

Assessing the rigor of case study research in supply chain management

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Abstract

Purpose – This paper aims to assess the current practice in research on supply chain management applying a case study method. Two particular research fields, namely sustainable supply chain management (SustSCM) and performance supply chain management (PerformSCM), are used as examples.

Design/methodology/approach – The paper is based on a content analysis, where quality criteria for documenting case study research are analyzed. A total of 68 papers from the two research fields (51 SustSCM and 17 PerformSCM) forms the sample. The criteria of analysis chosen are taken from the case study research process.

Findings – There are two major findings: first, supply chain researchers have to make a greater effort to collect data from supply chains (i.e. at least two, or better, three or more stages of the supply chains). Second, the research process needs to be more comprehensively documented in related peer-reviewed journal publications. This way, the value of case study based research might be appreciated more, as well enabling stronger conclusions to be drawn on the individual piece of research.

Research limitations/implications – The research presented focuses on two particular fields inside SCM. However, the observations made that methodological rigor is often lacking in the papers holds for both fields.

Originality/value – The paper contributes to the further development of appropriate empirical research strategies for supply chain management.

Keywords Supply chain management, Economic sustainability, Performance management, Case studies, Research method

Paper type Research paper

1. Introduction

While supply chain management has received much attention, few examples can be found where “real” supply chains capturing at least three stages are described and analyzed in empirical research. The term “stage” is used here to comprise focal companies as well as *n*-tiers of suppliers and/or *n*-tiers of customers (see the term used in the same meaning, by, for example, Catalan and Kotzab, 2003; Narayanaswamy *et al.*, 2003). Taking a brief look at different research strategies (Yin, 2003, p. 5), case studies can be comprehended as a particularly useful approach for assessing “real world” examples (McCutcheon and Meredith, 1993). Case studies allow direct observation of the field, which would be particularly suitable for approaching several stages of a supply chain. Case study research has often been criticized for its lack of rigor (Ellram, 1996). Still, if the research process is carried out in a structured way and is well documented then case study research will continue to allow the in-depth analysis of contemporary phenomena. For ensuring rigor,

quality criteria have been put forward which should be obeyed. These comprise, for example, case selection, data collection, validity and reliability. Taking up this research process and related quality criteria should enable “useful” case study research in supply chain management.

The importance of case based research has been highlighted by a number of authors for operations (McCutcheon and Meredith, 1993; Stuart *et al.*, 2002; Voss *et al.*, 2002) and logistics management (Ellram, 1996) and supply chain management (Hilmola *et al.*, 2005, Seuring, 2005) in recent years. In line with the general methods of case study research (Yin, 2003) and its outline for management related research (e.g. Eisenhardt, 1989) the process of case study research is discussed. This process has to be conducted in a structured way to ensure rigor and quality of the research. Looking at case study publications, a frequent observation is that the research process is only described as a minor issue, if it is mentioned at all.

The aim of the paper is to analyze to what degree case study research in supply chain management is conducted and whether it is presented in a rigorous manner in related peer-

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reviewed journal publications. As an analysis of all related publications would be too broad, two particular fields are selected:

- 1 supply chain performance management (PerformSCM); and
- 2 sustainable supply chain management (SustSCM).

In both fields, a key word or title word search for related publications was performed. Case-related papers were selected for the further analysis, which was conducted by means of a content analysis. This leads to the following structure of the paper. The first section briefly introduces supply chain management. Next, the research method applied within this paper, i.e. content analysis, is discussed. The case study methods are summarized to allow identifying the analytic dimensions and respective categories used for the content analysis. The subsequent section briefly justifies the selection of the two fields (i.e. sustainable supply chain management and supply chain performance management) analyzed in detail and provides details how related publications were selected. Then, the analysis is presented, which is structured in accordance to the case study research process described above. This will help point out how “better” case based research in supply chain management can be conducted.

2. A brief background on supply chain management

Supply chain management has developed into a major conceptual approach inside management and business administration. As a basic comprehension, the following definition(s) will be taken up: “Supply chains are a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer” (Mentzer *et al.*, 2001, p. 3). And “supply chain management (SCM) is the integration of these activities through improved supply chain relationships, to achieve a sustainable competitive advantage” (Handfield and Nichols, 1999, p. 2).

