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# Transaction costs detailed: single-industry studies and operationalization

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## Abstract

**Purpose** – This paper aims to present an in-depth review on the latest state of empirical research in transaction cost economics (TCE), focusing on single-industry studies. The intensely discussed subject of operationalization of transaction costs is critically assessed, and a concept of how to increase the quality of findings in empirical studies is presented.

**Design/methodology/approach** – The sample was obtained by a literature research and review in high-class media and submitted to in-depth quantitative and qualitative analysis such as content analysis.

**Findings** – The findings are in part unexpected and substantially contribute to research: applicability of TCE to a broad range of industries is found, the majority being large industries with important markets. Most studies support TCE statements, some suggesting theory extension by complementary aspects. Operationalization of transaction costs remains a field requiring further research.

**Research limitations/implications** – First, this article is condensed and therefore limited to single-industry studies within TCE, understanding “industry” as a specialized field of activity. The question of industry boundaries may be a base for future research. Second, the subject of operationalization of transaction costs still requires further research.

**Practical implications** – Decision makers can continue to use TCE for various applications such as strategic alliance, vertical integration, governance choice, make-or-buy or contract choice questions. A shortcoming in most articles reviewed is the presentation of the industry’s characteristics. Authors need to consider them in order to increase the qualitative level of single-industry studies.

**Originality/value** – This paper provides significant insight into the field of single-industry TCE studies. As a result of penetrating research in high-class media and in-depth analysis, the paper provides highly structured and intensely examined statements on existing literature and related findings, which support TCE statements and will lead current disputes in the literature to a further stage.

**Keywords** Transaction cost economics, Single-industry studies, Operationalization, Budgeting, Cost analysis

**Paper type** Literature review

## 1. Introduction

In recent decades, experts have paid considerable attention to the subject of transaction cost economics (TCE). Growing numbers of publications on this theoretical approach

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clearly show TCE as a significant contribution to understanding the nature of a firm. Additionally, the number of citations of Williamson's early works of approximately 500 per year (David and Han, 2004) clearly indicates that TCE has become one of the leading perspectives in the study of management and organizations. Finally, through awarding Williamson the Nobel Prize for Economics in 2009, TCE is now proven to be a fully established theory within Economics. Experts have also undertaken considerable empirical research in order to verify its statements. The number of such empirical papers has increased enormously over the years, also recently (Kamyabi and Devi, 2011; Ashill and Jobber, 2010; Bosch, 2010; Gibbons, 2010; Mellewigt and Das, 2010; Mooi and Ghosh, 2010; Goo *et al.*, 2009; Tate *et al.*, 2009), such that the publication of numerous reviews of empirical work based on TCE is not unexpected.

All tables and figures referred to in the text, as well as the complete references of the sample considered in this article, are available as supplement only online. Table AI can be seen as the very base of the following literature review. It underlines the variety of empirical works, research questions and industries analyzed with TCE over the last years as well as the broad range of results obtained from the different approaches.

However, this paper is different from other existing works addressing this point: first, it is the first in-depth literature review in this field concentrating on single-industry studies. As yet, no consistent, profoundly structuring analysis and detailed literature review of single-industry studies in the field of TCE exists. While the literature contains many publications in this field, this is not the case for systematic reviews in this particular field of the literature (David and Han, 2004). This gap can be considered as a serious lack of research for the following reasons:

- Single-industry studies focus on one industry and are therefore promising in providing more stringent findings: certain industry characteristics can only be measured through their consequences within an industry.
- That the patterns of one particular industry as well as the resulting findings could also be found in another branch with similar industry characteristics and therefore contribute to the verification and optimization of the underlying theory or model.
- Patterns of one particular industry as well as the resulting findings that one could expect in a similar industry but not confirmed herein can contribute to the optimization of the underlying theory or model.

Furthermore, scientists consider the methodology of single-industry studies as particularly suitable for TCE: as Klein (2004) states, "asset specificity is difficult to measure consistently across industries, partially explaining why there are far more single-industry studies of vertical boundaries". Also Vannoni (1999) considers TCE as "particularly apt to be tested in single industries". Therefore, a systematic literature review of single-industry studies on TCE in this paper aims to fill the considerable gap in the research. For the purpose of this study, the authors use a general definition of industry, in accordance with the *Merriam-Webster's Collegiate Dictionary* (Merriam-Webster, Inc., 2003): the expression industry is not a strictly manufacturing-related activity, but rather a specialized business sector, concentrating on one field of activity, such that other non-manufacturing sectors are also a part of this study.

Another argument for the originality of this paper is the fact that it allows us to highlight the important controversies within the field of TCE. The analysis

and discussion of the intensely debated issue of operationalization of transaction costs is such an example. Finally, this paper is the first one to draw attention to the industry settings in empirical TCE work. Through in-depth qualitative analysis the authors show how randomly the empirical database is often chosen and what risks for the scientific quality of a paper arise from this.

The overall purpose of this article is therefore a critical assessment of the latest state of research within single-industry studies in TCE and of operationalization of transaction costs in this regard. We intend to find out about the industries being analyzed within the theoretical framework of TCE, about the categories and evolution of research questions and the level of support or criticism provided with respect to TCE. Finally, we want to study how authors deal with the characteristics of the industry sector they have chosen for their article, if they see any research contribution by the empirical settings they have chosen or do they foresee limitations. Based on this, we summarize the research questions as below:

*RQ1.* What is the latest state of research in single-industry studies on TCE?

*RQ2.* What is the latest state of research on operationalization of transaction costs?

*RQ3.* What particular implications for TCE can be drawn from a literature review of single-industry studies?

This paper is structured as follows. The next section discusses the theoretical framework on which the subsequent theoretical assumptions and statements considered later in this review are based. After this, the review starts by explaining the methodology as well as providing a description and characterization of the sample. The next part “Findings” shows how intensely examined the sample is, and how significant the results are. This section falls into “Descriptive findings”, presenting overall results from evaluating the sample, and “TCE-related findings”, looking into greater detail with respect to TCE. The next results, “Industry-related findings”, follow in a separate paragraph, because of the highly important and major results of the industry-related evaluation. We discuss the results obtained by this literature review by presenting limitations and suggesting further research possibilities, and conclude the article by underlining the highlights.

## 2. Transaction cost economics

TCE is part of the New Institutional Economics. Williamson (1975, 1989, 1996) has put forward the core statements of TCE, continuing the work of Coase (1937). Unlike neoclassical economics, TCE considers new environmental assumptions, thus making this field of theory more realistic: one general assumption is opportunism (Williamson, 1975). Market players behave opportunistically. Additionally, the aspect of bounded rationality is new compared to the neoclassic. Actors are limited by bounded rationality (Williamson, 1996). The central unit of analysis in TCE is the transaction (Picot *et al.*, 2008). The transaction possesses different definitions. For example, scientists define the transaction as a transfer of property rights of a certain product or service (Williamson, 1996). TCE considers transactions as not being free of cost but causing the transaction costs.

A firm's governance choice therefore depends on the level of transaction costs (Williamson, 1996). A firm will organize in the most competitive way in order to minimize transaction costs. Possible governance choices are the extremes of market

and hierarchy, or any hybrid form between these boundaries. Typical research questions that TCE explains or analyzes are therefore vertical integration questions (Caves and Bradburd, 1988), make-or-buy decisions (Hodgkin *et al.*, 1997), questions on contract choice (Kalnins and Mayer, 2004), firm boundary choice questions (Jantunen *et al.*, 2009), governance choice questions (Pangarkar and Klein, 2002; Klein and Saidenberg, 1997) or more general questions on buyer-supplier relationships (Liker *et al.*, 1996). Transaction costs themselves are dependent on the so-called transaction dimensions. These are mainly asset specificity, uncertainty and frequency, and are visualized in Williamson's (1975) organizational failure framework.

Asset specificity explains the degree to which the asset represents a particular, specialized investment for the given transaction (Williamson, 1996). High-asset specificity is present when an investment is limited to one specialized transaction. Typical examples of asset specificity are human asset specificity, physical asset specificity or site asset specificity (Williamson, 1989). The greater the asset specificity of a transaction, the more likely the firm will integrate vertically (Picot *et al.*, 1996).

Uncertainty is a factor describing the unpredictability of an event (Williamson, 1996). Typical sub-categories of uncertainty are environmental uncertainty and behavioral uncertainty. Environmental uncertainty is the uncertainty arising from unpredictable market developments. Behavioral uncertainty is due to the difficulty of measuring the performance or quality of a service, product or output in general. The greater the uncertainty, the more likely the firm is to make use of the hierarchical organization.

Currently, some aspects remain critical in TCE and continue to cause discussions. One of these aspects is the operationalization of transaction costs. Although quite a number of authors have contributed to the conceptualization of transaction cost operationalization models (Picot, 1991; Albach, 1988), most works remain sceptical regarding this point (Barzel, 1982; David and Han, 2004). Indeed, the main body of existing empirical work does not specifically or directly calculate transaction costs, but uses statistical methods in order to obtain the answers to their research questions. Such indirect operationalization methods define transaction costs or the research question directly as dependent variable. They define transaction dimensions, or even other sub-categories of them, as independent (Dyer, 1996). All of these direct and indirect calculations of transaction costs are of *ex post* character, which represents another point of critique of TCE.

Other points of critique come from Goshal and Moran (1996) who dedicate an entire article to the critiques of TCE: in "Bad for practice: a critique of the transaction cost theory", they particularly discuss the non-economic aspects of organizations, such as learning effects in an organization, trust and creating innovations. According to our findings, these effects are indispensable for explaining the success or the collapse of an organization, not the assumptions of TCE. Additionally, other authors describe the longing for power of actors as an example of the non-economic aspects that TCE does not consider (Müller, 2005). In this review, we aim to also address the above points of critique.

