

Principal-Agent Conflicts in Efficient Consumer Response

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Abstract

A meta analysis of empirical research on Efficient Consumer Response was used to derive the central problem areas of this cooperation concept: dominance/opportunism, information sharing, goal alignment, incentives, commitment, formal design and measurement/control. It is then shown that these problems can be interpreted from an agency perspective. By specifying where the antecedents to these problems lie – agent, task, or situation –, more precise solutions and improvement recommendations can be developed.

Keywords

Efficient consumer response, agency theory, meta analysis.

1 Introduction and Problem Delimitation

Both manufacturers and retailers have been facing large challenges in the consumer goods market: better informed and increasingly fastidious consumers, stagnating retail sales and mounting concentration in retailing (Frankel et al. 2002). As most firms have exhausted optimization potentials in their internal processes, external, supply-chain-wide saving and optimization possibilities become increasingly important (Mentzer et al. 2001). Consequently, numerous strategies for supply chain cooperation have been developed between manufacturers and retailers, as well as manufacturers and their upstream suppliers. Well-known examples include Efficient Consumer Response (ECR), Supply Chain Management (SCM),

Supplier and Customer Relationship Management (SRM, CRM), as well as Collaborative Planning, Forecasting and Replenishment (CPFR), or Quick Response (QR).

When focusing on the producer-retailer-relationship, ECR has been a particularly prominent form of cooperation. Literature provides comprehensive overviews of the implementation procedures and requirements for ECR. In addition, case studies and practical examples are well-known, and a number of empirical studies on ECR success are available (see appendix I). Numerous works discuss the adoption and success factors for ECR partnerships in detail (see e.g. Martin 2001). Much of this research, however, is strongly management-oriented. Approaches to analyze ECR using economic theory are still rare so far (Corsten 2004, Schmitz Whipple et al. 1999).

In addition, contrary to wide-spread high expectations, current ECR success appears to be only moderate or quite mixed among the various stakeholders. Causes of the (partially) missing success of cooperative concepts such as ECR are mostly conflicts between the participating partners. These conflicts concern both the required investments and efforts, hence costs, within the scope of the cooperation as well as the allocation and division of the mutually acquired cooperation gains between the different partners.

However, these types of conflict are not fundamentally new. This raises the question, to what extent existing theories may contribute to solving the problems of ECR collaboration. To answer this question, it seems sensible first of all to compile and systemize the problems which arise during and after ECR adoptions. The first objective of the present contribution is hence to answer the following inquiry:

1. What are central problems in today's ECR partnerships?

To accomplish this, it is necessary to systematically review and evaluate the empirical research on ECR adoption. In a second step, the central problems must be extracted and structured. The causes for conflicts between ECR partners observed in this meta study raise the subsequent question of whether the ECR collaboration can be interpreted as a principal-agent-relationship. If such an interpretation proves feasible, findings from agency theory could be deployed to solve some of the problems in ECR relationships. Hence, the second goal of this research is to solve the next research question:

2. Is it possible to interpret the empirically determined ECR problems theoretically as principal-agent-relationships and how would such an ECR agency-relationship be described precisely?

In order to solve the cooperation problems attached to ECR today, a theory-led analysis of the different sub-problems appears sensible. To accomplish this, the ECR manufacturer-retailer-partnership is interpreted as a complex principal-agent-relationship. This seems reasonable, as ECR problems tend to exhibit features cen-

tral to agency theory (see e.g. Levinthal 1988; Ross et al. 1997; Charreaux 2002). In addition, the ECR problems obtained previously need to be interpreted within this agency framework. Based on the findings of this analysis, the causes of the prevailing ECR problems can be derived and the last research question can be considered:

3. How could Efficient Consumer Response partnerships be improved?

To develop solution suggestions, the findings from agency theory are utilized. These general solutions are developed further and concretized for the ECR concept. The resulting recommendations for action can significantly improve current ECR collaborations and ease the implementation of future ECR collaborations.

Therefore, the remainder of this paper will be organized as follows: First, the needed background on the Efficient Consumer Response concept for collaboration is provided. Then, a review of the empirical literature on ECR is presented and evaluated. Seven central problem areas in ECR collaborations are identified, described and structured. In section 4, agency theory is introduced in more detail and the extracted problems are analyzed within this theoretical framework. From this analysis we will then derive recommendations on how to improve ECR partnerships in section 5. The paper ends with a discussion of the main findings, the central management implications, a discussion of this study's limitations and an outlook on future research directions.

2 Collaboration through Efficient Consumer Response

Two aspects are seen as central to the Efficient Consumer Response concept: the focus on the *consumers* to satisfy their needs, and *efficient response* as being the process-oriented and inter-firm cooperative optimization of the supply chain (Seifert 2004). To accomplish these two goals simultaneously, certain concepts and basic strategies need to be implemented across multiple supply chain members.

In the remainder of this section the essential theoretical background on the basic ECR collaboration strategies is provided to establish a common starting point for solving the research questions posted in the previous section. In order to do this, a short overview of the history of the ECR movement is necessary. It will be followed by an introduction and definition of the central ECR strategies commonly employed today.

2.1 The History of Efficient Consumer Response

The ECR movement was born in 1992, when U.S. retailers and brand manufacturers in the fast-moving consumer goods industry launched the Efficient Consumer Response Working Group to a) counter the rising threat of mass discounters and

b) replicate the success of other newly introduced collaboration models (Corsten 2004). The ECR model which was introduced for the US grocery industry in 1993 by the Food Marketing Institute and the consultancy Kurt Salmon Associates (KSA) delineates the starting point for all following ECR initiatives and research (King and Phumpiu 1996; Kotzab 1999). KSA (1993, p. 13) then defined ECR as “a grocery strategy in which distributors, suppliers and brokers jointly commit to work closely together to bring greater value to the grocery consumer”.

European adaptations of the basic ECR model followed shortly after. In 1994, the Coca-Cola Retailing Research Group Europe (CCRRGE) not only added a European dimension to the ECR model but also developed additional strategies such as e.g. efficient operating standards (EOS). In a study conducted by GEA Consulenti Associati di gestione aziendale (GEA) for the CCRRGE “Supplier / Retailer Collaboration (SRC) is when both Retailers and Suppliers share proprietary internal or external data, and/or share policies and processes used in decision making with the clear objective of sharing the benefits” (GEA 1994, p. 9). Also in 1994, leading European manufacturers and retailers founded the ECR Europe initiative and presented the ECR Europe model in 1997 (Kotzab 1999). This initiative defines ECR as a cooperative strategy between retailers and manufacturers to “fulfil consumer wishes better, faster and at less cost” (Coopers & Lybrand 1996, p. 1). ECR Europe and various consultancies further modified the supply side strategies of previous ECR models (e.g. Coopers & Lybrand 1996; AT Kearney 1998).

As a result, a variety of models and strategy compilations exist, all of which are associated with the Efficient Consumer Response concept. To focus on an overall and internationally valid framework in the following, the next section will define and structure these basic strategies.

