WHY ARE SUPPLY CHAIN PROJECTS (NOT) SUCCESSFUL?[¥]

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ABSTRACT

The goal of this paper is to explain, from a managerial accounting and transaction cost perspective, why many supply-chain projects are not continued after an initial research phase. A case base of recent projects, governed by different Dutch subsidy agencies, was analyzed by means of desk research and semi-structured interviews with key participants. These supply chain projects had mainly reduction of energy usage as a focus. It was found that the main causes for discontinuity were: the use of different accounting methods in different project stages, a lack of ex ante information on costs and benefits of projects, a lack of ex ante agreement on redistribution in the supply chain of such costs and benefits, as well as the existence of possibilities to act opportunistically as a result of asymmetrically distributed and hidden information. To supply chain managers, we advice to guarantee commitment from the top-management of all chain partners at any stage and to address measurement and redistribution issues in earlier stages than has been the case in the past. To the scientific community we advice to further develop techniques for supply chain accounting, with a lead role for cash accounting and the integration of non-financial project objectives.

Key words: costing, supply-chain, redistribution of results, investments, transaction costs

1. Introduction

In the Netherlands, in the last ten years a lot of effort and financial means have been invested to promote cooperation in supply chains. The early programs aimed at improving supply chain efficiency and effectiveness, as well as food safety and risk control in food and agri-related supply chains. One of the more recent programs is supporting projects to reduce energy usage by means of chain cooperation[2]. Typical to all of these supply chain projects was the involvement of research institutes and government subsidy agencies to improve the operations and management of the supply chain of the private entities.

In practice and theory, lots of work still have to be done to improve the conditions for successful supply-chain cooperation. With "success" we denote lasting cooperation, beyond the time-horizon of the project itself. Key success factors are the measurement and (eventually) redistribution of project results. These areas have been addressed by different disciplines, like project-management, marketing, management accounting, game-theory, industrial and social psychology as well as information science (for an overview, see Broens and Bremmers, 2007), but they deserve a more systematic approach.

Projects unroll in stages. After an *initiation stage*, in which the consortium is formed and the approach is being agreed upon, the main phase of the supply chain projects under study was a *feasibility study*. Then, if investments or contracts are necessary to realize the energy savings or other supply chain optimizations, generally a *design stage* will be necessary. Then

[2] In 2002 the Dutch agriculture administration together with the environment administration initiated the program Sustainable Supply Chains and Energy Usage Reduction (DKE) managed by SenterNovem and ACC.

naturally follow the *realization* and *exploitation* stages. Although the projects in our case base were feasibility studies mainly, we could follow the consortia through the consecutive stages, if necessary.

A significant number of projects in the case base we studied had as a goal the acquisition and exchange of knowledge between the project partners only. The objectives of the partners did not include cooperation after the project horizon, so that the cooperative efforts of the consortium partners on the subject in question (e.g. energy savings) did not extend beyond the project. One could say, the goal of the cooperation was the project itself. We label them 'knowledge projects'. Needless to say, these projects are successful by definition.

For other projects, success is defined as lasting cooperation, during the realisation phase and beyond. Our aim is to identify factors that influence such type of success. To do so we focus on the factors that have to do with measuring and distributing the results of the cooperation, both ex ante and ex post. The goal of this paper is therefore (1) to contribute to the development of financial instruments for supply chain accounting and (2) to investigate the pitfalls in the process of supply chain project management.

The continued participation of stakeholders in supply chain projects depends on their attitude. The 'calculating participant' will weigh the costs and benefits against each other in the different phases, from his own perspective and using his own value system and measurement methodology. Management accounting techniques are not really applicable to supply chain costing and pricing under all circumstances. Supply chains often include a multitude of stakeholders with conflicting (profit) goals. Moreover, in supply-chain projects a situation of information asymmetry exists, which could induce opportunistic behavior. A further complication is that project revenues often are intangible of a kind, like improved business relations, consumer satisfaction, brand equity, risk reduction and ecological value. These can not easily be identified and expressed in money terms. Without an adequate measurement methodology for chain costs and benefits it is not possible to take the next step: the redistribution of financial outcomes over chain partners. In this paper we will address these problem areas and take steps to improve the management of supply chain projects.