### 3. Methodology

In order for the analysis to follow normal conventions we take into account the theoretical guidelines for literature reviews as well as content analysis. Before presenting the specific methodology, we start by indicating the formal elements

of the literature review and content analysis and describe the relation between these formal aspects and the structure used in this article. As our article concentrates on quality and qualitative research, we have applied qualitative methods. These will combine elements of the research category of the literature review and of the instrument of content analysis. The formal frameworks of the literature review and the content analysis are partially overlapping. This is because content analysis is only one part of a literature review. However, content analysis can also be applied to other fields of research (Mayring, 2008). Therefore, the formal elements of content analysis are dealt with separately in the following section.

### *3.1 Formal aspects of literature review, content analysis and this article*

“A literature review distills the existing literature in a subject field; the objective of the literature review is to summarize the state of the art in that subject field” (Rowley and Slack, 2004). Literature reviews can focus on several purposes. They:

[...] can attempt to integrate what others have done and said, to criticize previous scholarly work, to build bridges between related topic areas, to identify the central issues in a field, or all these (Cooper, 1998).

A literature review – and so this article – should provide the following elements (Fink, 2009):

- select research question;
- select bibliographic database;
- choose search terms;
- apply practical screen;
- apply methodological quality screen;
- do the review;
- synthesize the results; and
- produce a descriptive review.

Content analysis is far more than just analyzing the content of a communication (Mayring, 2008). The aim of content analysis concentrates on the following categories: analyze communication, analyze fixed communication, use systematic procedures, use rule-guided procedures and proceed according to theory, with the aim of drawing conclusions from the communication (Mayring, 2008). To obtain the above objectives, Mayring (2008) postulates a systematic procedure for qualitative content analysis that can be directed to the following steps:

- (1) material selection;
- (2) descriptive analysis;
- (3) definition of categories; and
- (4) material evaluation.

In this article, we have taken into account the main elements of both the literature review as well as the content analysis indicated above, because our research is intended to be a literature review and at the same time contains content analysis as formal instrument at the same time. In order to combine these formal elements of literature



reviews and content analysis imposed by literature with a clear structure of this article, the relation can be pointed out as follows:

Section 1, "Introduction" contains the following formal elements: definition of research questions, and identification of research gaps and research contributions.

Section 3, "Methodology" contains the following formal elements: definition of bibliographic databases, material selection, search terms and methods.

Section 4, "Findings" contains the following formal elements: application of practical screen (descriptive findings), application of methodological quality screen (descriptive and TCE-related findings), descriptive analysis, explanation of results, qualitative generation of results, material evaluation.

Section 5, "Industry-related findings and conceptualization" contains the following formal elements: explanation of results, qualitative generation of results, material evaluation.

### *3.2 Material selection and methods*

This literature review is primarily quality based. Sample size is a secondary issue. The intention of this work is not to list all existing single-industry studies of TCE. Instead, the aim is to focus on high-quality papers. Therefore, we proceed as follows: the research process was based on a literature research within very large databases on scientific, economic journal articles. Such databases included ScienceDirect, emeraldinsight, and Google Scholar. As key words, the following expressions were used in different combinations: transaction cost, empirical, industry, single-industry study, vertical integration and governance. The research was focused on journal articles published in the English language.

Studies focusing their empirical work on a manufacturing branch as well as on a specific sector of field of activity were of significance for this paper. The catalogue of registered journal articles also included a number of literature reviews if they contained significant statements or contributions regarding the subject of single-industry studies in TCE.

### *3.3 Category selection*

On the obtained sample the authors conducted a content analysis according to the procedure above. We read and analyzed the text carefully with respect to different categories. Key words used for this were: "industry", "limitation", "operationalization", "dependent variable" and "independent variable". For the industry-related evaluation and conceptualization, four categories were selected:

- (1) *Macroanalysis*. Does the author provide a macroanalysis of the considered industry?
- (2) *Profits*. Does the author point out the benefits arising from considering this particular industry?
- (3) *Limitations*. Does the author point out the limitations arising from considering this particular industry?
- (4) *Solutions*. Does the author provide solutions for the above limitations?

In order to study the sample with respect to the industry settings, we created a five-point Likert scale. A journal article is coded with 0, if the authors do not provide

any macroanalysis or explanation on profits or limitations arising out of the use of the chosen industry. Four means that a study provides an explanation of the industry characteristics, the profits and the limitations resulting from the focus on this industry. Numbers 1-3 are the settings in between (Table AVII). If an article additionally provides a solution for the limitations, it is also assigned a “+”.

A further analysis follows with respect to the field of research question. The analytic dimension in this case is the research category on which the paper is focused. A few articles were not included in this analysis, as they cover several of the above categories, which does not contribute to the scientific findings. This categorization, however, does not aim to be as exact as possible but to sort the sample into a small number of categories for their field of application. If one paper does not belong precisely in a theoretical way to one of the categories, the authors place the article in the most closely corresponding category.

The definitions of the categories are as follows:

- Strategic alliance- or relationship-focused papers belong to the category of buyer-supplier relations. Also studies regarding collaboration in dyads, chains or networks are in this category.
- The category of vertical integration studies includes papers explicitly on this field as well as papers regarding vertical disintegration as the research question, only being in the opposite direction.
- All papers regarding any kind of questions on (firm) structure, structure of supply chains, networks or how to manage certain fields of activities in a firm are governance choice studies.
- Make-or-buy decisions of any kind are boundary choice papers.
- Papers focusing on the contract as the central unit of analysis are contract choice studies.

### 3.4 Sample

This literature research led to a broad catalogue of approximately 200 journal articles in the field of TCE. We then filtered the resulting catalogue for single-industry studies according to the above definition of industry. Conspicuous were the findings that an important number of papers use the terms transaction or transaction costs without referring to TCE or without using TCE statements as theoretical base (Liang *et al.*, 2004; Tarn *et al.*, 2002). These articles had to be excluded from this review. This selection led to a sample of 81 journal articles, of which six were literature reviews. We consider this sample as representative, and samples below this size already exist for other prominent reviews (Rindfleisch and Heide, 1997). Table AI provides an overview on the sample and demonstrates the accuracy which with it was analyzed: besides, documenting the authors and the date of publication, Table AI reproduces the purpose, analyzed industry, theoretical framework as well as a summary of the obtained results of the underlying sample.

## 4. Findings

### 4.1 Descriptive findings

The section below presents a qualitative overview of the results and answers to *RQ1*. In total the sample shows 40 different industries or business sectors. This supports



the statement that TCE applies to a large field of different research questions, industries and applications. Table AII displays the results of all noted industries and business sectors in our sample, sorted alphabetically. The relative weight of each is 9 percent or less. Number 1 of the chosen industries is the automotive industry with 9 percent. The electronics industry follows closely, with 8 percent. An unexpected finding is the fact that the healthcare sector is present with 7 percent, and is therefore number three of the most often chosen business branches in our sample. The choice of healthcare is unexpected as this is not a field of activities associated with manufacturing, industry, or the commercial sector. Even so, TCE proves to be a theory that fits in general. Of the 40 sectors, 23 sectors only represent 1 percent of the whole sample. Again, this shows the large variety of possible fields of application for TCE.

We find that all the considered industries, especially the dominating ones, are very large, powerful industries, targeting international mass markets. An explanation for this could be the fact that such mass industries have higher budgets available for such kinds of research combined with strong pressure from the competition. Also, the factor of an industry's age could be an explanation for these findings: an industry that has been present on the market for a longer time than another one will certainly have greater market experience and also more industry-internal competition. Typical extreme examples can on the one hand be the conventional, powerful and old automotive industry, consistently the dominating field in our statistics, and on the other hand the young solar industry, which is not present in our sample.

The research question-related analysis leads to five categories into which 74 papers are distributed. The buyer-supplier relationship studies dominate these statistics (20 papers) followed by the studies on choice of governance mode/organization (18 papers). Figure AI shows the total statistics. The dominating field being buyer-supplier studies is unexpected: as explained in Section 2 of this paper, TCE addresses in its origins the question of how to optimally organize (market vs hierarchy). Therefore, the most typical and obvious application of TCE is the make-or-buy question, and scientists would expect this to be the dominating category (boundary choice studies) in the above analysis. However, we obtain the completely opposite result: the boundary-choice studies are the least represented category. A reason for this could be the general applicability of TCE, and/or growing attention to the field of buyer-supplier relationship questions. Combined, the sample covers 27 years of research. The oldest papers considered date from 1982, while the most recent were published in 2009. The distribution of different industries and sectors as well as the range of dates is relatively constant. The main date in our sample is 2004, which represents 9 percent of all the papers. Figure AII shows the time distribution of the articles in our sample which are grouped according to the categories of research questions. Based on this distribution it is difficult to postulate a trend within a particular category of research question within TCE. Instead Figure AII rather underlines the growing popularity of TCE by showing an overall trend towards an increasing number of publications in this field and with all possible categories of research questions.

#### *4.2 TCE-related findings*

The section below presents a qualitative summary of the results and answers to RQ2 and RQ3. In addition to the evaluation above, a more detailed analysis follows with respect to TCE. As the field of application of TCE is very broad, the specific purposes with respect to the research questions of each paper were noted as well as the core findings (Table AI).

Furthermore, the analysis is extended with respect to the question whether each paper provides support for the TCE statements or not. This can be seen as a part in answering RQ3. In particular, we define a detailed rating for the papers. Table AIII shows the exact results. As only 6 percent of the sample does not provide support for the TCE statements and 8 percent of the papers do not endeavor to verify them, 86 percent of the sample confirms TCE in general. Thus, despite the numerous points of critique of TCE stated in the second section of this paper, strong support of this theory is noted. This result also supports the ratings in Table AIII, and because of this, the majority of the 86 percent could be analyzed in more detail. From this, 55 percent of the sample gives unlimited support of the TCE findings. A very interesting result of this evaluation is, however, the number two of this ranking: 20 percent of the sample also confirms the TCE statements, but considers TCE not sufficient to explain all the observed effects. These are mostly the papers using not only TCE but also other approaches in parallel. About 11 percent do not question the TCE statements, they accept them as given and as correct, and build all other research on them.