2.2 The History of Efficient Consumer Response

The ECR history stretches across continents and numerous national and international initiatives are, whilst not necessarily directly competing, at least developing differing concepts simultaneously. Therefore, the development of an ECR framework encompassing all ECR strategies is somewhat challenging. Based on Kotzab’s (1999) comparisons of the three different ECR models discussed in the previous section, the most prominent ECR strategies developed and employed today can be summarized as depicted in Table 1.

The four ECR core strategies are commonly seen to be the ones originally developed by KSA (1993): Efficient Product Introduction (EPI), Efficient Promotion (EP), Efficient Store Assortment (ESA) and Efficient Replenishment (ER). The first three are generally seen as the demand side activities. In addition, they are often summarized under the broader concept of Category Management (CM) whereas the ER strategy is seen as the respective supply side strategy and subsumed under (a somewhat narrow definition of) SCM.

However, a full implementation of these core strategies is closely related to the additional supply side strategies Efficient Operating Standards (EOS), Efficient

Administration and Systems (EAS), Efficient Sourcing (ES) as well as Efficient Controlling (EC). As of ECR Europe, this includes the implementation of so-called enablers and integrators, that is, enabling technologies (such as electronic data interchange (EDI)), process tools (such as computer-assisted ordering (COA)), joint e-business and CPFR (Corsten 2004).

Table 1: Sum of ECR strategies

	ECR Strategy	Scope of Strategy	Source	
Demand Side (CM)	<i>Efficient Product</i> (Development & Introduction (EPI))	Development and introduction (incl. product launch) of new products focusing on customer needs	KSA 1993	
	<i>Efficient Promotion</i> (EP)	Harmonization of promotion activities between manufacturer and retailer by communicating benefits and value		
	<i>Efficient Store Assortment</i> (ESA)	Provision of a complete, easy-to-shop, consumer oriented product assortment		
Supply Side (SCM)	<i>Efficient Replenishment</i> (ER)	Maintenance of high in-stock levels of the required assortment; optimization of replenishment on warehouse level through sharing of delivery responsibilities	GEA 1994	Coopers & Lybrand 1996
	Efficient Operating Standards (EOS)	Optimization of operational logistics by coordinating the flow of merchandise		
	Efficient Administration/Systems (EAS)	Optimization of document and information flow; optimization of IT networks and data warehouses		
	Efficient Sourcing (ES)	Optimization of pull, flow-through systems through integrated suppliers		
	Efficient Controlling (EC)	Optimization of reporting and forecasting systems (CPFR, activity-based costing (ABC), real-time controlling)		

Note: The source column indicates which initiative first described the respective strategy; subsequent modifications are indicated only for significant extensions.

Sources: Kotzab 1999, pp. 368, 370, 373; AT Kearney 1998, p. 72; Coopers & Lybrand 1996; GEA 1994, p. 11; KSA 1993, p. 29

3 Review of Empirical Research on Efficient Consumer Response

Efforts to describe and explain Efficient Consumer Response have led to a plethora of research and writing in this field. At the same time, the level of attention ECR now receives in business practices also heavily influences the growing interest in ECR research. Today, ECR is understood as an effective way of creating value for customers and participating businesses alike (Corsten 2004). In addition, researchers have provided taxonomies and frameworks that help both practitioners and academics to understand how to adopt and manage ECR strategies. However, despite the mounting attention to ECR, a lack of cohesive information summarizing the empirical research on the ECR concept and emphasizing the central findings is clearly observable. For example, Kotzab (1999), in addition to reviewing relevant streams of thought in ECR, suggested that the overall potentials of ECR for supply chain performance should be critically discussed and evaluated.

A systematic review and evaluation of the empirical research on ECR adoption is, however, still missing. For this reason, the authors will provide an up-to-date overview in the remainder of this section. As one might expect, there will be certain limitations to any meta study of this scope.

Firstly, in an emerging field of research like ECR, much research is currently conducted and an updated meta study is periodically needed. Secondly, with a research topic this closely tied to business practices, numerous studies emerge from business projects, consultancy work or partnerships such as ECR initiatives. Thirdly, difficulties arise when trying to clearly distinguish ECR-focused research from related fields such as e.g. Supply Chain Management, Category Management, Quick Response or Efficient Replenishment.

To keep this analysis within a research article depth and length, certain limitations had to be decided on. Firstly, we have intentionally limited our focus to articles that have already been published in academic journals at the time of this writing as an attempt to a) base our findings on a certain basic level of scientific reasoning and b) understand the state of scientific research at a fixed point in time. Secondly, only those empirical studies were included which either clearly examined Efficient Consumer Response¹ or which focused on certain sub-topics in the field of ECR such as particular ECR strategies (see section 2), enabling technologies, process tools or applications in certain industries or firm networks.

Appendix I summarizes the current state of empirical research on ECR sorted by year of publication and identifies each work's study design and central focus.² Based on this compilation of empirical studies on ECR, it is now possible to develop a much clearer picture, which areas of ECR have been studied in depth and where certain gaps can be observed and need additional research in the future. Therefore, the accumulated empirical ECR research is typologized in the following subsection and central areas of past research are pointed out.

3.1 A Basic Typology of the Empirical ECR Literature

The empirical research on ECR so far can be classified in terms of study design and ECR strategy focus as depicted in table 2.

It becomes apparent, that research has hardly explicitly considered the demand side activities EPI, EP and ESA on the one hand. On the contrary, the areas ECR in general and ER³ have been dealt with rather extensively. Also, while almost balanced, qualitative research has been employed somewhat more often than quantitative studies.

¹ versus broader concepts such as collaboration, marketing dyads or wide definitions of SCM as postulated by Mentzer et al. 2001

² In addition, appendix II lists all journals that were specifically searched for empirical studies on ECR (all issues from January 1994 to March 2007). The lists of references of all articles found were also searched, as were all management and economics journal databases accessible to the authors.

³ and within this strategy especially VMI and ARP

Table 2. Typology of empirical ECR research

Strategy focus Study design		ECR										
		general	Demand side				Supply side					
			general (CM)	EPI	EP	ESA	general (SCM)	ER (VMI)	EOS	EAS	ES	EC (CPFR)
Quantitative		8	3	-	-	-	4	5	3	7	1	3
Qualitative	Single case	1	3	-	-	-	-	1	-	-	-	-
	Multiple cases/ interviews	5	4	1	1	1	2	7	1	1	1	-
	Network(s)/ working groups	2	1	-	-	-	-	2	1	2	-	1

Note: Multiple entries are possible due to studies combining both different empirical designs and/or focus on multiple strategies.

This typology not only indicates potential research opportunities. It also yields indicators about which areas are particularly strong already and can support theory-based ECR problem solving. On the other hand, such a typology will indicate limitations as well. Obviously, from this meta analysis, inferences can be drawn for only those areas, which have been studied in detail. Thus, any findings and implications in the following sections will naturally be limited in this respect.

With this limitation in mind, it is nevertheless possible to extract central findings from these studies, that a) indicate which problems are commonly associated with both ECR adoption and execution, and b) may profit from an application of agency theory. The next section provides details on the relevant problem areas.