We use a grounded-theory approach in which theoretical insights are derived from our experiences with practical cases, and the application of these theoretical insights to reality leads to a reconsideration of the theoretical basis. The theoretical starting point of this paper is given in § 2. Available accounting techniques for measuring and redistributing supply chain project results are addressed in § 3. The case base and the main results are described in § 4. In § 5 conclusions will be drawn and recommendations will be given to improve project management.

2. Theoretical foundation

In this paragraph we will first provide a foundation for our research using transaction cost economics (§ 2.1). Next, in § 2.2, we will describe different supply chain configurations, and investigate which configurations create a measurement and/or distribution problem. In § 2.3 we will address different "classical" solutions to the problems, and go into their shortcomings.

2.1 Transaction cost economics and the supply chain

While earlier economic theorizing addressed the firm as a production function, Ronald Coase first regarded the firm as a governance structure (Rindfleisch and Heide, 1997; Williamson, 1998). The inclusion of the firm as a governance alternative in the theoretical landscape of goevrnance represents a shift away from classical economics (Grover and Malhotra 2003). Coase posed the question whether transactions (the central units of analyses) could better be performed within a hierarchy (firm) or in a market context (Geyskens et al., 2006). Governance costs connected to a hierarchy create a tendency towards the market as governance structure, were it not that dimensions of transactions – especially uncertainty and asset specific investments underlying them – can cause "market failure". In that case a hierarchy is be preferred. Especially asset specific investments create dependency, which can lead to shirking (opportunistic exploitation; see in this respect: Clemens et al. (1993). The basic supposition in TCE is that individuals are behaving rational, but this rationality is limited (Williamson, 1998), so that contracts are never complete. It is suggested however, that trust can replace formal governance mechanisms like monitoring and controls (Griesinger, 1990). In general, asset specificity forms a strong bias towards hierarchy governance (David and Han, 2004; Geyskens et al. 2006; Poppo & Zenger, 2002). Therefore commitment to long term common investments in supply chain projects can enhance continuity and cohesiveness, although such cohesiveness also can obstruct innovativeness (see in this respect Granovetter, 1973, 1985).
Uncertainty of transaction results combined with transaction specific investments strengthens the preference towards hierarchic governance. Such uncertainty may be both environmental, which relates to specifying circumstances of an exchange ex ante, and behavioural, which refers to verifying a performance ex post (Grover and Malhotra, 2003). Uncertainty without transaction specific investments favours the market (Geyskens et al, 2006). Projects with uncertainty about future costs and benefits and their distribution in the supply chain is therefore not a fertile soil for teambuilding, trust and cooperation.

2.1.1. Governance of supply chain projects

The contractual scenery of supply chain projects is complex (see figure 1) and includes four types of subcontracts.

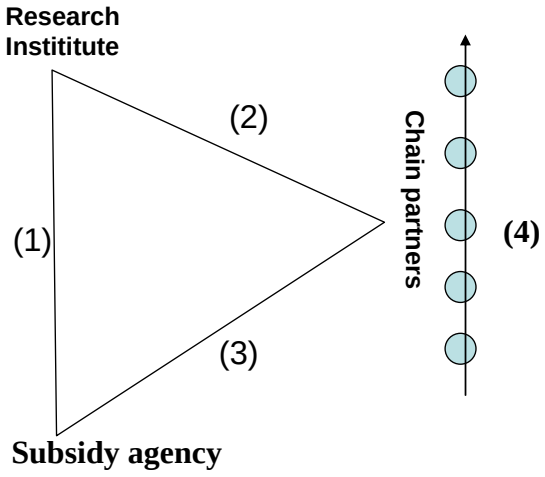

Figure 1: The chain project configuration

The contract to enter into a supply chain project entails a sub-contract between:

1. the public subsidizing agency and the research institute, which is involved to provide or develop specific technical knowledge;
2. between the research institute and the supply chain partners, in which the chain partners specify problems and desires, and the knowledge institute provides research and process management services;
3. between the supply chain partners and the subsidizing agency, in which the chain partners promise to collaborate in an effort to realize common benefits,
4. between the participating supply chain partners themselves, together in the project context referred to as 'the consortium'.

