of the social dimension compared to the environmental dimension was to be expected. Although nearly every major food producer states to follow sustainability practices, the fact that the social dimension is often excluded is somewhat sobering.

With our research we show a possible way of identifying and describing DCs even when their somewhat “mysterious” nature (Winter, 2003) makes this a challenging feat. The insights gained from this literature review integrating DCs and SSCM provide a solid foundation from which future empirical research can be based. As Helfat and Peteraf (2009, p. 92) said, “emerging and evolving theories develop slowly, over long periods of time.” Implementing dynamic capabilities into sustainable supply chain management is certainly no exception.

References[3]

Ahi, P., Searcy, C., 2013. A comparative literature analysis of definitions for green and sustainable supply chain management. J. Clean. Prod. 52, 329–341.
Alvarez, G., Pilbeam, C., Wilding, R., 2009. Nestle Nespresso AAA sustainable quality program: an investigation into the governance dynamics in a multi-stakeholder supply chain network. Supply Chain Manag.: Int. J. 15 (2), 165–182. (*).
Ambrosini, V., Bowman, C., 2009. What are dynamic capabilities and are they a useful construct in strategic management? Int. J. Manag. Rev. 11 (1), 29–49.
Apaiah, R., Linnemann, A., van der Kooi, H., 2006. Exergy analysis: a tool to study the sustainability of food supply chains. Food Res. Int. 36, 1–11. (*).
Ashby, A., Leat, M., Hudson-Smith, M., 2012. Making connections: a review of supply chain management and sustainability literature. Supply Chain Manag.: Int. J. 17 (5), 497–516.
Baecke, E., Rogiers, G., De Cock, L., Van Huylenbroeck, G., 2002. The supply chain and conversion to organic farming in Belgium or the story of the egg and the chicken. Br. Food J. 104 (3), 163–174. (*).

[3] References marked with an * are contained in the literature review.

Barreto, I., 2010. Dynamic capabilities: a review of past research and an agenda for the future. J. Manag. 36 (1), 256–280.

Beamon, B., 2008. Sustainability and the future of supply chain management. Op. Supply Chain Manag. 1, 4–18. (*).

Bergstroem, K., Soler, C., Shanahan, H., 2005. Professional food purchasers' practice in using environmental information. Br. Food J. 107 (5), 306–319. (*).

Beske, P., 2012. Dynamic Capabilities and Sustainable Supply Chain Management. Int. J. Prod. Logist. Manag. 42 (4), 372–387.

Bitzer, V., Francken, M., Glasbergen, P., 2008. Intersectoral partnerships for a sustainable coffee chain: really addressing sustainability or just picking (coffee) cherries? Glob. Environ. Change 18, 271–284. (*).

Brown, C., Longworth, J., Waldron, S., 2002. Food safety and development of the beef industry in China, 27, pp. 269–284. (*).

Buysse, K., Verbeke, A., 2003. Proactive enviromnetal strategies: a stakeholder management perspective. Strateg. Manag. J. 24, 453–470.

Carter, C.R., Easton, P.L., 2011. Sustainable supply chain management: evolution and future directions. Int. J. Phys. Distrib. Logist. Manag. 41 (1), 46–62.

Chiou, T., Chan, H., Lettice, F., Chung, S., 2011. The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. Transp. Res. Part E 47, 822–836. (*).

Cholette, S., Venkat, K., 2009. The energy and intensity of wine distribution: a study of logistical options for delivering wine to consumers. J. Clean. Prod. 17, 1401–1413. (*).

Ciliberti, F., Pontrandolfo, P., Scozzi, B., 2008. Logistics social responsibility: standard adoption and practices in Italian companies. Int. J. Prod. Econ, 13, pp. 88–06. (*).

Cross, P., Edwards, R., Opondo, M., Nyeko, P., Edwards-Jones, G., 2009. Does farm worker health vary between localised and globalised food supply systems. Environ. Int. 35 (7), 1004–1014. (*).

Defee, C.C., Fugate, B.S., 2010. Changing perspective of capabilities in the dynamic supply chain era. Int. J. Logist. Manag. 21 (2), 180–206.

Dobon, A., Cordero, P., Kreft, F., Østergaard, S., Antvorskov, H., Robertsson, M., Smolander, M., Hortal, M., 2011. The sustainability of communicative packaging concepts in the food supply chain. A case study: part 2. Life cycle costing and sustainability assessment. Int. J. Life Cycle Assess., 16, 537-547.