3.2 An Examination of the Empirical Results to Date

To extract central problem areas commonly found in today's ECR collaborations, the empirical studies were thoroughly read as regards content and central findings were extracted. For a number of works, the findings were summaries of success factors, key barriers or reasons for (non-)implementation. In cases where such summaries were not presented, we had to extract the central findings from the results and discussion sections. Next, these central findings were further condensed to central constructs, keywords and key relations. Based on these key ideas, a first mind map was created and further concretized. This process yielded seven problem areas which are strongly supported in the empirical literature. They are summarized in table 3 and described in more detail in the following:

1. The dominance/opportunism problem

In ECR, the two collaborating partners are seldom equals. Many empirical studies observed retailer dominance and manufacturer dependence (e.g. Hogarth-Scott and Dapiran 1997; Mackay et al. 2003; Corsten and Kumar 2005). One party

dominance⁴ leads to power plays and significant amounts of time spent on politics in negotiations (Hoffman and Mehra 2000; Kurnia and Johnston 2001). The more dependent party distrusts the dominating actor and fears opportunism (Paché 1998; Harris et al. 1999), profit maximization goals as well as increasing dependence (Kurnia and Johnston 2003).

2. The information sharing problem

Another well-supported finding is that the actors in ECR do not share (enough) relevant information with their ECR-partners (Frankel et al. 2002), at least not without strong incentives⁵ to offset perceived risks (Clark and Hammond 1997; Fearné and Hughes 2000). Oftentimes, strong unwillingness and resistance to share information exist and the information advantaged party even capitalizes this information asymmetry (Svensson 2002). Such opportunistic behavior in turn fosters distrust and, hence, the dominance/opportunism problem (see 1.).

3. The goal alignment problem

Typically, a certain degree of goal incongruence is realistic between retailers and manufacturers as they pursue own company goals. This problem is also well supported through the empirical findings (e.g. Kurnia and Johnston 2001; Skjoett-Larsen et al. 2003; Danese 2007). Goal incongruence and the failure to align goals in turn foster distrust and fear of opportunism as they make opportunistic behavior more likely.

4. The incentive problem

There seem to be no, too little or no clear incentives for ECR-optimal behavior and performance in today's ECR practice (Vergin and Barr 1999; Frankel et al. 2002; Kurnia and Johnston 2003). The development of suitable incentive systems, however, is absolutely necessary for ECR to fully work in the long run (Tuominen 2004). Incentive deficits exist when such central issues like e.g. information sharing (Fearné and Hughes 2000; see 2.), significant investments in ECR, the precise measurement of benefits and costs (Zairi 1998) or the signaling of ECR suitability (Myers et al. 2000; Dupre and Gruen 2004) are concerned. In addition, the lack of incentives is closely linked to the problem of persisting goal incongruence (see 3.) and the commitment problem discussed next.

5. The commitment problem

Empirical research supports the hypothesis, that there is a general lack of commitment among ECR participants (Barratt and Oliveira 2001; Mejías-Sacaluga and Prado-Prado 2002; Svensson 2002) and no or not enough willingness to change or to understand the partner business's needs and wants (Frankel et al. 2002; Kotzab

⁴ While this party is often the retailer, it can also be the supplier in other situations, e.g. as category captains (see e.g. Gruen, Shah 2000).

⁵ Therefore, the information sharing problem is additionally affected by the incentive problem (see 4.).

and Teller 2003). Relatedly, no (strong) common norms exist which could induce such commitment (Frankel et al. 2002).

6. The formal design problem

Inefficient contract design, imprecise task descriptions and no or too little formal definitions of plans and goals form another empirically well supported problem area (e.g. Borchert 2002; Kotzab and Teller 2003; Tuominen 2004). Again, this provides room for opportunistic behavior, creates disincentives and hinders commitment (see 1., 4. and 5.).

7. The measurement/control problem

Another deficit area in current ECR partnerships is measurement and control. Empiricism shows that there is no or only little, mostly imprecise measurement of the costs and benefits of the various strategies to the various stakeholders (e.g. Collins 1997; Hoban 1998; Zairi 1998; Brown and Bukovinsky 2001). In addition, hardly any control systems are in place (Frankel et al. 2002; Dupre and Gruen 2004) and the measurement and monitoring of performance is insufficient (Stank et al. 1999; Vergin and Barr 1999).

Table 3. ECR problem areas and supporting studies

Problem	Supporting studies (in chronological order)
1. dominance/opportunism problem	Collins 1997; Hogarth-Scott and Dapiran 1997; Pearce 1997; Paché 1998; Harris et al. 1999; Gruen and Shah 2000; Hoffman and Mehra 2000; Mouzas and Araujo 2000; Myers et al. 2000; Alvarado and Kotzab 2001; Brown and Bukovinsky 2001; Kurnia and Johnston 2001; Borchert 2002; Mejías-Sacaluga and Prado-Prado 2002; Svensson 2002; Kurnia and Johnston 2003; Skjoett-Larsen et al. 2003; Mackay et al. 2003; Corsten and Kumar 2005
2. information sharing problem	Clark and Hammond 1997; Stank et al. 1999; Fearne and Hughes 2000; Myers et al. 2000; Borchert 2002; Frankel et al. 2002; Mejías-Sacaluga and Prado-Prado 2002; Svensson 2002; Skjoett-Larsen et al. 2003; Dupre and Gruen 2004; Kulp et al. 2004; Corsten and Kumar 2005
3. goal alignment problem	Pearce 1997; Hoban 1998; Zairi 1998; Kurnia and Johnston 2001; Borchert 2002; Kotzab and Teller 2003; Kurnia and Johnston 2003; Skjoett-Larsen et al. 2003; Kulp et al. 2004; Tuominen 2004; Danese 2007
4. incentive problem	Cachon and Fisher 1997; Clark and Hammond 1997; Vergin and Barr 1999; Fearne and Hughes 2000; Mouzas and Araujo 2000; Barratt and Oliveira 2001; Brown and Bukovinsky 2001; Dhar et al. 2001; Kurnia and Johnston 2001; Frankel et al. 2002; Dapiran and Hogarth-Scott 2003; Kulp et al. 2004; Tuominen 2004
5. commitment problem	Mouzas and Araujo 2000; Myers et al. 2000; Barratt and Oliveira 2001; Kurnia and Johnston 2001; Frankel et al. 2002; Mejías-Sacaluga and Prado-Prado 2002; Svensson 2002; Kotzab and Teller 2003; Tuominen 2004
6. formal design problem	Hoban 1998; Borchert 2002; Kotzab and Teller 2003; Kurnia and Johnston 2003; Skjoett-Larsen et al. 2003; Tuominen 2004
7. measurement/control problem	Zairi 1998; Stank et al. 1999; Vergin and Barr 1999; Myers et al. 2000; Brown and Bukovinsky 2001; Frankel et al. 2002; Dupre and Gruen 2004; Tuominen 2004

This set of ECR-related problems will be subject to scrutiny from an agency perspective in the following section. In order to do so, a short introduction to

agency theory itself and the underlying rationale for application to ECR are necessary and will follow in the next section.