Based on their review, Mentzer *et al.* (2001, p. 7) propose that supply chain management has the following characteristics:

- 1 a systems approach to viewing the supply chain as a whole, and to managing the total flow of goods inventory from the supplier to the ultimate customer;
- 2 a strategic orientation toward cooperative effort to synchronize and converge intra-firm and inter-firm operational and strategic capabilities into a unified whole; and
- 3 a customer focus to create unique and individualized sources of customer value, leading to customer satisfaction.

While the debate on theory development in supply chain management has already started (e.g. Croom *et al.*, 2000; Chen and Paulraj, 2004; Mentzer *et al.*, 2004), related advancements in research approaches have rarely been addressed (see, for example, the papers in Kotzab *et al.*, 2005). Further, the questions arise regarding what distinguishes research on supply chain management from research in other management fields. As supply chains comprise several companies, one major requirement might

be that data collection is carried out across several stages of the supply chain, irrespective of the specific research design applied. Selecting one particular research design, i.e. case study research, would provide a flexible and customizable approach for related supply chain research (Seuring, 2005), justifying the already stated research aim.

While editorial boards of journals often have preferences for specific empirical research approaches, *Supply Chain Management: An International Journal* as one prominent example encourages case research related papers (see www.emeraldinsight.com/info/journals/scm/notes.jsp). Similar analysis is missing so far. Hilmola *et al.* (2005) present a related piece of work, which complements the methodology driven approach taken here by looking at whether and how case study papers have contributed to theory development. In particular, they analyze whether a deductive or an inductive approach was taken and what kind of data (qualitative or quantitative) was used. Yet, the research process is not assessed.

3. Research methodology

For the research methodology, two issues need to be addressed. First, content analysis is described, as this is the method applied for the research presented in this paper. Second, case study research needs to be briefly outlined, as this research strategy was applied in the analyzed papers. The different steps of the case study research process provides the analytic dimensions used in the content analysis. Jauch *et al.* (1980) have argued on the suitability of such an approach allowing detailed insights beyond the single case.

3.1 Content analysis

The research process conducted will be described according to the five steps outlined by Stuart *et al.* (2002). While the authors use this for case study research, it is a general approach suitable for different empirical research methods.

“Content analysis is the research technique for the objective, systematic, and quantitative description of the manifest content of communication” (Berelson, 1952, p. 55). Peer-reviewed journal articles form a typical mode of communication among researchers, so they form a relevant unit of analysis. The analysis of documents pursues the aim of opening up material that does not have to be created on the basis of a data collection by the researcher. One problem is derived from the challenge that it is impractical to read everything. Only for emerging or narrowly defined issues might it be possible to provide complete reviews. Hence, two particular fields inside supply chain management were chosen to conduct the analysis.

The research is driven by theoretical pre-considerations and follows a clear process, as this allows conclusions to be drawn on the analyzed material. A process model for content analysis (Mayring, 2003, p. 54; see also Neuendorf, 2002, pp. 50–51) comprises the following four steps:

- 1 *Material collection* – The material to be collected is defined and delimited. Furthermore, the unit of analysis (i.e. the single paper) is defined.
- 2 *Descriptive analysis* – Formal aspects of the materials are assessed, for example the number of publications per year. This forms the background for the theoretical analysis.

- 3 *Dimension selection* – Structural dimensions and related analytic categories are selected, which are to be applied in the literature review to structure the field.
- 4 *Material evaluation* – The material is analyzed and sorted according to the structural dimensions and categories built. This should allow identification of relevant issues and interpretation of results.

This process was followed in the study. As it would not be feasible to assess all case study papers published in supply chain management, two particular fields were chosen:

- 1 sustainable supply chain management; and
- 2 supply chain performance management.

Both can be justified in that they only emerged within about the last ten to 15 years, so the overall number of publications is still limited. For both fields, the period from 1990 to 2005 was taken into account. A systematic search for papers was conducted by means of a key word search in major databases (e.g. EBSCO, but also the publisher databases such as Emerald, Blackwell Synergy, Elsevier Scencedirect, Taylor and Francis, Wiley).