Doluschitz, R., Engler, B., Hoffmann, C., 2010. Quality assurance and traceability of foods of animal origin: major findings from the research project IT foodtrace. J. Consum. Protect. Food Safe. 5, 11–19. (*).

Dyer, J.H., Singh, H., 1998. The relational view: cooperative strategy and sources of interorganizational advantage. Acad. Manag. Rev. 23, 660–679.

Dyllick, T., Hockerts, K., 2002. Beyond the business case for corporate sustainability. Bus. Strat. Environ. 11 (2), 130–141.

Easterby-Smith, M., Lyles, M.A., Peteraf, M.A., 2009. Dynamic capabilities: current debate and future directions. Br. J. Manag. 20, 1–8.

Eisenhardt, K.M., Martin, J.A., 2000. Dynamic capabilities: what are they? Strateg. Manag. J. 21, 1105–1121.

Elkington, J., 1997. Cannibals with Forks: The Triple Bottom Line of 21st Century Business. Capstone Publishing Ltd, Oxford.

Emmehainz, M., Adams, R., 1999. The apparel industry response to "Sweatshop" concerns: a review and analysis of codes of conduct. J. Supply Chain Manag. 35 (3), 51–57.

Faerne, A., Hornibrook, S., Dedman, S., 2001. The management of perceived risk in the food supply chain: a comparative study of retailer-led beef quality assurance schemes in Germany and Italy. Int. Food Agribus. Manag. Rev. 4, 19–36.

Foerstl, K., Reuter, C., Hartmann, E., Blome, C., 2010. Managing supplier sustainability risks in a dynamically changing environment – sustainable supplier management in the chemical industry. J. Purch. Supply Manag. 16, 118–130.

Folkerts, H., Koehorst, H., 1998. Challenges in international food supply chains: vertical co-ordination in the European agribusiness and food industries. Br. Food J. 100 (8), 385–388.

Fritz, M., Schiefer, G., 2009. Tracking, tracing, and business process interests in food commodities: a multi-level decision complexity. Int. J. Prod. Econ. 117, 317–329. (*).

Gadema, Z., Oglethorpe, D., 2011. The use and usefulness of carbon labelling food: a policy perspective from a survey of UK supermarket shoppers. Food Policy 363, 815–822. (*).

Gimenez, C., Sierra, V., Rodon, J., 2012. Sustainable operations: their impact on the triple bottom line. Int. J. Prod. Econ. 140, 149–159.

Gold, S., Seuring, S., Beske, P., 2010. Sustainable supply chain management and inter-organizational resources: a literature review. Corp. Soc. Responsib. Environ. Manag. 17 (4), 230–245.

Hall, G., Howe, J., 2011. Energy from waste and the food processing industry. Process Saf. Environ. Prot. 90 (3), 203–212. (*).

Halldorsson, A., Kotzab, H., Skjøtt-Larsen, T., 2009. Supply chain management on the crossroad to sustainability: a blessing or a curse? Logist. Res. 1, 83–94.

Hamprecht, J., Corsten, D., Noll, M., Meier, E., 2005. Controlling the sustainability of food supply chains. Supply Chain Manag.: Int. J. 10 (1), 7–10. (*).

Hassini, E., Surti, C., Searcy, C., 2012. A literature review and a case study of sustainable supply chains with a focus on metrics. Int. J. Prod. Econ. 140, 69–82.

Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., Winter, S., 2007. Dynamic capabilities: understanding strategic change in organizations. Blackwell Publications, Malden.

Helfat, C.E., Peteraf, M., 2009. Understanding dynamic capabilities: progress along a developmental path. Strateg. Org. 7 (1), 91–102.

Henningsson, S., Hyde, K., Smith, A., Campbell, M., 2004. The value of resource efficiency in the food industry: a waste minimisation project in East Anglia, UK J. Clean. Prod., 12, 505-512. (*).

Holt, D., Ghobadian, A., 2009. An empirical study of green supply chain management practices amongst UK manufacturers. J. Manuf. Technol. Manag. 20 (7), 933–956.

Jauch, L., Osborn, R., Martin, T., 1980. Structured content analysis of cases: a complementary method for organizational research. Acad. Manag. Rev. 5 (4), 517–525.

Klassen, R., Vereecke, A., 2012. Social issues in supply chains: capabilities link responsibility, risk (opportunity), and performance. Int. J. Prod. Econ. 140, 103–115.