The complexity of the contractual scenery of supply chain projects, the incompleteness of contracts, and the diversity of stakes that are involved, give a fertile ground for the occurrence of abundant transaction costs (like costs of information provision, monitoring and control). This calls for meticulous process management, for instance by securing goal congruency, unity of measurement and synchronization of commitment from the start.

2.2 Supply chain project categorization

Based on the case base we propose a categorization of supply chain projects. We mentioned 'knowledge projects' in the introduction. The more lasting supply-chain projects can be discerned in different types. With respect to the reach of the cooperation, a continuum of cooperation-options can be described with the alliance on one side of the continuum and greenfield investments on the other.

To address the problem of redistributing cooperation results, the techno-economic specifics of supply chain investments can be ordered into four dimensions (Broens and Bremmers, 2007):

(1) *Investment-dependency*. With investment-dependency we denote the situation, in which (a) an investment has to be made (b) by more than one party to make the total project a success. Once the investment has been made, the parties are locked-in. The investment could be a stand-alone common activity (for instance a new processing plant) or could be split up in parts at single business-units (for instance investing in a supply-chain logistics system to reduce the delivery time). It can be expected, that early joint investments in a chain project lead to mutual dependency, and will be a strong indicator for lasting cooperation and integration.

(2) *Value-dependency.* This is the situation, in which there are no possibilities outside the supply-chain project to earn the initial investment back. However, if such possibilities exist, there is an opportunity to shirk and to act opportunistically. Value dependency can occur at the same time as investment-dependency, but not necessarily so. Investment-dependency is a connectivity at the input-side, while value-dependency is a connectivity at the output-side. In the first-mentioned situation, there are no technical opportunities to invest alone, or it it would be economically unwise to do so.

(3) *Result-disproportionality* depicts the situation in which the individual participant's costs are not in equilibrium with the individual benefits. Disproportionality can be the result of causal effects within the supply chain. Redistribution of the project-related benefits will be necessary to provide incentives to the partners to continue participation.

(4) *Value-displacement* (or a-causality) is the situation in which extra efforts displayed at one stage in the supply chain cause extra benefits in a different stage, or vice versa.

This is for instance the case in the BRC- or EurepGap guidelines, in which upstream standards imposed by food-retailers are prescribed to reduce food safety risks, increase product quality or improve supply chain efficiency, predictability and/or effectiveness. *Value-alignment* (causality) is the situation in which costs (efforts) and benefits (advantages) coincide in the same stage of the supply chain.

Figures 3 and 4 describe two extreme situations. Figure 3 entails a situation of investment independence, value-independence, result-proportionality and causality.