For the field of supply chain performance management the search was then restricted to searching for “supply chain” and “performance” in the title of the paper, as specially “performance” is very frequently used as a key word. Otherwise, the results would have been overwhelming, yielding a data basis that could not have been handled. Based on the search process, papers could even fall into both research fields, although only three such examples were found, all with one author in common (Zhu and Sarkis, 2004; Zhu *et al.*, 2005; Hervani *et al.*, 2005). A second reason for selecting these two particular fields is that they form two major streams of research that the current he author works in. Hence, the author has a detailed knowledge of the field already, which allows an analysis of the material in the respective contexts.

The limitations of the method are almost obvious: “Content analysis is reliant on the multiple judgments of a single analyst [...] keen to find support for a particular view of the data” (Brewerton and Millward, 2001, p. 153). This risk can be reduced by involving two or more researchers when searching for and analyzing the data. This helps to ensure the validity and reliability of the research. In this particular case, the detailed analysis of the papers was conducted involving master students. For each field, two students were involved to analyze the material. Thereby, a total of three persons assessed the material in each field. Instead of calculating the inter-coder reliability, each difference in coding of the material was assessed by the research team and checked for the categorization. This way, all differences could be eliminated.

After this short overview about the research design of a document analysis and the method of content analysis, this is applied to the body of literature on sustainable supply chain management and supply chain performance management. The single dimensions and categories for the analysis will be selected by building on the case study research process.

3.2 Defining case study research

“A case study is an empirical enquiry that (1) investigates a contemporary phenomenon within its real life context, especially when (2) the boundaries between phenomenon and context are not clearly evident” (Yin, 2003, p. 13). Case studies are used as a research method if contextual factors are taken into account but at the same time limit the extent of the

analysis (Eisenhardt, 1989; Voss *et al.*, 2002). Applying a flexible, sometimes even opportunistic research strategy is one of its major strengths, but might also be a major weakness of case study research, in particular, if the process is not well documented.

Linking this to the research cycle of description, explanation and testing (Meredith, 1993), one can look at what kinds of insights can be gained from case study research. It is evident that case study research investigates a contemporary phenomenon in its real life context (Yin, 2003), so that, for example, existing theories might be taken up to gain a first insight into the phenomenon studied. Case studies can be used for different purposes. Yin (2003, p. 3) distinguishes three types of case studies:

- 1 an exploratory case study is aimed at defining the questions and hypotheses of a subsequent study (not necessarily a case study) or at determining the feasibility of the desired research procedure;
- 2 a descriptive case study presents a complete description of a phenomenon within its context; and
- 3 an explanatory case study comprises data bearing on cause-effect relationships – explaining how events happened.

Furthermore, Yin (2003, pp. 40-7) suggests case selection based on the following criteria. A single case can serve as a critical example:

- if it forms an extreme or unique case (e.g. if not many cases are available);
- if it forms a typical or representative case, standing as an example of a wider group of cases;
- if it is a revelatory case, where the investigator has an opportunity to observe and analyze a phenomenon so far inaccessible to scientific investigation;
- if it provides a longitudinal case studying two or more points in time; or
- if it stands as a pilot in a multi-case setting.

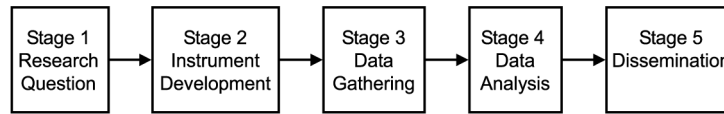
In contrast, multiple cases often use a replication logic, but can also be used to select typical cases within a certain domain (Eisenhardt, 1989). In this context, the question arises whether rather a single case is studied on an in-depth and interpretative basis (Klein and Myers, 1999) or whether a more positive multi-case design is chosen (Dyer and Wilkins, 1991; Eisenhardt, 1991).

3.3 The case study research process

The research process for case studies is similar to those used for other (empirical) research. Stuart *et al.* (2002, p. 420) propose a five-stage research process (see Figure 1) and explain in detail how each step should be carried out when conducting case study research (for similar descriptions, see, for example, Yin, 2003; Eisenhardt, 1989; Mentzer and Kahn, 1995; Ellram, 1996; Voss *et al.*, 2002).

It should be emphasized that while a linear, sequential approach is chosen, not only but in particular in case study research, the actual process might have to repeat several stages. While starting at one research question and/or collecting some evidence on a social or organizational phenomenon, the researcher might have to return to a previous research stage, yielding a much more iterative process (Golden-Biddle and Locke, 1993). This might then over time allow theoretical constructs to form (Van Maanen, 1979).