4 Interpreting ECR as a Principal-Agent-Relationship

After having obtained a general idea how empirical ECR research has progressed until today and which problems are commonly observed, this section of the paper utilizes agency theory to analyze these empirical findings in more detail. Specifically, the ECR relationships will be interpreted as a principal-agent-relationship. In doing so, we are able to pinpoint causes for certain cooperation problems observable in ECR partnerships today. Based on these findings, solutions to improve existing and future ECR collaborations will be investigated.

The remainder of this section will first provide a justification for applying agency theory to the ECR phenomenon, and then introduce central agency constructs. Next, the contracting problem and the antecedents to the specific nature of the contracting problem in each ECR case are discussed. Based on these influencing factors, ECR phenomena are classed in this agency framework and central problems solvable through an agency approach are isolated.

4.1 A Rationale for the Application of Agency Theory

The conceptual argument for this study rests on the contributions from agency theory. Agency theory describes the principal-agent-relationship using the metaphor of a contract (Jensen and Meckling 1976). In such a relationship, one party, the principal, delegates work to another party, the agent, who then performs this job. Hence, the agent acts on behalf of the principal. The complexity of such a relationship arises from the principal's uncertainty about the agent's characteristics and actions. Therefore, any contracting between the two parties over task delegation can be seen as an attempt to align preferences and mitigate goal conflict. As Levinthal (1988, p. 155) argues:

"Agency theory views this problem of contract design as maximizing the payoff to the principal, taking several factors into account: (1) the relationship between output and the incentive scheme offered, (2) the allocation of risk associated with different compensation schemes, and (3) the preferences of the principal and agents with respect to income and nonpecuniary outcomes."

In ECR, the retailer e.g. delegates category management tasks to certain manufacturers, the retailer's inventory is vendor-managed to achieve efficient replenishment, or retailer's point of sale (POS) data as well as manufacturer marketing data is shared with the cooperation partner for efficient forecasting. Hence, ECR partnerships exhibit features central to agency theory: The two parties collaborating through ECR, manufacturer and retailer, are both interdependent and coopera-

tive, whilst they most likely pursue goals which are not fully aligned⁶. Therefore, ECR relationships embody the principal-agent model (Lassar and Kerr 1996) and also meet the requirements for a useful application of agency theory proposed by Eisenhardt (1989). As ECR collaborations observed in practice are still not optimal today, an agency approach to the design of the ECR contract seems sensible.

In addition, Lassar and Kerr (1996) provide a range of reasons why agency theory is useful in a manufacturer-retailer setting: First, agency theory makes assumptions about the actors' behavior which are plausible in an ECR setting. Second, agency models focus on the economic motives within the relationship in question, irrelevant of the respective governance form (Eisenhardt 1989).

While transaction cost economics, another theory often utilized in inter-firm relationships (see e.g. Williamson 1975, 1998; Rindfleisch and Heide 1997), often focuses on deriving the optimal governance form or organizational boundaries with the transaction as the unit of analysis, agency theory focuses on the contract between cooperating parties as the unit of analysis, regardless of organizational boundaries. The following section discusses the concepts central to agency theory in more detail.

4.2 An Introduction to Central Agency Concepts

The basic agency model and the resulting agency problem of determining the optimal contract for the agent's service rest on a set of assumptions. These can be differentiated according to their focus into human, organizational and informational assumptions (Eisenhardt 1989, pp. 59, 63):

Human assumptions:

- Actors are self-interested, individual profit or utility maximizers⁷.
- Actors are only boundedly rational as there is environmental uncertainty in terms of outcomes.
- The agent is more risk averse than the principal (who is often assumed to be risk-neutral); more recent studies relax this assumption to risk preferences differing in some way for principal and agent (divergent preferences).

Organizational assumptions:

- A (at least partial) goal conflict exists between principal and agent.
- Some information asymmetry exists between the principal and the agent (where the agent is typically the better informed actor).

⁶ The ECR approach ideally prescribes cooperative behavior to achieve common goals. Nevertheless, it would be unrealistic to assume that firms will subordinate all their individual goals to a common greater good. Hence, at least residual goal incongruence can be assumed (as has been shown in a number of the empirical studies summarized above).

⁷ Only the basic assumptions are presented here. However, agency theory can accommodate the pursuing of broader social goals (Bergen et al. 1992).

- Preeminence of efficiency as effectiveness criterion; the principal will always attempt to choose a contract which brings about the best possible outcome subject to the constraints given.

Information assumption:

- Information is a commodity, i.e., it is purchasable at a certain cost.

With the contract between principal and agent to delegate a certain task as the unit of analysis, the key idea of agency theory can be summarized as follows: The principal-agent-relationship should reflect the efficient organization of agency costs, which are the sum total of all information costs and risk-bearing costs. Hence, agency theory centers on the contracting problem between principal and agent.

Such a contracting problem is observable when looking at the manufacturer-retailer relationship in efficient consumer response as reasoned in section 4.1. When looking at the ECR problems derived from the empirical literature with an agency focus, many phenomena central to agency theory are easily discernible (see table 4).

Table 4. ECR problem areas and related agency phenomena

Problem	Agency aspect (hypothesized)
1. dominance/opportunism problem	opportunism
2. information sharing problem	information asymmetry
3. goal alignment problem	goal incongruence
4. incentive problem	incentives
5. commitment problem	strength of norms
6. formal design problem	formalization of contract, task descriptions
7. measurement/control problem	monitoring, measurement, signaling

The relevance of agency theory to ECR seems quite clear: Current ECR endeavors often struggle with problems which are related to aspects discussed in agency theory. Thus, the next section will consider the general contracting problem in ECR in more detail to isolate specific factors which influence the contractual outcome. It is these factors that need close attention if improvements and solutions are to be found.

4.3 The Contracting Problem

In essence, the contracting problem between principal and agent is differentiated into two phases (Bergen et al. 1992). The pre-contractual or ex-ante problems arise before any contract is signed between the principal and the agent. These are due to what is commonly referred to as hidden information (in the sense of hidden characteristics and/or hidden intent of the agent being unknown to the principal) resulting in adverse selection. Once the contract is binding for both parties, post-contractual or ex-post problems arise. Here, hidden action (often through utilizing

superior knowledge, i.e. hidden information) of the agent and unobservable by the principal becomes a problem as it results in moral hazard (Arrow 1985).

Three major antecedents can influence the precise dimensions and severity of both the ex-ante and the ex-post problem: the **type of agent** (Jensen and Meckling 1976), the **characteristics of the task** contracted upon (Eisenhardt 1985), and the relevant **situation** with a particular information constellation of the two actors (Eisenhardt 1985; Bergen et al. 1992).

While the three dimensions are relevant both to the ex-ante and the ex-post model, their specific contents differ, which is why they are discussed in turn, first for the pre-contractual, then for the post-contractual phase.