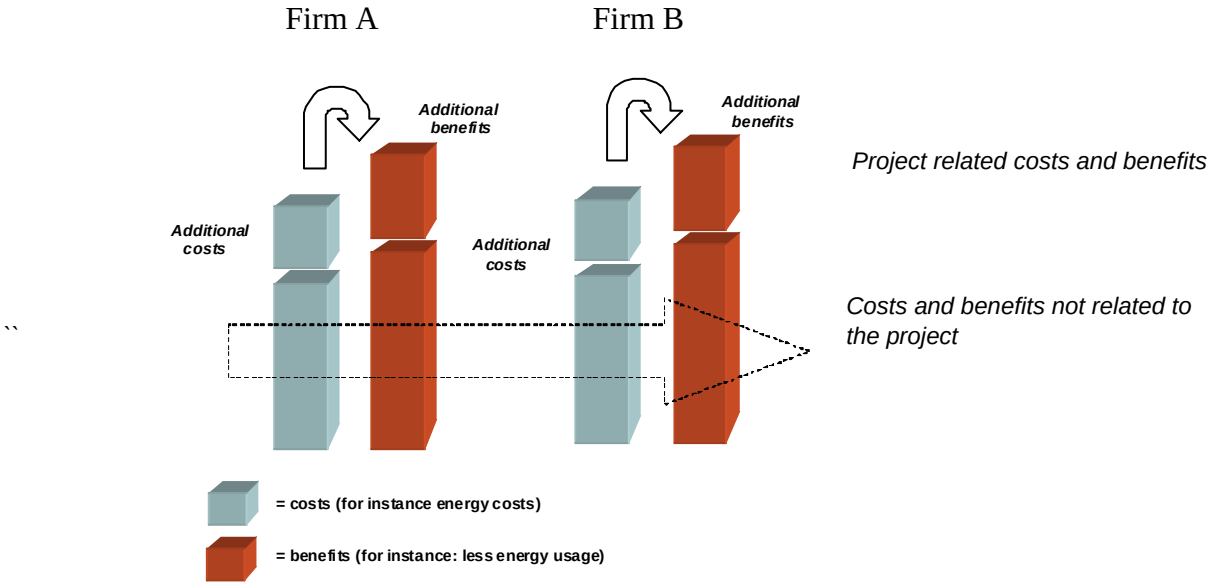

Figure 3: Example of a supply chain with complete project independence

In a situation of complete project independence, each company considers its investment opportunities on a firm level. The benefits are evaluated and harvested just like any other firm-specific project. Should one participant opt out, the remaining partners in the consortium can go on without any damage. The possibilities for opportunism are absent, which would even be the case if result-disproportionality occurs. However, in that case the willingness to participate will possibly depend on the moral obligation the partners feel to share the advantages. An example of a project in the case base that fell within this category is “Energy reduction in the pork meat chain”. Participants were energy providing companies as well as participants in the supply chain, without the aim to make common investments but searching to benefit from acquiring knowledge together, in order to reduce the energy consumption in the supply chain.

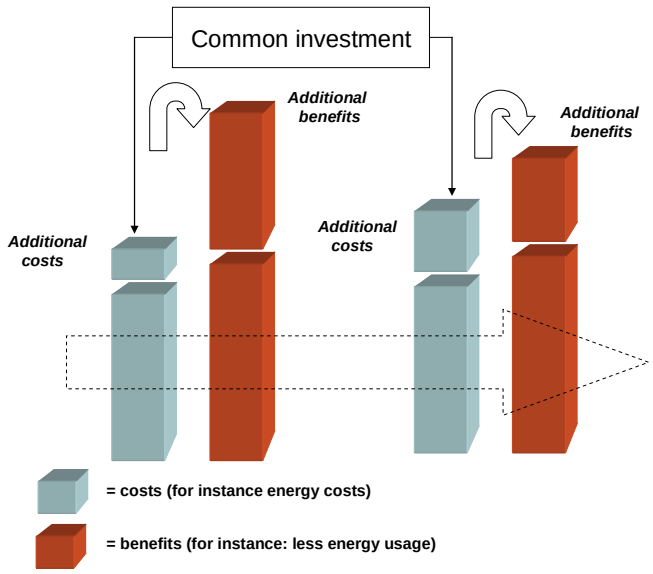

Figure 4: Example of a supply chain with complete project dependence

On the other extreme of the scale, figure 4 describes the extreme situation in which parties engage in a common investment, and the costs & benefits are a-causally distributed over the participants. In the situation depicted in figure 4, opportunities exist to shirk and to secure a disproportional part of the benefits a project. Negotiations can either focus on the distribution of the initial investment costs over de participants, or focus at the redistribution of the benefits. An example of a project in the case base that falls within this blueprint is “Easy Slurry System”. It encompasses a joint investment in technology development and a pilot plant by three companies: a processor of swill (waste from restaurants and catering companies), a biogas-producer and an installation company to produce energy in a cost-efficient way.

3. Measuring and redistributing costs and benefits in supply chain projects

In this section specific complexities in measuring supply chain results are described, and completed with an overview of available accounting techniques (§ 3.1-2). Next we will describe possibilities to redistribute the cooperation results (§ 3.3).