Figure 1 The five-stage research process model



Source: Stuart *et al.* (2002, p. 420)

3.4 Ensuring quality of case study research

The quality of research designs is ensured by aiming for validity (i.e. is the stated evidence valid?), and reliability (i.e. is the stated evidence correct?) (Mayring, 2002, p. 140; Yin, 2003, p. 34). Mayring (2002, p. 141) emphasizes the specific problems in ensuring objectivity and reliability of qualitative research and measure-related performance. The excellence of qualitative research is addressed especially through procedural reliability and validity (Stuart *et al.*, 2002). This has led to a debate on related quality factors (Mayring, 2002, p. 144; Mentzer and Flint, 1997). In line with other authors, Mayring (2002, p. 144) proposes six quality factors for qualitative research:

- 1 process documentation;
- 2 safeguarding interpretations by arguments;
- 3 research process structured by rules of conduct;
- 4 closeness to the study item;
- 5 communicative validation; and
- 6 triangulation.

For case study research, Yin (2003, p. 34) outlines how validity of the research can be ensured. He proposes three types of validity:

- 1 construct validity;
- 2 internal validity; and
- 3 external validity.

These three types of validity are applied during different stages of the research process, as reliability and validity are ensured by a clearly structured research process. The issues outlined in this section will be taken up in the three cases presented below to illustrate such research.

3.5 Selecting analytic dimensions based on case study research

Based on this research process, the following criteria will be used to assess case study based publications on supply chain management. The applied criteria (see Table I) are frequently presented and discussed in related publications, so taking them up is a deductive step in the content analysis. The analytic dimensions and related categories are not discussed in detail here as comprehensive descriptions can be found in the literature already cited.

In most dimensions, papers could have been assigned to more than one category, so the total count presented later in the paper can exceed the number of papers. In many instances, the information search for in the content analysis was not openly stated in the paper. It was given rather implicitly and could only be concluded on by reading the papers, as authors did not state related details in the description of their research process. As one example, the theoretical aim was concluded to be exploration when the authors did not mention one at all, but instead provided a case study to illustrate some conceptual findings.

Table I Analytic dimensions and related categories for the content analysis

Dimensions	Categories
Stage 1: Research question	
Theoretical aim	Exploration, theory building, theory testing, theory extension
Stage 2: Instrument development	
Cases	Number of cases, embedded units and stages of the supply chain where data was collected
Case selection	Single cases: unique case, representative case, revelatory case, longitudinal case, pilot case for multi case design Multiple cases: unique case, representative case, revelatory case, longitudinal case
Stage 3: Data gathering	
Data gathering techniques	Open interview, semi-structured interview, structured interview, questionnaire, documents/websites/publications, direct observation, participant observation
Stage 4: Data analysis	
Data analysis	Transcription, use of software, cross-case analysis
Stage 5: Dissemination/overall process	
Case quality	Construct validity, internal validity, external validity, reliability

4. Case study research in the two research fields

To select case study related papers, each paper was unambiguously assigned to one research methodology, where five categories were distinguished:

- 1 conceptual;
- 2 case study;
- 3 survey;
- 4 model; and
- 5 literature reviews.

Table II shows the absolute number of papers as well as the fraction of the particular research method. It should be noted that papers which provide empirical evidence as their

Table II Research methodologies applied in the two fields

Research field	Total	Case			Literature review	
		Concept study	Survey	Model		
PerformSCM	149	32 (21)	17 (11)	63 (42)	37 (25)	0
SustSCM	130	29 (22)	51 (40)	33 (25)	13 (10)	4 (3)

Note: Figures in parentheses are percentages

illustration(s) were also counted as case-related papers. As will be pointed out later, such papers often lack a rigorous presentation of the research methodology employed. Yet, the authors usually draw on their experience in the field, which justifies the labeling of these papers as case study related. This was only done if the case content was of significant length and importance. If, for example, the conceptual content dominated, such papers were categorized as such.