4.3.1 Factors Influencing the Ex-ante Problem

The ex-ante hidden information problems arise because of information asymmetries occurring prior to the principal entering into a contract with a given agent (Bergen et al. 1992). Three areas typically affect the contractual outcome, i.e. the type and design of the chosen contract, ex-ante:

1. The type of agent

The principal has no full information about the respective agent's **risk preferences** (Bergen et al. 1992). That is, the principal does not know whether the agent is risk averse, risk seeking or risk neutral. Depending on the nature of the agent's risk structure, however, different types of contracts (outcome-based vs. behavior-based; Eisenhardt 1985, 1989) are most appropriate and will generate an efficient risk distribution. Therefore, if the agent's risk preferences are unknown to the principal, the contract chosen may shift too much (or too little) risk to the agent which may potentially be costly to the principal (Bergen et al. 1992).

The **level of goal conflict** between the principal and agent is a decisive factor as to how important additional incentives built into the contract become to ensure goal-congruent behavior of the agent (Bergen et al. 1992). A related factor, **effort aversion**, has been discussed by Eisenhardt (1985). With increasing degrees of effort aversion, the agent becomes less inclined to perform the task well. Again, incentives in the contract need to ensure efficient behavior.

On the other hand, the **norms** of an agent and their relative strength (Heide and John 1992; Bergen et al. 1992) can be seen as a mediating factor. Strong norms to comply with the tasks agreed upon in the contract with the principal can positively affect or even offset certain levels of effort aversion or goal conflict.

Another unobservable characteristic of the agent is her **quality of fit** for the task under contract. Agents well suited for a certain task will not only perform that task better but also with more ease than unsuited agents (Celly and Frazier 1996). Strong goal conflicts for example may lead to **strategic misrepresentation** (Milgrom and Roberts 1992). However, an agent's **reputation** (Jensen and Meckling

1976) may mediate the chance for the principal to choose unfit agents, if the contracts are periodically renewed.⁸

2. The task characteristics

The second area influencing the degree of agency conflict is the characteristics of the task under contract. Prior to contracting upon the task, its **fit for efficient signals** by the agent is relevant. That is, is there a certain signal relevant to the task that suitable agents can use to signal their fit, and would it be prohibitively costly for unsuitable agents to obtain the same qualifying signal? If a task can generate efficient signals from suitable agents, a separating equilibrium is obtained (Bergen et al. 1992). If there are no fitting signals to the task under contract, the principal has more difficulty to differentiate between agents. Similarly, the task's **suitability for self-selection signals** influences the options to the principal for offering different contract schemes that initiate self-selection among the agents.

These suitability concerns are related to the future degree of task **observability** (Lassar and Kerr 1996) and ex-ante **programmability** (Eisenhardt 1985, 1988). Task observability describes how well or badly and how costly the agent's actions to perform the particular task can be monitored and how well this is known by the principal ex-ante. A similar impact results from task programmability. "Programmed jobs are ones in which behaviors can be precisely defined" (Eisenhardt 1988, p. 493). These factors strongly determine the principal's options regarding contract design in terms of task specification.

3. The situation

The last factor influencing ex-ante conflict is the particular situation of the two actors with a certain information constellation (the information state; Eisenhardt 1985). Firstly, the situation can be described by the overall level of ex-ante **information asymmetry**. Contingent on, for example, how well the principal knows the particular agent, the market for agents in general and the task under contract, the agent may have a large or small information advantage.

Dependent on the particular situation, the **cost of information** can differ. Different costs may be associated with screening activities (Lassar and Kerr 1996) or the observation of signals in different situations.⁹ Depending on the cost of information, the principal faces different trade-offs between obtaining more costly information to alleviate the existing information asymmetry and incurring a loss resulting from an inappropriate agent in the future (Bergen et al. 1992).

In addition to the costliness of information, the **validity of predictions** matters. Valid predictors do not always exist for ex-ante measures available to the principal. He may be able to screen agents for certain characteristics or observe signals from them. However, the information obtained through these activities has to be a valid measure for the sought-after characteristics (Bergen et al. 1992).

⁸ This line of argument relates to multiperiod aspects, as they are the case within ECR collaborations (Lassar, Kerr 1996).

⁹ Clearly, these costs are also related to the task characteristics.

4.3.2 Factors Influencing the Ex-post Problem

The ex-post hidden action problems are again due to information asymmetries, this time, however, occurring after the principal entered into a contract with a given agent. The agent then chooses whichever action she perceives as best to maximize her own utility. The principal is assumed to be unable to perfectly monitor all actions by the agent and their precise quality. In addition to the agent's behavior, the realized outcomes are also partly determined by environmental factors which are uncertain. Hence, an information asymmetry situation arises (Bergen et al. 1992). Again, the same three areas typically affect the exact outcome of the post-contractual problems:

1. The type of agent

The hidden action problem is first of all influenced by the type of agent as her behavior is central to the post-contractual outcome. The first decisive factor on the agent's behavior is her general attitude towards the contract. This attitude varies with the **level of reservation utility**¹⁰ (Bergen et al. 1992). Depending on the agent's reservation utility, she is inclined to work or not, and if she does, how much and with which amount of effort. **Risk preferences** also influence the agent's attitude towards the contract and thus the specific outcome of the hidden action problem (Eisenhardt 1989; Bergen et al. 1992). As discussed above, **effort aversion** (Eisenhardt 1985) makes the agent less inclined to perform the task well. Similarly, the agent's **taste** influences whether and to what extent he enjoys work or leisure (Jensen and Meckling 1976).

Another antecedent to the ex-post problem is the **opportunism potential** (Dutta et al 1994). This is driven by the **preference exercising ease** or relative power of the agent (Jensen and Meckling 1976). How easy is it for the agent to do as she chooses? Similarly, a strong degree of **goal conflict** increases the potential for opportunistic behavior (Lassar and Kerr 1996; Bergen et al. 1992). On the contrary, **norms** (Heide and John 1992) and their strength (Bergen et al. 1992) can dampen opportunism. Similarly, if the agent feels **commitment** towards the principal and the contracted task, this also decreases the opportunism potential (Ross et al. 1997).

2. The task characteristics

The specific characteristics of the task under contract also influence the outcome of the ex-post problem. The degree of task **observability** (Lassar and Kerr 1996) and task **programmability** (Eisenhardt 1985, 1988) strongly determine the principal's options regarding measurement and evaluation of the agent's performance (Eisenhardt 1988). In this sense, measurability is partially inherent in the nature of a job and not only due to the situation's specific information systems as described below. In addition, both task observability and programmability relate to

¹⁰ The value of the best outside option to the agent, i.e. her best alternative outside the relationship with the given principal, which serves as a benchmark for the respective contract.

the agent's opportunism potential in the sense that opportunistic behavior becomes easier, the less observable or programmable a particular task is.