3.1 Measurement problems

Measurement problems of supply chain results increase uncertainty among project partners (Bremmers, 2006). Uncertainty can be exploited by partners to their own benefit. In general, the transaction costs for a project (vested in negotiating contractual conditions, monitoring and control) will increase substantially if accounting procedures remain vague and project outcomes cannot be determined with a reasonable amount of certainty. Measurement problems are vested in (Broens and Bremmers, 2007):

- the time horizon of projects;
- tacit project assets and results;
- the existence of opportunity costs;
- vague accounting procedures;

- the occurrence of common costs;
- accounting procedures.

Time horizon
In most cases, the time horizon of supply chain projects is long-term. However, earnings will possibly be negative in the first years (cash-outflows will exceed cash inflows), creating problems in estimating growth rates (they would be negative) and therefore in assessing the net present value of cash flows to a chain project (Damodaran 2000). It often is not clear what cash flows will be generated, at what moment in time, and (thus) what the risk is to individual project participants. Moreover, risk perceptions between partners can be different, so that a project which is acceptable for one partner, is rejected by another.

Tacit assets and results
Assets and results will often be tacit of a kind (like knowledge, network relationships, trust, connectivity, goodwill etc.) and hard to explicate among chain partners. Moreover, the change in asset-value can be asymmetrically distributed over the partners, and can possibly be hidden to the consortium.

Existence of opportunity costs
Opportunity costs are not accounted for in profit calculations in most cases. But chain projects will be confronted with opportunity costs, if scarce resources are to be re-allocated to serve common goals. Opportunity costs are the implicit (shadow-)prices of such resources. They represent foregone gross profits. Such opportunity costs depend on the alternatives that individual partners have to employ their resources. These 'costs' are, in principle, hidden to the other participants. Hidden costs can disturb fair negotiations about redistribution of common benefits, since the complete 'pie' is unknown. Opportunity costs may be completely clear within one company but lead to unexpected project halts if not shared between project members. After extensive studies, supported by all partners, at least one project in the case base, concerning retail logistics, promised high returns if investments were made in the retail warehouse. Yet this recommendation never reached beyond the study stage since the opportunity costs of the warehouse owner had not been accounted for.

Existence of common costs
In supply chain operations more than one product at the same time can be produced. For instance, a rape seed supply chain can result in the production of bio-fuel, protein as well as feed for animals. The allocation of investment and operational costs to these different but causally related project results is arbitrary and questionable. An example of a project with common-cost problems in the food industry is the creation of value out of remainders of grain in producing beer (project "Bierbostel" in the case base).

Accounting procedures
Different accounting procedures can be applied by partners in a supply-chain, and at different stages in the project. A prominent distinction in this respect is *cash accounting versus accrual accounting*. Within the accrual accounting context, a multitude of different valuation methods can be applied (see for instance: Barfield et al., 1994; Morse and Zimmerman, 1997). Moreover, accrual accounting does not recognize the time value of money, which is important in assessing the viability of follow-ups in a chain project. Where cash accounting should be applied, it is common practice to apply accrual accounting (e.g. Activity Based Costing) especially in the feasibility stage of a project.

Another reason to prefer cash accounting over accrual accounting is the aforementioned opportunity costs problem. In a retail logistics project (included in the case base), the option which lead to the utmost optimal alternative from an accrual accounting perspective required extensive investments by one single partner. Even with heavy compensation from other partners this investment seemed to be in conflict with a large incumbent investment project. By using cash accounting from the start, this could have been signaled in an early stage. In doing so, the seemingly optimal alternative could have been excluded in favor of a more realistic one.

In accrual accounting a distinction can be made between product- and period costs. Whether costs are attributed to single products (project-outcomes) or taken as a loss in one lump-sum (period costs) makes a lot of difference if project outcomes are heterogeneous, spread over different parties, or are driven by a multitude of causal factors.