The content-related analysis leads to a very broad, overwhelming confirmation of the TCE statements (Monteverde and Teece, 1982; Caves and Bradburd, 1988). Contradictory results are also present with respect to different assumptions of TCE (Rindfleisch and Heide, 1997). However, certain behaviors, situations or conditions are unexplainable by TCE. In relation to this, a few of the authors apply TCE including modifications (Murray and Kotabe, 1999; Eccles, 1982). Delmas (1999) also confirms the TCE statements but does not consider them as sufficient for an overall explanation. Masten *et al.* (1989) show heterogeneous results with respect to specificity (human vs asset specificity), while Rindfleisch and Heide (1997) state heterogeneous results regarding the dimension of uncertainty (environmental vs behavioral uncertainty).

As indicated above, 20 percent of all papers consider their findings as conforming with the TCE statements but not fully explicable with this approach. This controversial discussion is very current and relevant for future research. Therefore, we highlight some key findings below: Jantunen *et al.* (2009) conclude their paper by arguing that the TCE statements are not fully sufficient to explain a firm's organization but that the type and strategic relevance of the considered activity also represent an important part of the decision. Cho (2009) finds that distributors attempt to avoid backward integration in the case of high-quantity fluctuations, country-specific risk and high-asset specificity. However, in the case of asset specificity, the risk of free riding, and high-purchase volumes, they did tend to backward integration.

Also interesting are the findings made by Lee *et al.* (2008) that state a contrary influence of technology development and market uncertainty on strategic purchasing and purchasing alliances: while the first has positive influences, the latter has a negative effect. Further affecting characteristics appear to be market power, industry experience and learning processes (Shervani *et al.*, 2007; Bigelow and Argyres, 2008; Mayer and Argyres, 2004). In order to discover whether these aspects represent a valuable complement to TCE, we analyzed their relative weight in the sample. Shervani *et al.* (2007) dedicated a whole paper to the influence of market power. They claim that integrating the aspect of a firm's market power into TCE is indispensable and confirm this statement in their results. A similar approach is the paper by Bigelow and Argyres (2008) that analyzes the aspect of industry experience. However, this cannot be confirmed on a quantitative level: only one paper each in this sample appears to put forward the aspects of market power with respect to industry experience. Only in relation to the industry statistic in the overall findings

market power re-appears: firms with greater market power/industry experience are presented more frequently in scientific journal articles. The aspect of learning as a required complement in TCE appears in two papers in our sample (Mayer and Argyres, 2004; Dragonetti *et al.*, 2003). These authors refer here to the TCE critique by Goshal and Moran (1996) which also claims the importance of learning effects in firms. The current sample does not support this statement. However, the fact that three works do exist on the importance of considering learning effects indicates that this aspect could be an interesting subject for further research.

By stressing the above highlights, we show that the controversial discussion on TCE is not only very current (papers published in recent years) but also that there is as yet no general solution for it. This remains a relevant research shortcoming and represents an important starting point for further research.

In this paper, however, we focus more on the subject of operationalization of transaction costs, as indicated in *RQ2*, and which we will now analyze. As described above in the section on theoretical basics, this subject has caused considerable discussion in the literature. The results and statements are, however, controversial, and no satisfactory solution has as yet been presented. Therefore, the aim is to focus on the way authors in this sample approach this field.

The fact that so many negative statements on the operationalization of transaction costs appear within the literature already suggests that this field will not be an easy domain. The results confirm this view. The papers considered do not give an equal representation of how authors commonly accomplish operationalization. Of the 81 articles, 12 do not attempt to operationalize transaction costs. An explanation for this may be the fact already indicated above: transaction costs are not easy to calculate or approach and no commonly confirmed solution currently exists. Only four papers of the whole sample explicitly mention transaction costs in their empirical study. One of these four uses transaction costs as an independent variable. The remainder use transaction costs as one or the only dependent variable.

Table AIV shows the alphabetically sorted group of categories used as dependent and independent variables. The most obvious result is the considerable variety of different categories used for the evaluation of different research questions. In order to obtain more significant results, we filtered these tables for the most prominent categories. Table AV shows the findings for dependent and independent variables. Even though highly filtered and summarized, the variety of different categories remains great. Additionally, the use of transaction costs as a dependent variable remains under utilized and requires more attention. These results suggest that further research within the field of operationalization of transaction costs is still required.

## 5. Industry-related findings and conceptualization

In addition to the above TCE analysis and the resulting findings, another complementary and detailed analysis is the main aim of this study. This type of analysis again underlines the originality of this paper as nothing comparable can be found in any other journal. Here, the considerations go in the direction of the industry settings, notably the empirical settings for single-industry studies. In this case, the arguments concentrate only on this field, being independent from the theoretical framework. Many papers in the sample, as well as other works not included, appear to be aware of the pros and cons of the single-industry study as an empirical setting for testing

a research question (Vannoni, 1999; Klein, 2004). In this paper, the authors in particular analyze how others treat the reasons for choosing a single-industry study as an empirical setting for their research questions, or – more specifically – for choosing exactly the industry they have chosen. Again, the intention is not to promote the framework of single-industry studies or any particular setting, rather to stress the importance of explaining why a certain setting has been chosen.

In addition to the theoretical framework, a scientific paper must explicitly put forward the arguments for having chosen the used empirical settings. As one of the very first steps of every work, the authors should have asked themselves the question of which empirical setting they want to use and for what reasons. Therefore, this information should be available to the authors from the beginning onwards and should also be present in every single article. The declaration of these considerations is therefore relatively easy to obtain but they are, however, not trivial. These facts make an important contribution to the quality of a paper. An article which does not indicate the considerations undertaken regarding the choice of the empirical settings cannot be regarded as complete because some of the very basic and essential information is lacking.

In the case of a single-industry study this means that the author needs to point out his/her reasons for having chosen this empirical setting (single- vs cross-industry study), and – in more detail – this particular industry. With regard to this, the sample was tested with respect to the empirical settings as indicated in Section 3.3. The authors of a good article must have considered these points before choosing their empirical settings. Thus, the concept focuses on the following keywords that need to be present in a paper:

- macroanalysis;
- profits;
- limitations; and
- solutions.

The in-depth analysis with respect to the choice and awareness of the empirical settings is based on these above assumptions. Table AVI shows the details and Table AVII shows the results of the ranking according to the five-point-Likert-scale presented in Section 4. An unexpected finding is the fact that 16 percent of all articles do not go into more detail with respect to the chosen industry. This is not only a very significant deficit, but also has a negative impact on the reputation of single-industry studies. One-third, and therefore the majority within the categorization, provides only a limited characterization of the chosen industry. Discussion as to why a given industry had been specifically chosen for the empirical settings or limitations arising out of this is totally lacking. Almost a quarter of the articles within the sample also provides a macroanalysis of the chosen industry and additionally explains the profits arising out of that choice. Here, however, the potentially negative aspects or limitations of these settings are not present. Another third of the listed articles are aware of only the limitations arising out of choosing the single-industry study as an empirical setting. An even more negative aspect is that only half of them suggest a solution to this constraint.

As explained above, the recommended and preferred category of the above industry analysis would be 4 + . However, in the sample record only eight papers, representing 11 percent, fulfill these conditions. One ideal example in this respect is the article by Liang *et al.* (2007).

All these empirical findings confirm the assumption that discussing the choice for the empirical settings of an article is basic but obviously not trivial. To make use of this concept of how to increase the quality of findings in empirical studies therefore remains highly relevant: only by providing a macroanalysis of the chosen sector, explaining benefits arising from these settings, discussing limitations due to this choice and by suggesting possible solutions to these limitations, can the empirical settings be clear, and the paper can then be considered as being complete in this regard.

Independently, from the above considerations the industry-related findings also provide important implications for the subject of empirical support of the TCE statements. While the TCE-related findings provide very broad support of the TCE statements, at this stage these findings are again questioned: apparently, a significant number of the articles present a qualitative lack with respect to the above criteria. As a consequence, the question arises: how serious can the TCE support be taken if it is the result of qualitatively unsatisfactory studies?

In order to answer this question, we completed the analysis even more in-depth by the following procedure. We exclusively analyzed those papers that fulfilled the qualitative elements according to Section 7 of this paper: the 14 papers marked with a four (indicating macroanalysis, profits and limitations of the industry settings) or 4 + (indicating macroanalysis, profits and limitations plus solutions of the industry settings). An important result of analyzing this sub-sample is that 43 percent give total support of TCE. About 29 percent supports TCE but consider TCE alone as not being able to explain all the effects. About 21 percent do not question the TCE statements. Therefore, even after very critical assessment of the validity of TCE statements, the results remain very supportive of the theory.

## 6. Discussion

In this section, we will discuss the practical and theoretical implications of our article, point out limitations and suggest future research directions. The practical and theoretical implications are strongly related to the answers to our research questions. Therefore, we will recall the purpose and the research questions of this article first. The overall purpose of this article was to provide a critical assessment of the latest state of research within single-industry studies in TCE and of operationalization of transaction costs in this regard. Based on this, three main research questions were suggested and answered in this article which are as follows:

*RQ1.* What is the latest state of research in single-industry studies on TCE?

TCE remains being applied to a broad range of research questions and industries among which the dominating ones are conventional and powerful branches. A shortcoming in most articles reviewed is the presentation of the industry's characteristics. Authors need to consider them in order to increase the qualitative level of single-industry studies.

*RQ2.* What is the latest state of research on operationalization of transaction costs? Operationalization of transaction costs remains a field requiring further research, as no commonly accepted approach can be determined.

*RQ3.* What particular implications for TCE can be drawn from a literature review of single-industry studies?

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Most studies support TCE statements, some suggesting theory extension by complementary aspects.