The contrasts between applying different research methodologies in the two fields are intriguing. The more “traditional” field of supply chain performance management is well in line with the field of logistics management, where frequently a market share of more than 40 percent (Kotzab, 2005) or even 50 percent (Mentzer and Kahn, 1995) for survey based papers in the *Journal of Business Logistics* was seen. Regarding the literature on sustainable supply chains, this picture is quite different and quite in contrast to the typical share of research methodologies in logistics and supply chain management. The field is dominated by case based research, which has a share of 40 percent. While theoretical/conceptual papers have a similar fraction, survey and in particular modeling papers are much less published.

Yet, even for supply chain performance management 17 case study papers could be identified. As the aim of this research is not statistical generalization but observing patterns of how case study research is applied in supply chain management, the 1:3 ratio is not seen as a significant obstacle.

4.1 Case studies in supply chain performance management

Following the saying that “What gets measured can be managed!” the interest in supply chain performance measurement and management is no surprise. As operational processes are more and more dispersed over several stages of the supply chain, the selection and evaluation of suppliers performance as well as the overall supply chain performance are examined. Here the term is basically comprehended by designing and running a performance management system across different members of a supply chain. The title word search yielded a total of 149 papers for the period 1990-2005. For the years from 1990 to 1994 no related papers were found. Looking at the overall sample, the publication of 17 or more papers for each year in the recent six-year period 2001-2005 can be interpreted as a stable interest in the topic. There is an upward trend in interest, still, as 2004 saw 25 papers and 2005 even 30 papers published. Out of these 149 papers, 17 papers presented case-related evidence.

Looking at the content of the papers, it is evident that most concentrate on presenting some performance indicators applied in a specific situation. As 12 papers present data collected at focal companies only, the outreach of the performance indicators is towards the supply chain, but this is not reflected in the empirical research process.

4.2 Case studies in sustainable supply chain management

Sustainable supply chain management is comprehended as the integration of sustainable development and supply chain management. Sustainable development is often described as containing three dimensions, i.e. integrating environmental, social and economic issue for human development, which also impacts corporate strategy and action (Dyllick and Hockerts,

2002). Merging this with supply chain management, environmental and social aspects along the supply chain have to be taken into account, thereby avoiding related problems, but also looking at more sustainable products and processes (see, for example, Green *et al.*, 1998; McIntyre *et al.*, 1998; Hamprecht *et al.*, 2005; Simpson and Power, 2005).

The total number of publications utilized for this literature review is 130 published across the time period 1994-2005. Case-related material is presented in 51 of these papers, thereby holding a share of 40 percent of the total number of publications. As mentioned already, this makes it the most often applied research methodology in the field of sustainable supply chain management. While it is not possible to provide insights into all 51 papers, a look at the journals is quite interesting. Thirty-three have been published in environmental management related journals, 13 in traditional operations, logistics and supply chain management journals, while six were printed in business ethics related journals.

5. Assessing the case study research process

This section will take a look at the case study process. The dimensions identified previously will be applied to the materials. While the two fields have been introduced separately before, they will now be discussed at the same time, which also allows identification of some similarities and differences. The five dimensions will be used to structure the discussion. To condense some of the arguments, tables and figures will be used to give the status for each field and to allow them to be compared.

Before looking at the dimensions identified in section 3, one more descriptive criterion must be mentioned: looking at whether the papers describe the methodology at all. By checking whether they contain a related part, it emerged that 12 of the 17 PerformSCM papers do so, while this is only the case in 19 of the 57 SustSCM papers. Environmental management related journals, where most of these papers appeared, seem to pay less attention to these, once “traditional” journals.

5.1 Theoretical aim

As outlined in the section on case study research, the theoretical aim of the paper should be stated. Table III highlights that exploration dominates in both fields with about 67 percent of the total assignments, which are based on both the explicit statements of authors as well as the implicit aims concluded from the description given in the papers. Rather new areas of research, such as exploratory research, are to be expected. Still, this would be an issue for enhancing future research and would aim more towards theory building, testing and extension. Both fields might have to draw on existing management theories to a greater extent.