Kolk, A., 2011. Mainstreaming sustainable coffee. Sustain. Dev., 1–14. (*).

Koplin, J., Seuring, S., Mesterharm, M., 2007. Incorporating sustainability into supply management in the automotive industry – the case of the Volkswagen AG. J. Clean. Prod. 15, 1053–1062.

Kumar, S., Nigmatullin, A., 2011. A system dynamics analysis of food supply chains – case study with non-perishable products. Simul. Modell. Pract. Theory 19, 2151–21688. (*).

Lee, H., Padmanabhan, V., Whang, S., 1997. The bullwhip effect in supply chains. Op. Manag. Res. 38 (3), 93–102.

Liu, X., Yang, J., Qu, S., Wang, L., Shishime, T., Bao, C., 2011. Sustainable production: practices and determinant factors of green supply chain management of chinese companies. Bus. Strategy Environ., 21, 1-16. (*).

Madsen, H., Ulhøi, J.P., 2001. Integrating environmental and stakeholder management. Bus. Strategy Environ. 10 (2), 77–88.

Maloni, M., Brown, M., 2006. Corporate social responsibility in the supply chain: An application in the food industry. J. Bus. Eth. 68, 35–52.

Manning, L., Baines, R.N., Chadd, S.A., 2005. Deliberate contamination of the food supply chain. Br. Food J. 107 (4), 225–245.

Manning, L., Baines, R.N., Chadd, S.A., 2006. Quality assurance in the food supply chain. Br. Food J. 108 (2), 91–104.

Marcus, A., Anderson, M., 2006. A general dynamic capability: does it propagate business and social competencies in the retail food industry. J. Manag. Stud. 43 (1), 19–46. (*).

Matopulos, A., Vlachopoulou, M., Manthou, V., 2007. A conceptual framework for supply chain collaboration: empirical evidence from the agri-food industry. Supply Chain Manag.: Int. J. 12 (3), 177–186.

Mayring, P., 2003. Qualitative Inhaltanalyse – Grundlagen und Techniken (Qualitative Content Analysis – Basics and Techniques). Weinheim, Beltz, Verlag.

Miao, Z., Cai, S., Xu, D., 2011. Exploring the antecedents of logistics social responsibility: a focus on Chinese firms. Int. J. Prod. Econ. 140 (1), 18–27. (*).

Miemczyk, J., Johnsen, T., Macquet, M., 2012. Sustainable purchasing and supply management: a structured literature review of definitions and measures at the dyad, chain and network levels. Supply Chain Manag.: Int. J. 17 (5), 478–496.

Müller, C., Vermeulen, W., Glasbergen, P., 2009a. Perceptions on the demand side and realities on the supply side: a study of the South African table grape export industry. Sustain. Dev. 17, 295–310. (*).

Müller, M., Gomes dos Santos, V., Seuring, S., 2009b. The contribution of environmental and social standards towards ensuring legitimacy in supply chain governance. J. Bus. Eth. 89 (4), 509–523.

Nikolaou, L., Evangelinos, K., Allan, S., 2011. A reverse logistics social responsibility evaluation framework based on the triple bottom line approach. J. Clean. Prod., 1–12. (*).

Pagell, M., Wu, Z., 2009. Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. J. Supply Chain Manag. 45 (2), 37–56. (*).

Pagell, M., Wu, Z., Wasserman, M., 2010. Thinking differently about purchasing portfolios: an assesment of sustainable sourcing. J. Supply Chain Manag. 46 (1), 57–73. (*).

Paloviita, A., 2010. Consumers' sustainability perceptions of the supply chain of locally produced food. Sustainability 2, 1492–1509. (*).

Parmigiani, A., Klassen, R., Russo, M., 2011. Efficiency meets accountability: performance implications of supply chain configuration, control, and capabilities. J. Op. Manag. 20, 212–223. (*).

Peacock, N., Camillis, C., Pennington, D., Aichinger, H., Parenti, A., Reannaud, J., Raggi, A., Brentrup, F., Sara, B., Schenker, U., Unger, N., Ziegler, F., 2011. Towards a harmonised framework methodology for the environmental assessment of food and drink products. Int. J. Life Cycle Assess. 16, 189–197. (*).

Peteraf, M.A., Barney, J.B., 2003. Unravelling the resource-based tangle. Manag. Decis. Econ. 23 (4), 309–323.