Transaction  
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These theoretical implications lead to the conclusion that TCE remains not only a profound theoretical framework for researchers but also provides significant practical benefits: decision makers can continue to use TCE for various applications such as strategic alliance, vertical integration, governance choice, make-or-buy, contract choice questions or in combination with other approaches. The impact of our findings are significant as this application of TCE to practical decisions turns out to be independent from the sector of activity, industry or business branch.

Another practical implication concerns the practice of research. As we have found in our study, the representation of the industry's characteristics is a severe shortcoming in most articles. In order to optimize the quality of a single-industry study, this sort of empirical framework should in future be elaborated upon by authors much more carefully.

In the above sections, scientific works were criticized for not considering or discussing any limitations. Therefore, we are ourselves ready to point out limitations of this paper: as already indicated this article has not analyzed all existing single-industry studies based on TCE. While the purpose of this study was certainly not to list the total existing literature, continuing this work and enlarging the analyzed sample will remain important further research. Second, following and monitoring single-industry studies, in particular in the field of TCE, will be required with respect to the industry's characterization as explained above. An interesting question will be to know whether scholars are taking into account the above concept of how to increase the quality of findings in empirical studies in order to complete their papers and to increase the level of quality. Another interesting task will be to discover, as a result of implementing the concept, particularly the macroanalysis of a sector, whether certain characteristics are similar or the same in some or even all industries.

Another limitation of this review exists within the definition of industry. While we applied a rather broad definition of the expression industry, other definitions of a more narrow character are also possible. Furthermore, the question of industry boundaries does not appear in this paper: for example, at which position within the supply chain does the industry start, and where does it stop? This question also implies the issue of potentially overlapping sectors: For example, high tech, innovative products or IT could include the same actors or businesses. While this review explicitly intends to use a broad-industry definition and is therefore not directly concerned by this consideration, answering this question will be an important task for authors of future single-industry studies. Finally, more attention needs to be paid to the subject of operationalization of transaction costs, as existing work in this field does not provide a clear model or view of the subject.

## 7. Conclusion

This paper provides significant insight into the field of single-industry TCE studies. As a result of penetrating research in high-class media and in-depth analysis, the paper provides highly structured and intensely examined statements on existing literature and related findings, which support TCE statements on the one hand and will lead current disputes in the literature to a further stage on the other hand. Additionally, the article critically assesses further research requirements in the field of (empirical) TCE,



notably in the field of operationalization of transaction costs as well as its dimensions. Finally, the concept of how to increase the quality of findings in empirical studies will help to increase the quality of single-industry studies and therefore upgrade their reputation and research contributions.

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## Appendix

Author	Date	Purpose	Industry	Method/ framework	Results
Alexander	1997	Measure empirically the relationship between structure and variety	Music	TCE	Nonmonotonic relationship: high and low levels of concentration result in lessened variety; maximum variety is promoted by a moderately concentrated structure
Allen and Lueck	1998	Examine governance mechanisms in farming	Farming	TCE	Seasonality and randomness limit benefits of specialization Farm organizations move toward factory processes and corporate ownership when able to mitigate seasonality and randomness
Anderson	1985	Examine the reasons for integrating selling personnel	Electronics	TCE	Support for TCE statements Direct sales forces are associated with the degree of difficulty to monitor the performance, complexity of product lines and demand for nonselling activities
Ashton	1998	Examine contracting experiences in health services	Healthcare	TCE	Costs of contracting are different for different services
Bigelow and Argyres	2008	Study determinants of make-or-buy decisions for engines made by every recorded US auto firm during 1917-1933	Automotive	TCE	Make-buy decisions affected by: Transaction cost effects Experience in the industry Pre-entry experience
Cameron and Collins	1994	Apply TCE to rock bands	Music	TCE	A number of phenomena are explicable in terms of transactions costs
Caves and Bradburn	1988	Examine the determinants of vertical integration	Customer/supplier industry	TCE	Support for TCE statements Importance of arm-length contracts as alternative to vertical integration supported
Chatterjee	2004	Investigate how satisfaction with performance and resource dependency in the presence of market and technological turbulence affects alliance outcomes	E-commerce	TCE	Risk aversion has no significant impact In a turbulent technological and marketing environment, alliances appear to be an attractive option allowing firms exploit valuable resources and opportunities in the new internet economy

*(continued)*Transaction  
costs detailed

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**Table AI.**  
Sample sorted by author,  
including research  
question, industry,  
framework and results

Table AI.

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Author	Date	Purpose	Industry	Method/ framework	Results
Chircu	1999	Examine whether new firms in EC can successfully compete with more established players in the marketplace	E-commerce	TCE	New internet-focused competitors can use a variety of strategies to attain competitive advantage in the short run, and maintain competitive parity in the long run Few strategies exist for providing sustainable competitive advantage Instead, competitive success depends on how well these internet intermediaries can use their first mover advantage, and then leverage these strategies for longer term gains A retail firm avoids backward integration when facing high-volume fluctuation and high-country risk combined with asset specificity, while it favours the integration when perceiving high-asset specificity, sociocultural distance, free-ride potential, and sourcing volume
Cho	2009	Examine backward integration of retailers	Retail	TCE	Trust building processes by electronic intermediaries can lead to concentration of electronic transactions on high-quality products, thus differentiating electronic and traditional markets Economic perspective suggests that increasing use of IT will lead to the disintermediation of real estate agents Institutional perspective suggests that impact of IT on the real estate industry will vary considerably by country and or region Social and cultural perspective suggests that IT may lead to an increase in the social capital of agent Fully integrated firms have higher systematic and bankruptcy risk in turbulent product-market environments Environmental growth associated with low creditor risk Environmental turbulence associated with high-shareholder risk Support in some areas (asset specificity)
Clark and Lee	1999	Examine the influence of trust on electronic transactions	E-commerce	TCE	
Crowston and Myers	2004	Examine the influence of IT on transformation of industries	Real estate	TCE, economic, institutional, social and cultural perspectives	
D'Aveni and Ilinitich	1992	Examine relation between vertical integration and risk to shareholders and creditors	Forest	TCE	
David and Han	2004	Assess the level of empirical support for TCE and the degree of paradigm consensus present in the empirical literature	Review	TCE	

*(continued)*

Author	Date	Purpose	Industry	Method/ framework	Results
Delmas	1999	Testing a model combining TCE with the dynamic capabilities approach at waste management industry	Waste	TCE, dynamic capabilities approach	Disagreement on how to operationalize some of TCE's central constructs and propositions Low levels of empirical support in other core areas (surrounding uncertainty and performance) Despite of high TC in technological alliances they remain attractive due to creation of competencies and reduce uncertainty arising from technological innovation
Dragonetti <i>et al.</i>	2003	Examine and test the factors influencing the outsourcing decision	Manufacturing	TCE, industrial organization, strategy	Learning is the strongest factor influencing the outsourcing decision Performance implications are also important
Dyer	1996	Examine relationship between interfirm asset specificity and performance in the auto industry	Automotive	TCE	Positive relationship between supplier-automaker specialization and performance
Dyer and Chu	2003	Examine relation between supplier trust in the buyer and transaction costs and information sharing	Automotive	TCE	Trustworthiness reduces transaction costs and is correlated with greater information sharing in supplier-buyer relationships The least trusted automaker spent significantly more of its face-to-face interaction time with suppliers on contracting and haggling when compared to the most trusted automaker Support for theoretical arguments
Eccles	1982	Examine the theoretical existence of the quasifirm in the construction industry	Construction	Modified TCE	
Fernández-Olmos <i>et al.</i>	2009	Examines relationship between product quality and governance mode choice	Wine	TCE	Wineries producing high quality are more likely to vertically integrate than those producing low quality Supports statements of TCE (regarding asset specificity and uncertainty) Size as another factor affecting governance choice ( <i>continued</i> )

Transaction  
costs detailed

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Table AI.

Table AI.

IMDS  
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Author	Date	Purpose	Industry	Method/ framework	Results
Fixson and Park	2008	Examine linkages between product architecture, innovation, and industry structure	PC	TCE	Link between technological change and industry structure Introduction of an integral architecture by a then non-dominating firm resulted in a nearmonopoly position of the innovating firm within a few years Vertical integration impacts speed of adoption in consumer internet applications Vertical integration has no effect on adoption of electronic communication tools Vertical integration has no effect on adoption of internet applications not used in distribution Transaction costs as primary determinant for vertical coordination
Forman and Gron	2009	Examine whether frictions created by differences in firm boundaries affect the speed with which firms adopt new information technology	Insurance	TCE	Vertical coordination index more robust than traditional vertical integration measure Product heterogeneity is a determinant of the make or ally choice Firms turn to horizontal alliances in order to implement product expansion projects that require greater resources than those available to them
Frank and Henderson	1992	Examine determinants of vertical coordination in US food industries	Food	TCE	Firms choose branded component contracts when supplier's brand name adds significant differentiation (leveraging) and when component supplier has made significant component customization investments (safeguarding) Choosing the wrong contract form causes significant adverse outcomes
Garette <i>et al.</i>	2009	Examine why firms choose to undertake product expansion through alliances with competitors rather than on their own	Aircraft	TCE	Integrated theaters run their own movies longer than other movies, and longer than non-integrated theaters This effect is stronger for movies of more uncertain demand due to higher contractual complexity Integrated distributors specialize in movies of higher demand uncertainty
Ghosh and John	2008	Examine motivators for choosing branded component contracts	Engineering intensive sectors	TCE	
Gil	2009	Analyze how variation in firm boundaries affect economic outcomes in the movie industry	Movie	TCE	