5.2 Case selection

A similar picture results for the next dimension. Here, the claim that the case is representative of the field clearly dominates. For supply chain performance management, 15 of the 17 papers are assigned to this category, while the other two are revelatory ones. The figure is 37 (of 51) for sustainable supply chain management. Yet, researchers in this field quite often claim that they have unique cases. One line of arguments is that greening a supply chain is quite different

Table III Theoretical aim of the papers

Theoretical aim	Exploration		Theory building		Theory testing		Theory extension	
	Explicit	Implicit	Explicit	Implicit	Explicit	Implicit	Explicit	Implicit
PerformSCM	13	8	2	1	2	1	0	0
SustSCM	13	25	7	4	6	4	0	2

from “conventional” supply chain management, as, for example, additional information flows to suppliers are needed to inform and even educate them about environmentally sound production processes and product requirements (Handfield *et al.*, 1997). In several papers, and being applicable to both fields, cases sometimes just appear. There is rarely a justification regarding why a particular case was studied. This then continues into the number of cases. Again the number is simply mentioned, and there is no clear justification whether a single or a multi case study design was chosen.

For the number of cases, this could be concluded from the description given, as this was more difficult for the number of embedded units and sometimes also for the stages of the supply chain. In some cases, this could be concluded, while in others, it was not possible to determine what the researcher/s was/were striving for.

There is an almost equal number of single and multi case designs, as nine of 17 PerformSCM and 25 of 51 SustSCM papers present more than one case (see Table IV). There are pleasant examples of multi-case design, such as the paper of Cox *et al.* (2004), who used a total of 12 case studies. Yet, there is a great imbalance in collecting data from just one stage of the supply chain, as 12 of 17 for PerformSCM and 31 of 51 for SustSCM papers describe such cases (see Table V).

For the survey, research questionnaires are sent out to just one stage of the supply chain, which is comprehended as the relevant access point for drawing conclusions. Just to emphasize and reiterate the point, none of the surveys found in the literature search aimed at data collection from more than one stage of the supply chain. Beyond the case-related papers, just one modeling paper could be identified, where the model developed was validated with empirical data based on more than one company (Fichtner *et al.*, 2004). Case-based research offers much more flexibility in the research design to gain access to a longer part of the supply chain. Still, the politics of access to the field might hinder this, as a company researched might not like, or even forbid, researchers access to suppliers and/or customers. In most cases, researchers would not report this, as they usually have to get the paper approved by the companies studied. A second issue is the geographical dispersion of supply chains. In many cases, parts will be sourced from other regions of the globe, where it is difficult or impossible for the researcher to gain access to the field. Yet, in both fields related examples are found, as Table V outlines. Some examples will be portrayed below.

Table IV Number of cases of the supply chain(s) studied

Number	1	2	3	4	5	More
PerformSCM	8	0	3	2	2	2
SustSCM	26	5	4	3	4	11

Table V Number of stages of the supply chain(s) studied

Number	1	2	3	4	5	6	7
PerformSCM	12	2	0	2	0	0	1
SustSCM	27	15	4	2	1	1	1

For supply chain performance management only two papers look at dyadic relationships (Holmberg, 2000; Jonsson and Gunnarsson, 2005) and just three papers have accessed more than two companies in a supply chain situation (Harland, 1997; Batt, 2003; Catalan and Kotzab, 2003). The three latter papers will be briefly presented. Harland (1997) researched on the spare parts (aftermarket) supply chain in the automotive industry in Spain and the UK. Four cases (two UK, two Spain) were included, where four stages of the supply chain were assessed: component manufacturer, area distributor, local distributor, and a set of ten installers or garages for each case. Batt (2003) studies the potato chain in Vietnam, where stages of the potato distribution chain were taken into account for the data collection. Starting at the farmers, all subsequent stages are wholesalers and retailers. The most comprehensive research design has been presented by Catalan and Kotzab (2003), who studied the Danish mobile phone supply chain. In their detailed description of their research approach, they talk about 17 cases. I would reinterpret this to just one case, as they discuss all evidence as one issue later in the paper, where seven stages of the supply chain were analyzed. The authors even present how the 17 companies are assigned to the different stages of the mobile phone supply chain. Still, this paper is also different, as it looks at an overall supply chain environment, where the companies accessed are not necessarily operating in one joint supply chain.