Supply chain cooperation (in other projects than just for acquiring knowledge) is often intended to be long-term of a kind. Therefore the relative proportion of fixed costs (like depreciation, financing costs, etc.) in the cost base will be considerable. The attribution of fixed costs to single products is more problematic than the assignment of variable short-term cost components. Moreover, a side-effect of the dominance of fixed costs is that it has an accelerating effect on operational leverage. This, in turn, has a negative effect on the net-value of future returns. The present disclosure of the ex-post profitability by individual firms is based on neo-classical economic theory, which induces that performance measurement instruments are output-oriented and profit-related (Gerlowski, 1996). The present focus of firms' accounting systems has major disadvantages (Bremmers, 2001): profit measurement is carried out retrospectively, the accountant's profit measurement lacks the inclusion of risk as a significant part of business performance (Hardaker and Huirne 1997), and business performance is described in a single measure. Profitability as a single performance criterion lacks managerial significance (Noori and Radford, 1995). Historical data are commonly used in published reports. It follows again that more emphasis should be placed on cash-accounting which is mandatory for decision making (Brealey and Myers, 1991), rather than accrual accounting. In practice, however, accrual accounting is applied in most cases.

3.2 Cost assignment processes and problems

Different cost assignment systems can be used to measure costs and benefits of supply chain projects. The following procedures are of significance for supply chain project partnering and its continuity.

Differential accounting

For assessing the financial consequences of a supply chain project, differential costs and benefits (accrual accounting) or cash flows (cash accounting) should be measured The sum of the participants' differential costs and benefits is the net-benefit of a chain project. Mandatory conditions for the use of such an approach are however: outcomes have to be identifiable and attributable to the project. Preferably only one cost-driver is discerned (such as production, transport-kilometers or energy-usage); this simplifies the measurement of cost-effectiveness of single projects and their comparability with alternatives. However, in practice more than one cost-driver will occur in most cases (compare the differentiation in quality costs in the Cost of Quality-model; Hackman and Wageman, 1995).

Apportionment of indirect costs

A project can render a multitude of different outcomes. In that case, indirect costs ('overhead') will occur and will have to be assigned to the different cost objects. In practice, often a mark-up percentage is applied, which can lead to invalid conclusions about the cost-effectiveness of measures. In the project "Biological breakdown of plant pots" (see Annex), an attribution of overhead using a mark-up percentage indicated that the process would be too expensive. With the use of mark-up percentages indirect costs (which are probably to a majority fixed of a kind) are treated as if they were variable. A more sophisticated method is activity based costing (ABC), as was applied for instance in the project "Sylonet" from our case base (TNO, 2003). However, ABC will require an elaborated chain information system, and an integration of information systems of participants.

Result measures
Accrual accounting based result measures, such as Return On Investment, Return on Equity, or Return on Assets, can induce invalid decision making and lead to unjustified conclusions on the profitability of alternative supply chain configurations. Such result measures are fed by ex-post figures on costs and benefits, use arbitrary procedures for product- or period matching, and (therefore) enable "window dressing". Risk (the counterpart of profit) is not included in the estimates. Also, as expressed already, opportunity costs are not considered. In contrast, the cash-based net present value (NPV) method focuses on generating cash rather than profits, and it adjusts cash flows for risk. Cash accounting systems take the timing of revenues into account. The net present value (NPV) is the value of the project adjusted for time preference and risk. Problematic in this respect is the fact that the (risk-adjusted) rate which partners apply to discount cash flows depends on the (marginal) financing costs at the individual firm level. Costs of financing as well as financial structure are important determinants for the minimal required return in projects. Debt financing accelerates the measure for systematic risk of equity (Brealey and Myers, 1991), which in turn can induce different project acceptance rates for different chain partners. It also increases financial risk (Ross, 2007). Likely, the effects of firm-specific financial leverage will be hidden to partners in supply chain projects. This asymmetric information distribution about the financing of chain projects (which is at the discretion of the individual firms) can obstruct cooperation on acquiring a common asset base.