*(continued)*

Author	Date	Purpose	Industry	Method/ framework	Results
Gimeno	2004	Examine how firms use alliances to respond to the alliance networks of their rivals	Airline	TCE, social exchange theories	Cospecialized alliances by rivals may involve exclusivity, precluding alliances with the rivals' partners and thus encouraging countervailing alliances Nonspecialized alliances are less exclusive and are used when rivals share the same partners
Globerman and Schwindt	1986	Evaluate the significance of transactional determinants in explaining observed patterns of vertical integration	Forest	TCE	Transactional considerations, particularly asset specificity, are robust empirical determinants of governance structures
Gonzalez-Diaz <i>et al.</i>	2000	Examine factors for subcontracting decisions in construction industry	Construction	TCE	As specificity grows, firms tend to subcontract less When output heterogeneity and the use of intangible assets and capabilities increase, firms tend to subcontract more
Hayes	1997	Examine the influence of reducing non-tariff barriers	Meat	TCE	Support for TCE statements Reducing non-tariff barriers and preventing new ones from arising is very resource intensive
Hodgkin <i>et al.</i>	1997	Examine contracting arrangement for mental health care	Mental health care	TCE	External contracting most likely to appeal to smaller, newer HMOs and those located in areas with multiple vendors
Hoetker	2005	Examine supplier selection under uncertainty	Innovative products	TCE	At low uncertainty: decision based on differences in technical capabilities At higher uncertainty: prior relationships get more important
Hoskisson <i>et al.</i>	1999	Examine current and future directions, both in terms of theory and methodologies, in the field of strategic management	Review	TCE	At extreme uncertainty: internal sales relationships only count "Pendulum swings" help accumulate newer theories and methodologies for strategic management
Hubbard	2001	Examine the relation between market thickness and contract choice	Trucking	TCE	Doubling the thickness of a market increases the likelihood of governing transaction costs by simple spot arrangements by 30 percent in trucking industry

*(continued)*

Table AI.

Transaction costs detailed



Table AI.

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IMDS  
111,8

Author	Date	Purpose	Industry	Method/ framework	Results
James	1997	Test the assumption that employment is characterized by managerial control	Electronics	TCE	Weaker relationship between market thickness and contract choice in haul industry Employed workers are not subject to more managerial control than non-employed workers
Jantunen <i>et al.</i>	2009	Examine boundary choices of firms operating in the pulp and paper industry	Pulp and paper	External TCE	Governance choice for different activities is not only affected by determinants implied in traditional TCE Transaction or management benefits are also important Managers also take into account long-term effects of boundary choices Determinants of governance choices depend on the nature and strategic importance of the activity in question Contract employees are more often hired for tasks with higher radiation exposure, where monitoring is difficult, and where firm-specific assets are important Supports TCE statements
Jensen and Rothwell	1998	Examine organization and contract choice in nuclear industry	Nuclear	TCE	
Joskow	1985	Examine vertical arrangements governing coal supply transactions between electric utilities and coal suppliers	Coal	TCE	
Joskow	1987	Examine contract duration and specific investments in the coal market	Coal	TCE	When relationship-specific investments are more important, buyers and sellers make longer commitments
Kalhins and Mayer	2004	Examine contract choice in IT	IT	TCE	Time and materials (T&M) contracts are preferred when the cost of measuring quality <i>ex post</i> is high and when it is difficult to estimate costs <i>ex ante</i> Site-specific measures of relationship lead to a preference for low-powered T&M contracts

*(continued)*

Author	Date	Purpose	Industry	Method/ framework	Results
Klein	2004	Reviews empirical literature on the make-or-buy decision, focusing on the transaction cost approach	Review	TCE	Supports TCE statements
Klein and Saldenberg	1997	Estimate the value added from diversification	Bank holding	TCE	Controversy about the role of asset specificity Diversification through the holding company structure does appear to bring certain benefits
Lee <i>et al.</i>	2008	Examine the impact of different dimensions of uncertainty on supplier alliances	Electronics	TCE	Technology change has positive effects on strategic purchasing, specific investments and supplier alliances Market uncertainty provides an unfavourable environment for specific investments and does not lead to supplier alliances Supports TCE statements
Leffler and Rucker	1991	Examine contract choice in timber harvesting	Timber	TCE	Hospitals' ownership of skilled nursing facilities helps minimize the transaction costs associated with post-acute patient transfers while productively using empty hospital beds
Lehrman and Shore	1998	Examine hospitals' vertical integration into skilled nursing	Healthcare	TCE	This creates however complex cost, quality, and accessibility trade-offs in terms of the skilled nursing care provided Fit-viability model as useful guide to decide whether to adopt a mobile technology
Liang <i>et al.</i>	2007	Adoption of mobile technology in business: a fit-viability model	Mobile technology	Fit-viability model, TCE	High level of involvement in the design of competitively significant subsystems poses a challenge to the predictions of traditional TCE
Liker <i>et al.</i>	1996	Examine supplier involvement in automotive component design in US and Japanese supplier-buyer dyads	Automotive	TCE, SCM	Japanese customers seem to rely on other forms of control than trust (target prices, etc.) Despite early involvement of suppliers by US companies, they are still weak on some processes contributing to the Japanese automakers' success

*(continued)*Transaction  
costs detailed

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Table AI.

Table AI.

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IMDS  
111,8

Author	Date	Purpose	Industry	Method/ framework	Results
Lyons	1995	Examine the influence of specific investment and economies of scale on make-or-buy decisions	Engineering	TCE	Probability of buying-in specialised inputs is higher if the production technology is non-specific, but only if there are economies of scale or scope Economies of scale/scope effect is much reduced in the presence of specific assets
Macher	2000	Examine the phenomenon of disintegration and the trend toward the organizational separation of product design and manufacturing	Semiconductor	TCE	Emergence of a specialized semiconductor manufacturing market is a structural response to semiconductor firms' needs for faster product and process development It is unlikely foundries can completely replace integrated producers due to the organizational requirements of certain process innovations
Macher	2006	Examine firm boundary decisions in the semiconductor industry	Semiconductor	KBV TCE	Integrated firms realize performance advantages when problem solving in technological development is ill structured and complex Specialized firms realize performance advantages when problem solving in technological development is well structured and simple
Mariotti and Canarca	1986	Examine causes of structural evolution in textile-clothing industry	Textile	TCE	Structural evolution of the textile-clothing industry is mainly the result of organizational innovations to economize on transactional costs and increase the dynamic efficiency of firms
Masten <i>et al.</i>	1989	Examine the relative influence of transaction-specific investments in physical and human capital on the pattern of vertical integration	Automotive	TCE	Investments in specialized technical know-how have a stronger influence than those in specialized physical capital on the decision to integrate production within the firm
Mayer and Argyles	2004	Examine development of contracting in PC industry	PC	TCE	Organizational learning Findings not only to explain by TCE

*(continued)*

Author	Date	Purpose	Industry	Method/ framework	Results
Mayer and Nickerson	2005	Develop a theory predicting organization of knowledge workers in IT and performance implications of this choice	IT	TCE	Firm capability impacts organizational choice but not profitability
Mayer and Teece	2008	Examine contracts governing strategic alliance relationships and their difference from more complex buyer-supplier contracts	Aerospace manufacturing	TCE	Key differences in alliance and supplier relationships and their reflection in the alliance contract
Michael	2000	Examine the influence of investments on bargaining power	Restaurant franchising	TCE	Tapered integration, selecting inexperienced franchisees, and employing a long training program increase the franchisor's bargaining power and the franchisee's compliance with franchisor standards
Mitchell and Singh	1992	Examine the use of pre-entry alliances before expansion into new technical subfields of imaging an industry	Medical diagnostic	TCE	Many firms, particularly stronger ones, will participate in alliances with other firms before their standalone entry
Möllering	2002	Examine impact of trustworthiness on the organization of inter-firm relations	Printing	TCE triadic forces argument <i>et al.</i>	Trust as parameter reducing hierarchy is not confirmed Triadic forces argument is confirmed
Monteverde	1995	Is interpersonal communication between engineers in design and fabrication stage positively related to efficiency of vertical integration?	Semiconductor	TCE	Hypothesis supported
Monteverde and Teece	1982	Test TCE of vertical integration with data from US automobile industry	Automotive	TCE	Confirms TCE explanations for organizational boundaries

*(continued)*Transaction  
costs detailed

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Table AI.

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IMDS  
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Author	Date	Purpose	Industry	Method/ framework	Results
Murray and Kotabe	1999	Examine the nature of service sourcing strategy	US service	Modified TCE	Similar to components and finished goods procurement, supplementary services are sourced globally, either internally or externally Relationship between asset specificity and internal sourcing of supplementary services is moderated by the level of inseparability and transaction frequency Internal sourcing and foreign sourcing of supplementary services are negatively related to a service's market performance Poorly aligned firms (according to transaction cost reasoning) realize lower profits than their better-aligned counterparts These firms will attempt to adapt so as to better align their transactions
Nickerson and Silverman	2003	Examine relation between organization and performance	Trucking	TCE organizational change	MNEs have different market entry and expansion strategies in the home region and in the foreign region Home region MNEs utilize their firm-specific advantages better than foreign region MNEs Vertical integration of pulp and paper industry positively related to: Regional concentration Paper-mill capacity Production of standardized grades of paper most established mills do not adapt to changes in the determinants of integration over time Built-in gains negatively influence conversions in the natural resource industry Alliance purpose and cultural distance can influence the choice of alliance governance R&D alliances tend to be equity alliances Marketing alliances tend to be non-equity alliances Cultural distance does not influence the choice of alliance governance
Oh and Rugman	2007	Analyze market penetration and expansion strategy of cosmetics and toiletries multinational enterprises	Cosmetics	TCE	
Ohanian	1994	Test transaction cost model of vertical integration in US pulp and paper industry between 1,900 and 1,040	Pulp and paper	TCE	
Omer	2000	Examine the influence of tax costs on organizational choice	Natural resources	TCE	
Pangarkar and Klein	2002	Examine the choice between equity and non-equity alliance governance	Biotechnology	TCE	