3. The situation

The specific situational context of the principal-agent-relationship also determines the outcome of the ex-post problem. Firstly, the degree of **measurement** and **evaluation** are, as discussed above, at least partially, due to the information systems available in the particular situation and their costliness (Eisenhardt 1985, 1988). Lassar and Kerr (1996) describe this phenomenon as the situational **monitoring ability** and **clarity of behavioral/outcome measures** available to the principal (see also Anderson and Oliver 1987; Jensen and Meckling 1976; Bergen et al. 1992).

The situation is also principally determined by the degree of **uncertainty**. Here, agency theory often differentiates the total **outcome uncertainty** (Eisenhardt 1988; Lassar and Kerr 1996), which describes the general (un)predictability of the contractual outcome, and the more specific **environmental uncertainty** (Eisenhardt 1985; Achrol and Stern 1988; John and Weitz 1988; Celly and Frazier 1996), which describes the more specific unpredictability of influencing factors outside of the contractual relations. Other types of uncertainty include, for example, technical uncertainty (Goerzen 2007) or perceived, i.e. subjective, uncertainty (Pavlou et al. 2007).

The situation further impacts the contractual outcome through the **market for agents** (Jensen and Meckling 1976) and the resulting **replaceability** of the chosen agent (Celly and Frazier 1996). As in the ex-ante discussion, this aspect becomes important when the contract is repeated. Depending on the particular situation, the market for agents determines if replaceability is possible at all and if replacement (search) costs are high or low (Jensen and Meckling 1976). Replaceability is also related to the agreed-upon contract duration (Celly and Frazier 1996).

4.4 ECR Phenomena under the Lens of Agency

In the last section, we discussed which variables determine the three major antecedents which in turn influence the precise dimensions and severity of both the ex-ante and the ex-post problem. These antecedents – the type of agent, the task characteristics, and the situation – can be specified for any ECR collaboration in place today and future ECR adoption plans. This would be a feasible approach to improving specific ECR relationships by identifying the particular problem area and applying the most feasible agency theoretical solution to the particular case.

In this paper, a broader approach is taken to generate more abstract solution approaches that are feasible to a range of ECR collaborations from agency theory. To do so, the central problems observed in empirical ECR research derived in section 3.2 are analyzed within the antecedent framework to pre- and post-contractual agency problems discussed in 4.3. That way we are able to specify more precisely, what causes a particular problem – agent type, task, or situation – and when it is caused – ex-ante vs. ex-post –.

As the scope of this paper is limited, a full discussion of the entire ECR problems/contractual antecedents' matrix is impossible. Therefore, we will only give examples of how the ECR problems can be sorted according to their causes.

The **dominance/opportunism problem** can emerge both ex-ante and ex-post. A dominant retailer may "force" a manufacturer to implement a VMI program, for example, or may extort changes to ECR agreements ex post. It is hence related to the type of agent¹¹ and the particular situation. The problem arises most prominently due to the type of agent: Retailer dominance fosters the opportunism potential as well as the preference exercising ease. Combined with the goal conflict between retailer and manufacturer, the pre-contractual problem very easily leads to ECR implementation reluctance and the post-contractual problem to moral hazard.

The **information sharing problem** is largely an ex-post problem. Here, for information asymmetries to persist the degree of goal conflict and the agent's risk preferences are backed by low task observability and programmability as well as the situation-specific difficulties of the principal to monitor the agent's actions.

The **problem of goal alignment** is caused by the goal conflict between principal and agent. This can be problematic both before the two parties sign a contract and after. Pre-contractual goal conflicts in ECR relations result in strategic misrepresentations by the agent and hence adverse selection or difficulties to even set up a binding agreement to cooperate. Ex-post, goal conflicts can lead to hidden actions such as shirking by the agent.

Similar reasoning holds for both the **incentive** and the **commitment problem**. The primary factor of influence is the agent's conflicting goals, risk preferences and effort aversion or taste causing problems both ex-ante – no incentives or commitment to implement ECR strategies – and ex-post – no incentives to fully commit to the ECR strategies agreed upon –.

The **problem to formally design** the ECR contracts and tasks surfaces ex-ante. The ease to write up contracts or specify tasks ex-ante depends heavily on the respective task and its ex-ante observability and programmability but also on the information situation (degree of information asymmetry and cost of information) and the type of agent (e.g. goal conflict degree, reputation and risk preferences).

The **measurement/control problem** is of course closely related to the ex-ante problem of formal design. As a result, measurement and control are ex-post problems due to the task characteristics of observability and programmability and the situation-specific difficulties with measurement and evaluation (monitoring ability, clarity of measures and uncertainty).

These arguments are summarized in appendix III. Based on this agency-based reasoning regarding problem causes, solutions are derived within this framework in the next section.

¹¹ Here, the retailer. A detailed discussion who takes on the role of principal or agent when, is omitted here due to space constraints. However, as Bergen et al. (1992) point out, a given actor can shift from the principal role to that of an agent across different contexts (here, tasks in ECR). The party with the information advantage is usually considered the agent in a given context.

5 Improving Efficient Consumer Response Collaborations

How could Efficient Consumer Response partnerships be improved? It was shown that the empirically observed ECR problems are of an agency-theoretical nature. Hence, solutions to these problems can be deducible from agency theory as well. The general starting points for solving ECR problems are structured by problem area and discussed in more detail in the following. Appendix IV provides a summary in table form.

To limit the **dominance/opportunism problem**, alignment of interests through feasible institutions is necessary ex-ante: Suggestions from agency theory for the principal include offering contract menus for self-selection, and/or screening for suitable agents (e.g. through qualification programs; Wathne and Heide 2004). Recent findings show that perceived dependence of one party fosters conflict (Zhou et al. 2007). Hence, for a working ECR collaboration, the dominant party should have an interest to mitigate some of this dominance as well. Agents could use signaling to disclose their good intentions or offer the exchange of hostages. On both sides, investments in relational norms can help to protect against the abuse of power in the long-term (Heide and John 1992).

The **information sharing problem** could be solved ex-ante, e.g. through suitable contracts. If information sharing has become a problem already in an existing ECR relationship, the information disadvantaged party could try to establish explicit (monitoring) routines (Ouchi 1979), and/or provide incentives to share information (e.g. by quantifying the benefits to both parties or introducing formal sharing rules). The principal could also provide “training” in the sense of educating the agent about the benefits of information sharing (Ouchi 1979), or use signals to verify his own commitment to offset information sharing impediments (distrust/fear of opportunism and risk aversion)¹².

As the goal **alignment, incentive and commitment problems** all relate to the type of agent antecedent, they are discussed jointly: Again, hostage exchange plays a crucial role: through investments in specific assets or the sharing of cospecialized assets (Milgrom and Roberts 1992) commitment is both signaled and realized. In addition, offering explicit profit sharing/incentive contracts and reward systems should be able to solve the incentive problem and help to align goals (Murry and Heide 1998)¹³.

One aid in solving **formal design problems** is the choice between output-based and behavior-based contracts depending both on the degree of task observability

¹² Such signals could include the principal’s own utilization of a collaborative communication strategy (Mohr and Nevin 1990; Mohr et al. 1996) with an explicit focus on communication quality (Holden and O’Toole 2004).