Polonsky, M.J., Scott, D., 2005. An empirical examination of the stakeholder strategy matrix. Eur. J. Mark. 39 (9/10), 1199–1215.

Pullman, M., Maloni, M., Carter, C., 2009. Food for thought: social versus environmental sustainability practices and performance outcomes. J. Supply Chain Manag. 45 (4), 38–54. (*).

Ras, P., Vermeulen, W., Saalmink, S., 2007. Greening global product chains: bridging barriers in the north-south cooperation. An exploratory study of possibilities for improvement in the product chains of table grape and wine connecting South Africa and the Netherlands. Prog. Ind. Ecol. – Int. J. 4 (6), 401–417. (*).

Roth, A.V., Tsay, A.A., Pullman, M.E., Gray, J.V., 2007. Unraveling the food supply chain: strategic insights from China and the 2007 recalls. J. Supply Chain Manag. 44 (1), 22–39.

Sarkis, J., Zhu, Q., Lai, K., 2011. An organizational theoretic review of green supply chain management literature. Int. J. Prod. Econ., 130, 1-15. (*).

Schiefer, G., 2002. Environmental control for process improvement and process efficiency in supply chain management – and the case of the meat chain. Int. J. Prod. Econ., 78, 197-206. (*).
Schliephake, K., Stevens, G., Clay, S., 2009. Making resources work more efficiently – the importance of supply chain partnerships. J. Clean. Prod., 17, 1257-1263. (*).
Schrader, C., Freimann, J., Seuring, S., 2011. Business strategy at the base of the pyramid. Bus. Strategy Environ. 21 (5), 281–298. (*).
Seuring, S., 2006. Supply chain controlling – summarizing recent developments in german literature. Supply Chain Manag.: Int. J. 11 (1), 10–14.
Seuring, S., 2011. Supply chain management for sustainable products – insights from research applying mixed methodologies. Bus. Strategy Environ. 20, 471–484. (*).
Seuring, S., Gold, S., 2012. Conducting content-analysis based literature reviews in supply chain management. Supply Chain Manag.: Int. J. 17 (5), 544–555.
Seuring, S., Müller, M., 2008a. From a literature review to a conceptual framework for sustainable supply chain management. J. Clean. Prod. 16 (15), 1699–1710.
Seuring, S., Müller, M., 2008b. Core issues in sustainable supply chain management – a Delphi study. Bus. Strategy Environ. 17 (8), 455–466.
Sharfman, M., Shaft, T., Anex, R., 2009. The road to cooperative supply chain environmental management: trust and uncertainty among pro-active firms. Bus. Strategy Environ. 18 (1), 1–13. (*).
Skjoett-Larsen, T., Thernøe, C., Andresen, C., 2003. Supply chain collaboration: theoretical perspectives and empirical evidence. Int. J. Phys. Distrib. Logist. Manag. 33 (6), 531–549.
Smit, A., Driessen, P., Glasbergen, P., 2008. Constraints on the conversion to sustainable production: the case of the Dutch potato chain. Bus. Strategy Environ. 17, 369–381. (*).
Solér, C., Bergström, K., Shanahan, H., 2010. Green supply chains and the missing link between environmental information and practice. Bus. Strategy Environ. 19, 14–25. (*).
Sonesson, U., Berlin, J., 2003. Environmental impact of future milk supply chains in Sweden: a scenario study. J. Clean. Prod. 11, 253–266. (*).
Tate, W., Ellram, L., Kirchoff, J., 2010. Corporate social responsibility reports: a thematic analysis related to supply chain management. J. Supply Chain Manag. 46 (1), 19–44. (*).
Teece, D.J., 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strateg. Manag. J. 28, 1319–1350.
Teece, D.J., Pisano, G., 1994. The dynamic capabilities of firms: an introduction. Ind. Corp. Change 3 (3), 537–556.
Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. Strateg. Manag. J. 18 (7), 509–533.
Trienekens, J.H., Wognum, P.M., Beulens, A.J.M., van der Vorst, J.G.A.J., 2012. Transparency in complex dynamic food supply chains. Adv. Eng. Inform. 26, 55–65.
Vachon, S., Klassen, R.D., 2006. Extending green practices across the supply chain. the impact of upstream and downstream integration. Int. J. Op. Prod. Manag. 26 (7), 795–821.