*(continued)*

Author	Date	Purpose	Industry	Method/ framework	Results
Park and Russo	1996	Examine determinants of joint-venture (JV) failures	Electronics	TCE	JV failures mainly caused by competition between JV partners Nonmonotonic failure rate (rising to a peak in the middle term, then declining) JV endings: termination or acquisition Support of TCE statements
Rindfleisch and Heide	1997	Asses an overview, critics and future research recommendations on TCE	Review	TCE	Also contradictory results and requirement for further research, e.g. the role of opportunism, environmental uncertainty
Robinson and Casolino	1996	Examine vertical integration in healthcare	Healthcare	TCE	Excess capacity and the need for investment capital determine short-term decisions Economies of scale, risk-bearing ability, transaction costs, and the capacity for innovation in methods of managing care determine long-term decisions
Sako and Helper	1998	Examine the determinants of inter-organizational trust	Automotive	TCE, game theory, sociological exchange theory	Determinants of trust are different from determinants of opportunism The way trust is conceptualised by suppliers is richer in Japan than in the US The level of trust is higher in Japan than in the US He factors facilitating trust and those attenuating opportunism differ in the US and Japan
Sawhney and Sumukadas	2005	Examine customs clearance uncertainties in global sourcing	PCB manufacturing	TCE (but poor theoretical basis)	Theoretical proposals for buyer-buyer collaboration to cope with government-induced import uncertainty
Shelanski	2004	Empirical study of pricing of intra-firm transactions	High tech	TCE	Supports TCE statements
Shelanski and Klein	1995	Asses an overview, critics and future research recommendations on TCE	Review	TCE	TCE important both in inter- and intra-firm exchanges Support of TCE statements Also contradictory results and requirement for further research, e.g. regarding explanation of hybrid contracts
Shervani <i>et al.</i>	2007	Is TCE framework equally appropriate for all types of firms in all business settings?	Electronics, telecom	TCE	Firms with high-market power are able to lower transaction costs under high-asset specificity and uncertainty in non-integrated distribution channels, avoiding the need to utilize highly integrated channels as a result

(continued)

Transaction costs detailed



Table AI.

IMDS  
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Author	Date	Purpose	Industry	Method/ framework	Results
Silverman <i>et al.</i>	1997	Examine organizational mortality in US trucking industry	Trucking	TCE organizational ecology neoclassical economics	Increased mortality when firms do not adhere to operating policies consistent with transaction cost-minimization principles
Vannoni	1999	Critical review of empirical literature on transaction cost-motivations of vertical integration strategies	Review	TCE	Empirical works on TCE have not explained all problems Author recommends combination of single- and cross-industry studies
Vilasuso and Minkler	2000	Examine the influence of agency costs and asset specificity on the capital structure of the firm	Printing	TCE	Optimal capital structure minimizes agency cost and asset specificity considerations
Wei and Chen	2008	Empirical investigation of TCE statements in the case of Taiwanese automotive industry	Automotive	TCE	Supports TCE statements
White and Lui	2005	Examine the sources and impact of the cooperation costs incurred in order to work with a partner	Construction	TCE, approach of cooperation costs	Both cooperation costs and transaction costs affect the level of time and effort a manager expends on an alliance
Zaheer	1994	Examine determinants of the degree of electronic integration	Insurance	TCE	Empirical support for a generally accepted proposition regarding the role of IT in influencing vertical relationships
Zylbersztajn and Lazzarini	2005	Examine contracting in the Brazilian seed industry	Seed	TCE	Empirical support for TCE

Transaction  
costs detailed**1319**

Industry	Percentage
Aerospace manufacturing	1
Aircraft	3
Automotive	9
Bank holding	1
Biotechnology	1
Coal	3
Construction	4
Cosmetics	1
Customer/supplier industry	1
Electronic commerce	5
Electronics	8
Engineering intensive sectors	3
Farming	1
Food	1
Forest	3
Healthcare	7
High tech	1
Innovative products	1
Insurance	3
IT	5
Manufacturing	1
Meat	1
Mobile technology	1
Movie	1
Music	3
Natural resources	1
Nuclear	1
Printing	3
Pulp and paper	3
Real estate	1
Restaurant franchising	1
Retail	1
Seed	1
Semiconductor	4
Service	3
Textile	1
Timber	1
Trucking	4
Waste management	1
Wine	1

**Table AII.**  
Industries, business  
sectors found within the  
sample

Support of TCE	Rating	Absolute no.	Relative no. (%)
No	0	5	6
Yes	1	44	55
Yes, but TCE is not able to explain all effects alone	2	16	20
Yes, and TCE statements are taken as given parameters and not questioned	3	9	11
The paper does not intend to verify TCE	4	7	8

**Table AIII.**  
Different levels of  
support for TCE  
statements

IMDS  
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Dependent variables	Independent variables
Acres	(Average) assets per employee
Album rating	Activity sector
Alliance	Agency costs
Alliance formation	Amount of internal production of product
Buyer-supplier characteristics of interest	Amount of product that is acquired in the market in order to provide input for the final production
Capital	Asset specificity
Capital structure	Attractiveness of product line
Choice of sourcing strategy	Behavioural uncertainty
Choice of supplier for given innovation	Buyer concentration
Company's organizational structure	Capital intensity of core and supplementary services
Contract choice	Channel integration
Contract duration	Channels owned
Contract form	Commitment
Contract outcomes	Common rivals
Contractual form	Company size
Customer opportunism	Competencies
Decision to stay in alliance	Competition
Degree of integration	Complexity
Degree of outsourcing	Compustar's hardware
Development time	Compustar's proprietary technology
Direct sales force vs manufacturer representative	Concentration
Distrust	Concurrent alliances
Duration	Contract
Employment	Control and transaction costs
<i>Ex ante</i> transaction costs	Cooperation and cooperation costs
<i>Ex post</i> transaction costs	Corporate sales
Family farm	Cospecialized rival alliances
Firm market power	Country level
Goodwill trust	Crop variables
Governance mode choice	Customer information
Governance structure	Customer switching
Initial yield	Customer's mainframe
Likelihood of spending substantial time and effort to coordinate with a partner	Demand uncertainty
Make	Development stage of the industry
Make-or-buy decision	Dialog
Managerial control	Differentiation capability
Mode of organization	Difficult to inspect
Percent of contractors	Difficult to measure quality
Percentage of subcontracting	Difficulty of evaluating performance
Performance	Difficulty of shifting suppliers
Probability of market entry	Distance
Profit margin	Distribution costs
Quality	Driver misalign
Ratio of owned to franchised units	Economies of scale
Return on assets	Economies of scope
Subsequent changes in organizational structure	Engineers

**Table AIV.**Dependent variables used  
in the considered sample

(continued)

Transaction  
costs detailed

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Dependent variables	Independent variables
Time starting to achievement of the first functional product	Environmental uncertainty
Transaction costs	Environmental unpredictability
Transaction costs (costs of contracting) for different services	Equipment
Transfer price	Exclusive territory used
Type of provision	Exclusivity restrictions
Variables for pre-entry alliance	Existing suppliers
Variety	Experience required
Vertical integration	Expropriation of technologies
Vertical integration index	External uncertainty
Vertical ratio	Farm variables
	Farmer variables
	Financial performance
	Firm age
	Firm maturity
	Firm size
	Firm-specific human capital
	Four-firm indices
	Franchised units
	Frequency
	Frequency of transaction
	Geographical dispersion
	Help in case of competition
	Hierarchical governance structure
	High frequency
	High transience
	Home channel
	Horizontal alliance experience
	Host channel
	Human asset specificity
	Idiosyncratic investments
	Impetus for alliance
	Importance of component
	Importance of nonselling activities
	Industry experience
	Industry production
	Information requirements
	Inseparability
	Integrative JV
	Intensity of information exchange
	Interdependency of parties
	Internal uncertainty
	Internalization costs
	International JV
	Internationalization
	Involvement in other alliances
	IPO recency
	JV between direct competitors
	Level of integration

(continued)

Table AIV.

IMDS  
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Dependent variables

Independent variables

Level of technology  
 License required  
 Linewidth  
 Litigation  
 Loss of member  
 LTL share  
 Market concentration  
 Market performance  
 Market share  
 Market turbulence  
 Marketing alliance  
 Mask layers  
 Measurement cost for verification  
 Mill size  
 Monitoring cost variables  
 Nature of the buyer-supplier relationship  
 Nb of competing aircraft  
 No. of partners  
 No. of previous JV  
 Non-deployability of the technology  
 Nonspecialized rival alliances  
 Number of models  
 Number of potential OEMs  
 Number of potential vendors  
 Number of previous alliances  
 OEM's specific investments  
 Operating restrictions  
 Outages  
 Output variety  
 Owned units  
 Owner  
 Ownership share inequality  
 Percent tied  
 Physical asset specificity  
 Plant proportion  
 Plant quantity  
 Previous IT contract  
 Problem complexity  
 Problem structure  
 Problems of measurability for each service  
 Procedural asset specificity  
 Process groups  
 Product quality  
 Product resource requirements  
 Product type  
 Production experience  
 Production of Kraft paper  
 Production of newsprint  
 Production-critical  
 Programming

Table AIV.

*(continued)*

		Transaction costs detailed
Dependent variables	Independent variables	
	Quality	
	Quantity	
	R&D activity included in JV	
	R&D alliance	
	Radiation exposure	
	Reaction in case of supplier price increase	
	Reciprocal investment	
	Regulatory	
	Relative dependence	
	Relative size	
	Revenue	
	Rivals' cospecialized partner	
	Rivals' nonspecialized partner	
	Sales	
	Satisfaction with own gains	
	Satisfaction with partner performance	
	Seller provided presale variables	
	Share of internal production that is consumed inside the firm as input for the final production	
	Share of internal production that is sold in the market	
	Significant innovation	
	Site specificity	
	Size	
	Size of firm	
	Specific investment	
	Specificity	
	Strategic importance	
	Structure	
	Suggestions	
	Supplementary information	
	Tacitness of industry	
	Task assignment	
	Task interdependence	
	Tax benefits	
	Tax costs	
	Tax strategies	
	Technical assistance	
	Technical capability of supplier	
	Technical uncertainty of innovation	
	Technological specialization	
	Technological turbulence	
	Technological uncertainty	
	Tier level	
	Time	
	Time since 1986	
	Time span to feedback	
	Total amount of product that is consumed inside the firm as input for the final production	
	Tract heterogeneity variables	
	Trading	
	(continued)	

Table AIV.