¹³ Note that Murry and Heide (1998) also show that close personal relations contribute significantly to retailer participation and compliance. Hence, again, investments in relational norms (Heide and John 1992) and socialization efforts (Stephen and Coote 2007) may counter opportunism threats in the long run. However, the personal relations effect was a) less important than the incentives effect and b) it did not diminish the incentives effect (Murry and Heide 1998).

and programmability (Eisenhardt 1985, 1988) and the agent's risk preferences (Basu et al. 1985). For example, to pay for promotions in EP, manufacturers can use "paying for results" versus "paying for behavior" (Clemons and Row 1993). When results are rewarded, retailers receive a set amount of funds for promotions where the level of the funds is determined by sales targets. Based on the retailer's performance against the set targets, the funds are then increased or decreased over time. In contrast, under behavior-based pay, the manufacturer contracts for specific promotional services with the retailer where the provision of these services could be monitored electronically (Clemons and Row 1993). A mixture of both outcome- and behavior-based measures could also be feasible depending on the particular circumstances (Churchill et al. 1985). In general, behavior-based contracts have a positive impact on motivation (Anderson and Oliver 1987; Oliver and Anderson 1994), thus on the incentive and commitment problem discussed above.

Solving the **measurement/control problem** ex-post involves the implementation of monitoring and control systems: Based on the respective contract format, actual outputs need to be evaluated against previously set target evaluations or the specific activities contracted upon are monitored¹⁴.

Summing up, this section provided a first exploration of agency solutions and briefly discussed the ways they may aid in solving common ECR problems. The paper closes with a discussion of the findings and concluding remarks regarding management implications, this study's shortcomings and future research suggestions in the following section.

6 Discussion and Conclusions

It has been argued that ECR relationships can be improved by applying agency theory to the problems commonly observed in practice. After a short introduction of the Efficient Consumer Response concept, a review of the empirical literature on ECR was presented and evaluated. Seven problem areas were extracted, described and structured. Then, agency theory was used to analyze the extracted problems and interpretation recommendations on how to improve ECR partnerships were derived.

These general solutions can certainly be supplemented with further suggestions in the future. Also, the solutions presented here should be developed further and concretized for the ECR concept in general and specific ECR collaborations in particular. The resulting recommendations for action can significantly improve the implementation of ECR cooperation in the future.

¹⁴ Note however, that monitoring may actually increase opportunism (John 1984; Murry and Heide 1998). If the same outcomes can be achieved through screening and/or efficient contract design ex-ante (e.g. by offering incentives), the direct and indirect costs of continuous monitoring should be compared to the costs of screening or offering incentives.

In terms of management implications, it should be stressed that a) all ECR implementation problems presented here were derived from empirical studies and b) agency theory provided a good foundation to provide first ideas on how to solve these problems. Hence, the findings of agency theory may be fruitful addition to current ECR strategy developments. As agency is concerned with both ex-ante and ex-post problems, this is relevant to companies planning to implement ECR as well as those already in ECR collaborations. A more integrative approach of management practice and economic research should be beneficial to all participants.

However, some limitations need to be pointed out. In this paper, a broad approach was taken to generate possible solutions from agency theory that are feasible to a range of ECR collaborations. We are aware of the fact that making generalizing assumptions regarding the ECR relationships inevitably causes the derived improvement suggestions to be somewhat imprecise. In this respect, future research should attempt to elaborate both on the ECR problems from an agency theoretical perspective and on the respective solutions. There is need for more detailed discussions of this subject and both scientific research and practice would benefit from more in depth and precise elaborations of the recommendations for improvement. These could then be applied in field experiments or pilot projects yielding new case study findings. Clearly, research would also benefit from a large-scale empirical test of the proposed relations between ECR problems and agency phenomena.

The agency approach to ECR presented here certainly needs further research as well. Central arguments presented in this paper and of agency theory in general (such as the assignment of roles) need further elaboration and scrutiny.

Last but not least, the application of agency theory to ECR may be perceived as controversial in itself, as the ECR concept rests heavily on mutual commitment and trust whereas agency theory's prime assumption is opportunism. The possible ramifications of assuming opportunistic behavior first and foremost need additional clarification.

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Appendix I: Chronological summary of empirical research on ECR published in academic journals

Author	Study design	Focus
Pearce 1996	Case study Birds Eye Wall's, U.K.	Customer satisfaction through ECR
Cachon and Fisher 1997	Simulation study, Campbell Soup distribution centres' data	Development and testing of operating rules for a continuous replenishment program
Clark and Hammond 1997	2 manufacturer and 2 retailer case studies, qualitative telephone surveys of 26 grocery retailers	Relationship between continuous replenishment program adoption and retail warehouse performance
Collins 1997	Case study Thomas J. Lipton, USA	Implementation aspects: barriers and future issues
Hogarth-Scott and Dapiran 1997	Qualitative semi-structured interviews with Australian and U.K. retailers (3; 2) and suppliers (4; 4)	Roles of power, trust and commitment in Category Management practice
Pearce 1997	Case study Birds Eye Wall's, U.K.	Implementation process of ECR and lessons learned
Hoban 1998	Qualitative telephone interviews with 15 manufacturers, 10 wholesalers and 15 retailers in the USA in 1993	Innovation adoption process
Paché 1998	Qualitative semi-structured interviews with purchasing/logistics managers from 4 multiple retailers, 3 retailer co-operatives, 3 hypermarket chains, 1 variety store in France	Nature of collaboration between retailers and contractors or third party service providers
Zairi 1998	Qualitative: case studies from 3 leading U.K. retailers, benchmarking with 6 suppliers	Benchmarking on success factors
Daugherty et al. 1999	Quantitative written survey of 75 manufacturers and 23 retailers	Automatic replenishment programs (ARP)
Harris et al. 1999	Quantitative mail survey of 450 Australian grocery supply chain members	Assessment of ECR applicability within the Australian grocery industry
Stank et al. 1999	Quantitative written survey of 47 U.S. food suppliers	Relation between interfirm supply chain coordination and logistics performance
Vergin and Barr 1999	Personal interviews with 10 Fortune 500 consumer products manufacturers	Experiences with continuous replenishment planning
Fearne and Hughes 2000	Qualitative structured interviews with U.K. fresh produce suppliers	Success factors for ECR in fresh produce supply chains
Fernie et al. 2000	Survey of 342 senior executives of U.K. grocery retailers, manufacturers and logistics service providers	Assessment of factors impacting the grocery supply chain
Gruen and Shah 2000	Qualitative interviews with retailer and supplier category managers; quantitative study of 128 supplier category managers	Category plan objectivity and implementation in category management relationships
Hoffman and Mehra 2000	Qualitative: exploratory interviews with multiple informants from 5 major U.S. grocery businesses	Analysis of the ECR implementation and development of a Management Action Plan
Mouzas and Araujo 2000	Qualitative embedded case study using interviews, archival records, observations and data triangulation of a business network (7 retailers, 5 manufacturers, 3 logistics & IT companies)	Longitudinal view, enabling and restraining factors in ECR implementation