In literature on sustainable supply chain management, two or more stages of the supply chain have been accessed a total of 24 times. Interestingly, most of these papers deal with farming products which are either used in food or for apparel production (i.e. cotton). In 15 cases, dyadic relationships were accessed by the researchers. Four papers looked at three stages (Stainer *et al.*, 1998; Seuring, 2001; Danse and Wolters, 2003; Seuring *et al.*, 2004). Two papers research four stages. Kogg (2003) deals with the production of organic cotton apparel. Kogg made a four-week field trip to Peru, where she interviewed all relevant players from four stages of the cotton supply chain, i.e. farmers, ginners, spinners, and staff members of a focal company operating the supply network. This is in many regards mirrored in the paper of Goldbach *et al.* (2003). Also dealing with the organic cotton supply chain, data was collected for fiber production (farmers), spinning, fabric and apparel production, and retailing. Mintcheva (2005) examines five stages of ketchup production (farming, tomato paste production, ketchup production) as well as consumption and end-of-life issues,

thereby capturing five stages of the supply chain. Jones (2002) deals with six stages in the supply and distribution chain up to the final customer. Narayanaswamy *et al.* (2003) have a similar design looking at seven stages of the wheat and starch chain.

There is no clear explanation why the field of sustainable supply chain management has attracted researchers to conduct case study research to such a degree, as well as to assess several stages of the supply chain. Twenty-four (18 percent) out of the 130 papers in total present related evidence, which is both in absolute and relative terms a higher number than the case-related research that has been published in supply chain performance management. One explanation might be that conventional supply chains usually end where unspecified commodity products are purchased. There is no need to integrate beyond this (see, for example, the critical analysis by Fawcett and Magnan, 2002). Yet, environmental impacts and social problems might be found at earlier stages of the supply chain, which might lead to pressure from non-governmental organizations (Preuss, 2001; Rao, 2002). Hence, this can be seen as a trigger to include such stages of the supply chain, where case studies offer a suitable research strategy, thereby partly explaining the large degree of cases in the SustSCM field.

5.3 Data gathering techniques

In this analytic dimension, the first issue is that in 23 instances for sustainable supply chain management (44 percent) and four papers on supply chain performance management, no information is given at all (see Table VI). The authors leave it completely open how related data was collected, thereby impacting on the quality of the papers. For the papers offering information, several techniques can be employed while conducting research on a certain case, so each paper could be assigned to several categories. Interviews, whether open, semi-structured or structured, are clearly the dominant data gathering technique (used 27 (= 15 + 7 + 5) times for SustSCM, and 12 times (= 4 + 3 + 5) for PerformSCM). The second most important technique is analyzing documents, websites and publication, applied 16 times (SustSCM) and six times (PerformSCM) respectively. Other data collection methods hardly play a role in the research process. In line with encouraging more case research, Näslund (2002) has encouraged action research approaches, but no related research has been presented in either of the two fields. The few papers mentioning participant or direct observation might point towards this.

5.4 Data analysis

Such deficits in describing the research process continue into the final two dimensions of the research process. In these dimensions a paper could be assigned to more than one category. In a well-written paper, authors would state whether

and which techniques were used for data analysis. Such information would be found while reading the paper but cannot be concluded on immanently.

Most intriguing is that a great number of papers do not mention related issues at all, which is the case 36 times for sustainable supply chain management and seven times for supply chain performance management. Among the three categories, transcription of the collected information is frequently mentioned (nine times for SustSCM, seven times for PerformSCM). A few cases report that the transcribed information was reviewed and approved by informants or external experts. This is well explained in Catalan and Kotzab (2003), for example.

5.5 Case quality

Again, related information should have been clearly stated by the authors of the papers. Staying with the no-shows, the issue of case quality is not addressed in 46 (88 percent) SustSCM and 11 (65 percent) PerformSCM papers. Such high numbers can be taken as one reason why papers on case study research justify its relevance and quality against a loss of credit (McCutcheon and Meredith, 1993). Still, good discussions of such issues are available (see, for example, McCarthy and Golicic, 2002; Catalan and Kotzab, 2003 for PerformSCM, and Handfield *et al.*, 1997, for SustSCM). Problems in this regard seem to be most obvious in sustainable supply chain management related papers appearing in environmental management and business ethics related journals. Hardly any of these publications mention how the quality of the research was ensured. This is somehow strange to observe, as all of these journals have a peer-review process.

6. Discussion

6.1 Weaknesses and strengths of case research on supply chains

Taking a look at the analysis just presented, a great deal of case study research on supply chain management as presented in the two research fields could be described as:

- dealing with a single case selected for unknown reasons;
- just one stage of the supply chain is approached; and
- data collection via a few interviews and an analysis of the company website.