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Dependent variables	Independent variables
	Trailer density
	Trailer type
	Training weeks
	Transaction frequency of core and supplementary services
	Transaction specific know-how required for engineering
	Transaction specificity of assets
	Transaction specificity of assets and environmental unpredictability
	Travel requirements
	Trust
	US firm
	Uncertainty
	Uncertainty
	Union (contribution of money to a union)
	Unique engine
	Utility proportion
	Utility quantity
	Vendor opportunism
	Vendor's specific investments
	Year
	Years before entry
	Years franchising

**Table AV.**  
Summary of dependent  
and independent  
variables used in the  
considered sample

Dependent variables	Independent variables
Alliance	Agency costs
Capital structure	Asset specificity (physical, human, site)
Contract-related variables	Difficulty of evaluating performance
Governance structure	Firm age
Make-or-buy decision	Firm size
Performance	Governance structure
Transaction costs	Level of technology
Vertical integration	Market concentration
	Market share
	Nature of the buyer-supplier relationship
	Time
	Uncertainty (demand, technological)

Author	Date	Industry-related analysis
Alexander	1997	Macroanalysis of chosen industry provided (p. 208 et sequation) Profits by using this industry explained (p. 208) No limitations due to concentrating on this industry mentioned
Allen and Lueck	1998	Macroanalysis of chosen industry provided (p. 343 et sequation) Neither profits nor limitations by choosing this single industry are explained, it seems that other industries are not even considered
Anderson	1985	No macroanalysis on chosen sector provided No profits by choosing this sector mentioned No limitations due to concentrating on this sector mentioned
Ashton	1998	Macroanalysis of sector provided (pp. 357, 359) No profits by concentrating on this sector provided No limitations due to concentrating on this sector mentioned
Bigelow and Argyres	2008	No macroanalysis provided No profits explained But research contribution by this setting of the study explained (compared to other auto studies, p. 792)
Cameron and Collins	1994	Macroanalysis of chosen sector provided (p. 172 et sequation) No profits by using this industry mentioned Limitations due to concentrating on this sector mentioned, as well as a basic solution (p. 172)
Caves and Bradburd	1988	No macroanalysis on chosen sector provided No profits by choosing this sector mentioned No limitations due to concentrating on this sector mentioned
Chatterjee	2004	Macroanalysis of chosen industry provided (p. 714 et sequation) Profits by using this industry mentioned (p. 719) No limitations due to concentrating on this industry provided
Chircu	1999	Macroanalysis of chosen sector provided (p. 1) No profits by choosing this sector provided No limitations due to concentrating on this sector provided
Cho	2009	No macroanalysis on chosen sector provided No profits by choosing this sector mentioned No limitations due to concentrating on this sector mentioned
Clark and Lee	1999	Macroanalysis of chosen sector provided (p. 1) No profits by choosing this sector provided No limitations due to concentrating on this sector provided
Crowston and Myers	2004	Short macroanalysis of chosen industry provided (p. 13) No profit by using this industry mentioned Limitations by concentrating on this industry mentioned (p. 24), but no solution provided ("all industries are unique is some way")
D'Aveni and Ilinitch	1992	Macroanalysis of chosen industry provided (p. 606 et sequation) Profits by using this industry explained (p. 606) No limitations due to concentrating on this industry mentioned
David and Han	2004	Not applicable
Delmas	1999	Macroanalysis (also regarding their TCE dimensions) of chosen industry provided (p. 637) Profits by choosing this industry explained (p. 637) No limitations by using this single industry provided
Dragonetti <i>et al.</i>	2003	No macroanalysis of chosen industry provided No profits by using this industry provided No limitations due to concentrating on this industry provided

**Table AVI.**  
(continued) Industry-related analysis

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Author	Date	Industry-related analysis
Dyer	1996	Macroanalysis of chosen sector provided (p. 276) (Industrial) importance of chosen sector explained (p. 276) Profits of single industry studies explained (p. 276) Limitations of single industry studies explained, but no solution provided (p. 284)
Dyer and Chu	2003	Macroanalysis of chosen industry provided (p. 4) Profits by using this single industry clearly explained (p. 3) Limitations due to concentrating on this industry mentioned (p. 23), but outlook to other industries with similar characteristics given (p. 23)
Eccles	1982	Short macroanalysis of chosen industry provided (p. 342) No profits by using this industry mentioned No limitations due to concentrating on this industry mentioned
Fernández-Olmos <i>et al.</i>	2009	Macroanalysis of chosen industry provided (p. 282 et sequeation) Profits by using this single industry clearly explained (p. 285) Limitations are put in a way that the paper can be generalized for other industries (p. 291)
Fixson and Park	2008	Macroanalysis of chosen industry provided (p. 3 et sequeation) No profits by using this industry provided Limitations due to concentrating on this industry provided (p. 38), but no solution
Forman and Gron	2009	Macroanalysis of chosen industry provided (p. 5 et sequeation) Profits by using this single industry clearly explained (p. 17) Limitations only mentioned, no further explanation (p. 36)
Frank and Henderson	1992	No macroanalysis provided No profits explained No limitations mentioned
Garette <i>et al.</i>	2009	Short macroanalysis of chosen sector provided (p. 888) Profits by using this industry mentioned (p. 888) No limitations due to concentrating on this industry mentioned
Ghosh and John	2008	Macroanalysis of chosen industry provided (p. 602 et sequeation) Profits by using this single industry clearly explained (p. 602 et sequeation) Limitations by using this single industry explained (p. 610)
Gil	2009	Macroanalysis of chosen industry provided (p. 580 et sequeation) Neither profits nor limitations by choosing this single industry are explained, it seems that other industries are not even considered
Gimeno	2004	Macroanalysis of chosen industry provided (p. 821) No profits by using this industry provided Limitations due to concentrating on this industry mentioned (p. 838) Solution for limitation provided (pp. 821, 838)
Globerman and Schwindt	1986	Short macroanalysis of chosen sector provided (p. 200) Profits by using this industry mentioned (p. 200) No limitations due to concentrating on this industry mentioned
Gonzalez-Diaz <i>et al.</i>	2000	Macroanalysis of chosen industry provided (p. 5) Neither profits nor limitations by choosing this single industry are explained, it seems that other industries are not even considered
Hayes	1997	Macroanalysis of chosen sector provided (p. 163) No profits by using this sector provided No limitation due to concentrating on this industry provided
Hodgkin <i>et al.</i>	1997	Macroanalysis of chosen sector provided (p. 359 et sequeation)

Table AVI.

(continued)

Author	Date	Industry-related analysis
		Profits by using this sector shortly explained (p. 359) No limitations due to concentrating on this sector mentioned
Hoetker	2005	Short description of chosen industry provided (p. 83) Limitations by using one industry mentioned (p. 92) Besides, no further explanation on decision for choosing this single industry
Hoskisson <i>et al.</i>	1999	Not applicable
Hubbard	2001	No macroanalysis provided No profits explained No limitations mentioned
James	1997	Macroanalysis of chosen industry provided (p. 456) No profits by using this industry mentioned No limitations due to concentrating on this industry mentioned
Jantunen <i>et al.</i>	2009	Macroanalysis of chosen industry provided (p. 317 et sequation) Profits by choosing this industry explained (p. 326) Limitations due to concentrating on this industry mentioned (p. 327) Solutions provided (research in other industries (p. 327), comparison to other industries (p. 324 et sequation)
Jensen and Rothwell	1998	Macroanalysis of chosen industry provided (p. 370 et sequation) Comparison to other industry provided (chemical, p. 373) No limitations mentioned
Joskow	1985	Macroanalysis of chosen industry provided (p. 39) Profits by using this single industry clearly explained No mentioning of limitations
Joskow	1987	Macroanalysis of chosen industry provided (p. 168) Profits by using this single industry clearly explained (p. 168) No mentioning of limitations
Kalnins and Mayer	2004	Contracts in IT industry characterized (p. 208 et sequation) Only little characterization of industry provided (p. 213) No limitations mentioned
Klein	2004	Not applicable
Klein and Saidenberg	1997	Short macroanalysis of chosen industry provided (p. 3) No profit by using this industry mentioned No limitations due to concentrating on this industry provided
Lee <i>et al.</i>	2008	Macroanalysis of chosen industry provided (p. 194) Profits by using this single industry clearly explained (p. 194) Limitations by using this single industry clearly explained (p. 201)
Leffler and Rucker	1991	Macroanalysis of chosen industry provided (p. 1063 et sequation) Profits by using this single industry explained (p. 1061) No limitations by choosing this single industry are mentioned
Lehrman and Shore	1998	No macroanalysis on chosen sector provided No profits by choosing this sector mentioned No limitations due to concentrating on this sector mentioned
Liang <i>et al.</i>	2007	Macroanalysis of chosen industry provided (p. 1154) Profits by using this single industry explained (p. 1155) Limitations by using this single industry clearly explained (p. 1164) Solutions to limitations provided in terms of pointing out future research requirements (p. 1164)
Liker <i>et al.</i>	1996	Macroanalysis of industry provided (p. 60) Profits of using this industry provided (p. 60)

(continued)

Table AVI.