Vachon, S., Klassen, R.D., 2008. Environmental management and manufacturing performance: the role of collaboration in the supply chain. Int. J. Prod. Econ. 111 (2), 299–315.
van der Vorst, J.G.A.J., Beulens, A.J.M., 2002. Identifying sources of uncertainty to generate supply chain redesign strategies. Int. J. Phys. Distrib. Logist. Manag. 32 (6), 409–430.
Vasileiou, K., Morris, J., 2006. The sustainability of the supply chain for fresh potatoes in Britain. Supply Chain Manag.:Int. J. 11 (4), 317–327. (*).
Vermeulen, W., 2010. Sustainable supply chain governance systems: conditions for effective market based governance in global trade. Prog. Ind. Ecol. – Int. J. 7 (2), 138–162. (*).
Virtanen, Y., Kurppa, S., Saarinen, M., Katajajuuri, J., Usva, K., Mäenpää, I., Mäkelä, J., Grönroos, J., Nissinen, A. 2011. Carbon footprint of food – approaches from national input-output statistics and a LCA of a food portion J. Clean. Prod., 19, 1849-1856. (*).
Vlajic, J., van der Vorst, J.G.A.J., Haijema, R., 2012. A framework for designing robust food supply chains. Int. J. Prod. Econ. 137 (1), 176–189.
Wacker, J., 1998. A definition of theory: research guidelines for different theory-building research methods in operations management. J. Op. Manag. 16, 361–385.
Walker, H., Disito, L., McBain, D., 2008. Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. J. Purch. Supply Manag. 14 (1), 69–88.
Wang, X., Li, D., O'Brien, C., 2009. Optimisation of traceability and operations planning: an integrated model for perishable food production. Int. J. Prod. Res. 47 (11), 2865–2886.
Wiengarten, F., Pagell, M., 2012. The importance of quality management for the success of environmental management initiatives. Int. J. Prod. Econ. 140, 407–415.
Wiengarten, F., Pagell, M., Fynes, B., 2011. Supply chain environmental investments in dynamic industries: Comparing investment and performance differences with static industries. Int. J. Prod. Econ. 135 (2), 541–551.
Winter, S.G., 2003. Understanding dynamic capabilities. Strateg. Manag. J. 24 (10), 991–995.
Wiskerke, J., Roep, D., 2007. Constructing a sustainable pork supply chain: a case of techno-institutional innovation. J. Environ. Policy Plan. 9 (1), 53–74. (*).
Wognum, P., Bremmers, H., Trienekens, J., van der Vorst, W., Bloemhof, J. 2011. Systems for sustainability and transparency of food supply chains – current status and challenges. Adv. Eng. Inf., 25, 65-76. (*).
Wolfert, J., Verdouw, C., Verloop, C., Beulens, A., 2010. Organizing information integration in agri-food – a method based on a service-oriented architecture and living lab approach. Comput. Electron. Agric., 70, 389-405. (*).
Wu, Z., Pagell, M., 2011. Balancing priorities: decision-making in sustainable supply chain management. J. Op. Manag. 29 (6), 577–590. (*).
Yakovleva, N., 2008. Measuring the sustainability of the food supply chain: a case study of the UK. J. Environ. Policy Plan. 9 (1), 75–100. (*).
Zanoni, S., Zavanella, L., 2012. Chilled or frozen? Decision strategies for sustainable food supply chains. Int. J. Prod. Econ. 140 (2), 731–736. (*).
Zhu, Q., Cordeiro, J., Sarkis, J., 2012. Institutional pressures, dynamic capabilities and environmental management systems: Investigating the ISO 9000 – environmental management system implementation linkage. J. Environ. Manag., 1–11.
Zhu, Q., Sarkis, J., 2004. An inter-sectoral comparison of green supply chain management in China: drivers and practices. J. Clean. Prod. 14 (5), 472–486.
Zhu, Q., Sarkis, J., Lai, K., 2008. Confirmation of a measurement model for green supply chain management practices implementation. Int. J. Prod. Econ. 111, 261–273. (*).
Zhu, Q., Sarkis, J., Lai, K.-H., 2011. An institutional theoretic investigation on the links between internationalization of Chinese manufacturers and their environmental supply chain management. Int. J. Prod. Econ. 55 (6), 623–630.
Ziggers, G.W., Trienekens, J., 1999. Quality assurance in food agribusiness supply chains: developing successful partnerships. Int. J. Prod. Econ. 60, 271–279.