Furthermore, it is unclear:

- how the data was analyzed; and
- how the rigor of the research was ensured.

This makes case study related publications vulnerable to objections coming from researchers using other empirical approaches such as surveys and (at least partly) mathematical modeling. Researchers in the field should take much more care in their procedures by following the guidelines proposed in related textbooks and journal papers. One reason for not

Table VI Data gathering techniques employed

	Open interviews	Semi-structured interviews	Structured interviews	Questionnaire	Documents, websites	Direct observation	Participant observation	No information given	Total
PerfSCM	4	3	5	3	6	1	2	4	28
SustSCM	15	7	5	4	16	5	3	23	78

Note: If just an interview was mentioned, this was counted as an open interview

describing the research process in detail might be the limited availability of space for journal papers. Authors (as well as editors and reviewers) might regard the content of the research as more relevant than information on the research process. In such instances, a brief table summarizing the most important issues might be an appropriate solution, thereby avoiding a lengthy description.

Problems in access to a certain company and their supply chains are straightforward. As mentioned already, studying one company might prohibit access to competitors, who could form a further case. Also, access to suppliers and customers might be forbidden. Here, a balance between the depth of the single case related analysis and the width of the overall research has to be maintained. A debate between the depth and width of such research was carried out years ago (see Eisenhardt, 1989, comments on this paper by Dyer and Wilkins, 1991, and the reply by Eisenhardt, 1991).

From working with the papers, researchers are encouraged to deal with such decisions in a much more active way. Many authors seem to not have this in mind. In some cases, they might be tracked into a certain case without knowing that they will later on write about it. This is not a critique as such. Building relations with people to gain company insights is frequently required before the case can be researched. Yet, in such processes, the researchers should be aware of their role and should be able to reflect on it and document it later (Johnson *et al.*, 1999). In several cases, researchers might have to present a kind of post-rationalization of the research process. Again, this can be seen as a major drawback of case study research, but it also forms part of its strength.

This strength can be seen by the issue that hardly any other paper from all those taken into account from the supply chain performance management as well as the sustainable supply chain management literature collected information from more than one stage of the supply chain. In both fields, several case research examples have found ways to get access to several stages of the supply chain, which moderates the critique mentioned above.

6.2 The content of the research

Regarding the evidence presented in the case studies, again a major drawback can be observed. Quite a number of papers from both fields tell success stories. This is even more prevalent in the sustainable supply chain management publications. Some researchers seem to be overly optimistic about some observations, which are then mixed with normative positions on “how the state of the world should be”. One explanation, again applying to both fields, comes from the kind of access to the empirical field. Companies featured in case study research do not like to read what went wrong. They prefer being presented in a well suited manner. This problem can partly be solved by presenting anonymous data, but even then real critical incidents or problems may seldom be mentioned.

One particular interrelation between the process and the content of the research has to be addressed. As usually only a few cases can be studied, analytic generalization (the opposite to statistical generalization, which is used in survey research) is applied in case study research (Yin, 2003; Eisenhardt, 1989). Yet, for ensuring the validity and reliability of the research, the presentation of the process is of key importance. This way, better stories and better constructs can be reached (Dyer and Wilkins, 1991; Eisenhardt, 1991).

7. Conclusion

In research on supply chain management a considerable number of case-based papers have been published. Case study research as a methodology has been fully developed and the research process can be carried out and documented in a rigorous way. The application of case study research in the two fields of supply chain performance management and sustainable supply chain management is often presented in an unsystematic manner. The analysis presented in this paper shows that authors often do not even provide basic information about the research process. Hence, better documentation of this process is encouraged. This would help in two ways:

- 1 it would avoid case study research being criticized for not being rigorous; and
- 2 it would allow readers to assess the quality of the research presented and appreciate analytic generalizations offered.

While several well-conducted and described examples could also be found, case study researchers are encouraged to use the strength of case based research. The flexibility in the specific research design allows accessing supply chains at various stages and with a range of data gathering techniques. This should be used to enhance the understanding of supply chain management through empirical research, which is still much needed. Here, the case study method offers some advantages which can hardly be met by other research approaches.

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