Author	Date	Industry-related analysis
Lyons	1995	No limitation due to concentrating on this industry mentioned No macroanalysis on chosen sector provided No profits by choosing this sector mentioned No limitations due to concentrating on this sector mentioned
Macher	2000	Macroanalysis of chosen industry provided (p. 10) Profits by using this industry provided (p. 2) Limitations due to concentrating on this industry mentioned (p. 32), but no solution provided
Macher	2006	Short macroanalysis of chosen industry provided (p. 436) No profits by using this single industry explained No limitations by using this single industry explained
Mariotti and Cainarca	1986	Macroanalysis of chosen industry provided, even national differences (p. 352 et sequation) No profits by using this industry mentioned No limitations due to concentrating on this industry mentioned
Masten <i>et al.</i>	1989	Short macroanalysis of chosen industry provided (p. 267) Neither profits nor limitations by choosing this single industry are explained, it seems that other industries are not even considered
Mayer and Argyres	2004	Macroanalysis of sector provided (pp. 395, 402) Approach to generalization of results to other industries provided (p. 395) No limitation due to concentrating on this industry mentioned
Mayer and Nickerson	2005	Macroanalysis of chosen industry provided (p. 14) Profits by using this single industry explained (p. 14) Limitations by using this single industry clearly explained, but are also put in a way that the paper can be generalized for other industries (p. 30)
Mayer and Teece	2008	Macroanalysis of chosen industry provided (p. 110 et sequation) Profits by using this single industry explained (p. 110) Limitations are put in a way that the paper can be generalized for other industries (p. 125)
Michael	2000	Short macroanalysis of chosen industry provided (p. 502) Profits by choosing this industry provided (p. 502) No limitation due to concentrating on this industry provided
Mitchell and Singh	1992	Macroanalysis of chosen industry provided (p. 349) Profits by using this industry explained (p. 349) No limitations due to concentrating on this industry mentioned
Möllering	2002	No macroanalysis of chosen industry provided Profits by executing a single industry study explained (p. 141) Limitations arising from the single industry study mentioned, but no solution (p. 141)
Monteverde	1995	Little characterization of industry provided, more details on products (p. 1629) No profits by analyzing this industry mentioned No limitations due to concentration on this sector mentioned
Monteverde and Teece	1982	Macroanalysis of chosen industry provided (p. 206) No profits by choosing this industry mentioned No limitations mentioned
Murray and Kotabe	1999	Macroanalysis of chosen sector provided (p. 791 et sequation) Industrial importance of chosen sector explained (p. 791) No limitations due to concentration on this sector mentioned

Table AVI.

(continued)

Author	Date	Industry-related analysis
Nickerson and Silverman	2003	Macroanalysis of chosen industry provided (p. 9) No profits or limitations by using this industry mentioned
Oh and Rugman	2007	Macroanalysis of chosen industry provided (p. 5) Profits by using this industry provided (p. 4) Limitations due to concentrating on this industry mentioned (p. 20) Solution: recommendation for future research in other countries and industries
Ohanian	1994	No macroanalysis provided No profits explained Limitations mentioned, but no solution provided (p. 206 et sequation)
Omer	2000	Macroanalysis of chosen industry provided (p. 39) Profits by using this industry mentioned (p. 39) No limitations due to concentrating on this industry provided
Pangarkar and Klein	2002	Short macroanalysis of chosen industry provided (p. 344 et sequation) Profits by choosing a single industry provided (p. 342) Limitation due to concentrating on this industry provided (p. 352), but no solution
Park and Russo	1996	No macroanalysis provided Only size of sample as profit mentioned (p. 881) No limitations mentioned
Rindfleisch and Heide	1997	Not applicable
Robinson and Casalino	1996	Macroanalysis of chosen industry provided (p. 9) Neither profits nor limitations by choosing this single industry are explained, it seems that other industries are not even considered
Sako and Helper	1998	Macroanalysis of chosen industry provided (p. 12 et sequation) Profits by using this industry provided (p. 13) Limitations due to concentrating on this industry mentioned (p. 13), but no solution provided
Sawhney and Sumukadas	2005	Macroanalysis of chosen industry provided (p. 283) Profits by using this single industry clearly explained (p. 283) As solution to limitation, suggestions for generalization are indicated (pp. 278, 292)
Shelanski	2004	Characterization of chosen firm provided (p. 957) No profits by concentrating on this sector provided No limitation due to concentrating on this industry mentioned
Shelanski and Klein	1995	Not applicable
Shervani <i>et al.</i>	2007	Short description of chosen industry provided (p. 641) Neither profits nor limitations by choosing this single industry are explained, it seems that other industries are not even considered
Silverman <i>et al.</i>	1997	Macroanalysis of chosen industry provided (p. 32 et sequation) Profits by choosing this industry explained (p. 33) No limitations due to chosen industry mentioned
Vannoni	1999	Not applicable
Vilasuso and Minkler	2000	Short macroanalysis of chosen industry provided (p. 65) No profits by using this industry mentioned No limitations due to concentrating on this industry mentioned
Wei and Chen	2008	Macroanalysis of chosen industry provided (p. 973 et sequation) Profits by choosing this industry mentioned, rather from industry perspective (p. 974) No limitations mentioned

(continued)

Table AVI.



Author	Date	Industry-related analysis
White and Lui	2005	Short macroanalysis of chosen sector provided (p. 919) Profits by using this industry mentioned (p. 919) No limitations due to concentrating on this sector mentioned
Zaheer	1994	Macroanalysis of chosen industry provided (p. 13) No profit by using this industry mentioned No limitations due to concentrating on this industry provided
Zylbersztajn and Lazzarini	2005	Macroanalysis of chosen industry provided (p. 6) No profits by using this single industry explained Limitations by using this single industry clearly explained, but are also put in a way that the paper can be generalized for other industries (p. 16)

Table AVI.

Category	Rating	Absolute no.	Relative no. (%)
No characterization at all	0	12	16
Only macroanalysis	1	24	32
Macroanalysis plus solutions	1 +	1	1
Macroanalysis and limitations	2	3	4
Macroanalysis and limitations plus solutions	2 +	3	4
Macroanalysis and profits	3	17	23
Macroanalysis, profits and limitations	4	7	9
Macroanalysis, profits and limitations plus solutions	4 +	8	11

Table AVII.  
Industry characterization

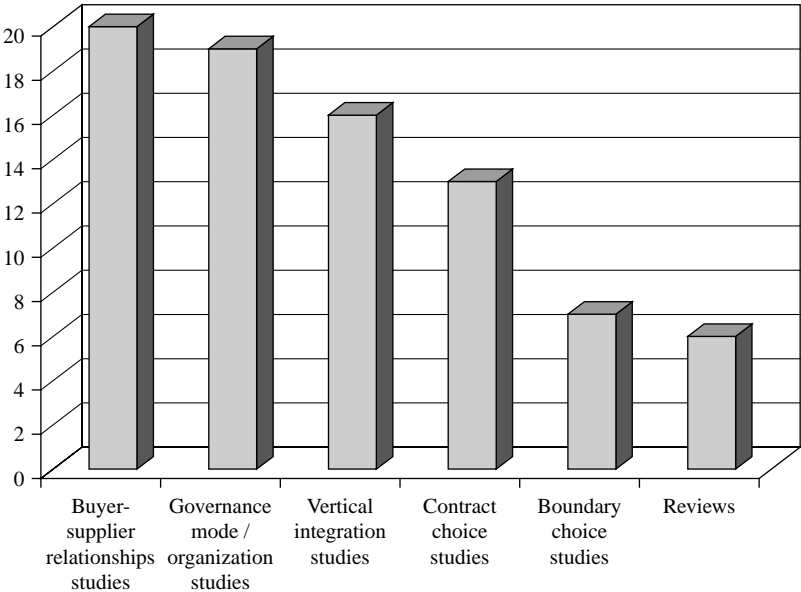
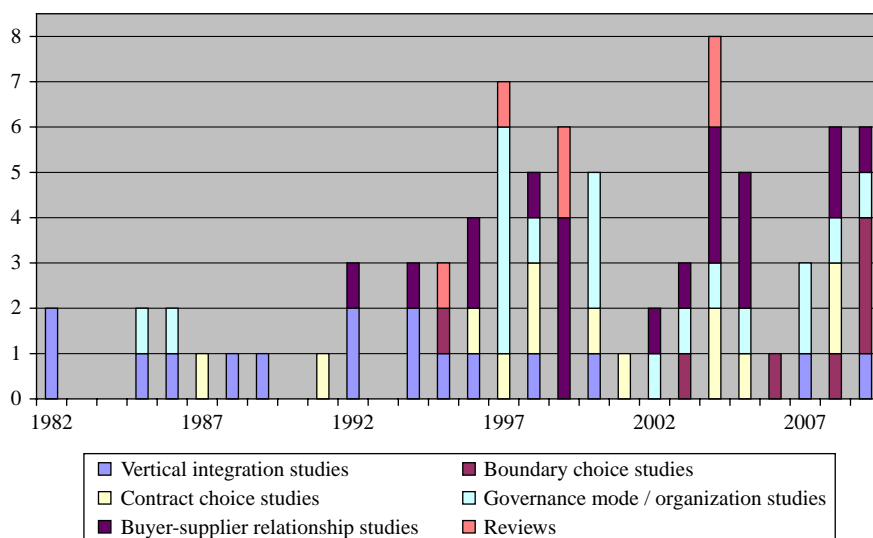


Figure A1.  
Categories of research questions



Transaction  
costs detailed

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**Figure A2.**  
Timely distribution  
of categories of research  
questions in the sample

### About the authors

Martin Müller studied Business Administration at the University of Fankfurt Germany and was a research assistant at Faculty of Business Administration at the University of Halle. Between 2001-2008 he was Associate Professor for Production and Environment, Faculty of Business, Economics and Law, University of Oldenburg, Germany. Since 2008 he has been Chair of Sustainable Development at Faculty of Mathematics and Economics, University of Ulm, Germany. Martin Müller is the corresponding author and can be contacted at: martin.Mueller@uni-ulm.de

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