Myers et al. 2000	Quantitative mail survey of 75 manufacturers and 23 retailers from the Council of Logistics Management member base	Usage and effectiveness of automatic replenishment programs (ARP)
Alvarado and Kotzab 2001	Qualitative research accumulated from European ECR working groups; standardized mail survey of 23 Austrian ECR-initiative members	Typology of interfirm governance dimensions applied to ECR-initiative
Barratt and Oliveira 2001	Quantitative e-mail survey of VICS (voluntary inter-industry commerce standards) CPFR sub-committee members	CPFR implementation inhibitors and process enablers
Brown and Bukovinsky 2001	Quantitative exploratory financial statement analysis of 25 (20) food retailers for the 1992-1997 (1992-1998) period	Comparisons of performance and financial ratios between ECR adopters and non-adopters
Dhar et al. 2001	Quantitative: account data for 106 U.S. grocery retail chains on 19 categories over 3 years	Key drivers of effective Category Management
Kracklauer et al. 2001	Case study: cooperation between Procter & Gamble and A&P	Collaborative customer relationship management as extension to category management
Kurnia and Johnston 2001	Qualitative case study: site visits and interviews with 7 managers of an Australian retailer-manufacturer-cooperation	Product replenishment process implementation, characteristics and barriers
Borchert 2002	Quantitative online survey of 70 manufacturers, 27 retailers and 11 service providers from Germany	Barriers to ECR implementation
Frankel et al. 2002	Qualitative: standardised, open interviews with 12 suppliers, 12 retailers, 2 distributors and 3 logistics service providers resulting in case studies of 15 supplier-customer pairs	Critical success factors to ECR collaboration
Mejías-Sacaluga and Prado-Prado 2002	Qualitative personal interviews with mostly Spanish manufacturers (35) and retailers (13) backed with quantitative standardized, mixed questionnaire	Supply-side cooperation aspects of ECR: order fulfilment, cross-docking, continuous replenishment
Svensson 2002	Qualitative inductive study in the Swedish retail industry, interviews with 33 executives	Perceived potentials and obstacles to ECR implementation
Dapiran and Hogarth-Scott 2003	Qualitative semi-structured interviews with Australian and U.K. retailers (3; 2) and suppliers (4; 4)	Roles of power, dependence and cooperation in Category Management practice
Kotzab and Teller 2003	Quantitative survey among 45 ECR-member companies in Austria	ECR specific implementation factors
Kurnia and Johnston 2003	Quantitative mail survey of 42 ECR-interested Australian firms; qualitative semi-standardized interviews with 3 manufacturers and 2 retailers	Key challenges to ECR adoption
Skjoett-Larsen et al. 2003	Quantitative survey of 218 Danish firms	Attitudes towards extent and scope of interorganizational collaboration, CPFR focus
Mackay et al. 2003	Quantitative survey of 163 retail firms trading electronically in Australia	Enabling technologies usage

Dupre and Gruen 2004	Qualitative: 16 exploratory, semi-structured interviews with 3 German retailers, 5 international manufacturers and third-party experts	Category Management practices and barriers to implementation
Kulp et al. 2004	Quantitative telephone survey of 53 manufacturer company divisions	Development and testing of conceptual framework explaining the effects of information integration on performance measures
Tuominen 2004	Quantitative survey of 545 grocery industry companies from multiple countries	Role of collaboration in the context of supply chain and firm value proposition
Corsten and Kumar 2005	Quantitative survey of 266 suppliers to a U.K. retailer and retailer's archival data on supplier performance	ECR adoption's impact on supplier economic performance
Danese 2007	Qualitative multiple case study analysis of 7 supply networks using semi-structured interviews, company documentation, archival records and direct observations	Dimensions explaining the variety of CPFR collaborations

Note: This list was developed through scanning journals (see appendix II) and following up referenced articles. Although the list may not be exhaustive, it should include most of the relevant articles.

Appendix II: Academic journals searched for empirical studies on ECR (in alphabetical order)

Academy of Management Journal
Academy of Management Review
Administrative Science Quarterly
Agribusiness
American Economic Review
American Journal of Agricultural Economics
British Food Journal
Decision Sciences
European Business Review
European Journal of Innovation Management
European Management Journal
Industrial Marketing Management
Integrated Manufacturing Systems
International Journal of Logistics Management
International Journal of Operations & Production Management
International Journal of Physical Distribution & Logistics Management
International Journal of Production Economics
International Journal of Research in Marketing
International Journal of Retail & Distribution Management
International Journal of Service Industry Management
Journal of Business & Industrial Marketing
Journal of Business Logistics
Journal of Business Research
Journal of Economic Behavior and Organization
Journal of Law, Economics and Organization
Journal of Logistics Research & Applications
Journal of Management
Journal of Management Studies
Journal of Marketing
Journal of Marketing Research
Journal of Operations Management
Journal of Purchasing and Materials Management
Journal of Research in Marketing
Journal of Retailing
Journal of Service Industry Management
Journal of Supply Chain Management
Journal of Systems Management
Journal of the Academy of Marketing Science
Logistics Information Management
Management Decision
Management Science
Marketing Science
MIS Quarterly
Organization Science
Production and Operations Management
Strategic Management Journal
Supply Chain Management: An International Journal
Supply Chain Management Review
The International Journal of Logistics Management

Appendix III: Selected antecedents to ECR problems from an agency perspective

	Ex-ante			Ex-post		
	Agent	Task	Situation	Agent	Task	Situation
dominance/ opportunism problem	goal conflict retailer/ manufac- turer		information asymmetry	opportu- nism potential, preference exercising ease, goal conflict		market for agents
information sharing problem			information asymmetry, cost of in- formation	goal con- flict, risk preferences	observabil- ity, program- mability	monitoring ability
goal alignment problem	goal conflict retailer/ manufac- turer, effort aversion			goal con- flict, effort aversion, taste		
incentive problem			information asymmetry, cost of in- formation			measure- ment & evaluation
commitment problem						
formal design problem	goal conflict, effort aversion, reputation, risk preferences	fit for signals, suitability for self- selection, observabil- ity, program- mability	information asymmetry, cost of in- formation, validity of predictions			
measurement/ control problem					observabil- ity, pro- grammabil- ity	measure- ment & evaluation, clarity of measures, outcome uncertainty, monitoring ability

Appendix IV: Selected solution proposals to ECR problems from an agency perspective

	Ex-ante			Ex-post		
	Agent	Task	Situation	Agent	Task	Situation
dominance/ opportunism problem	contract menus for self- selection, screening, signaling, hostage ex- change, in- vest in rela- tional norms					
information sharing problem				incentive provision, signaling		establish explicit (monitor- ing) routines
goal alignment problem	hostage exchange, explicit profit shar- ing/ incentive contracts, reward systems					
incentive problem						
commitment problem						
formal design problem		output-/ behavior- based contract				
measurement/ control problem						monitoring (output/ activities)