Differences in cost assignment procedures between chain partners can induce differences in project evaluation, opportunistic behavior and the occurrence of incomplete information and contracts, both at the beginning of and during a supply chain project. The level to which this will hamper chain project cooperation will depend on the specifics of the project (§ 2.1). The impact is more serious with complete project dependence (figure 4) than in a situation of complete project independence (figure 3). The involvement of neutral advisors or knowledge institutes can alleviate the inconsistencies and provoke more transparency, at least towards this entity. It requires however a pro-active and assertive position of these entities on the point of the accounting methods chosen.

3.3 Chain result redistribution

Uncertainty about the distribution of costs and benefits over chain partners, combined with measurement uncertainties and asset specific investments are major causes for abundant transaction costs. Transaction costs of cooperation of independent parties can lead to the abandonment of such joint operations or, at the other extreme, to vertical integration. Redistribution problems can be solved along different routes, which are described here.

Criterion 1: optimal pricing rules for (intermediate) products
If intermediate markets exist for the goods and services exchanged between chain partners, the differential market value (increased selling price because of improved product quality, the valorisation of a by-product etc.) can serve as a reward and (re)distribution criterion (Drury, 1992). Each single contributor will compare the differential benefits/cash-inflows with his differential costs/cash-outflows. If the return is below his minimal required level (which is dependent on his investment alternatives) he will opt out unless additional compensation is granted. Such additional compensation can possibly be acquired by means of exertion of power (especially in case of investment-dependency). From transfer pricing theory (Bremmers and Hagelaar, 1996**)** it can be learned, that if no perfect market conditions exist and no bottlenecks in production capacity are limiting the individual output, the optimal adjusted transfer price within a supply chain could be set at a level where the marginal costs of the supplier equal the net marginal returns of the buyer. Should however capacity bottlenecks exist, Solomon's rule (Drury, 1992) has to be applied: the optimal transfer price equals variable costs plus opportunity costs.

Criterion 2: Fair play
The neoclassical picture of a firm as being a selfish, profit-maximizing entity should be supplemented by the firm as a social entity. Over-exploitation of chain partners would lead to non-sustainable projects or partnerships. If from a behavioral perspective the neoclassical pricing rule prescribes the use of variable costs as a transaction price, for the partners to remain in business the supplier should at least be compensated for fixed costs by a lump sum transfer or otherwise. Fairness is not defined in cost accounting. In game theory however, formal definitions of fair distributions are cautiously defined. For projects, a ´fair´ compensation is defined in a differential way: the payoff of the project to any single partner should be balanced to its contribution. The Shapley-Aumann value allows to calculate the equilibrium project redistribution, based on some simple rules like symmetry among partners. In the case base, the project 'Sylonet' – concerning cooperative transport operations between competitors - applied this rather elaborate value and found it quite similar to a simple pricing heuristic, which was indeed applied into a successful chain cooperation.

Criterion 3: Disagreement payoff
From the cooperative game-theory, a precondition for commitment to cooperation can be retrieved from the concept of the "disagreement payoff". In the common situation where chain partners have an option to act outside the project, the minimum net contribution of the project to this partner should be at least equal to the payoff he receives outside the partnership.

Redistribution formats
Once the necessity and willingness to redistribute have been agreed upon, the technical compensation scheme can be either a single, a lump-sum compensation or a periodic compensation. A lump sum should naturally be based on the differential NPV's of the project participants; a periodic compensation can be based on differential cash flows in single periods or on a adaptation of the intermediate transaction price.
Furthermore, the compensation can be either by means of a (a) real-cost/benefit compensation, or alternatively by (b) a real cash outflow/inflow compensation. The disadvantage of a cost/benefit compensation is vested in the fact that it is spread over time. Supply-chain projects will use extensive cash funds in the execution-phase. This can represent a prohibitive burden, especially for SMEs. For instance, this has been brought forward as an explanation for the relatively low proliferation of ECR projects among the smaller retail

suppliers in the nineties. However, ex ante compensation will require the help of financial institutions or equity providers. They will require guarantees with respect to the long-term viability of a project, which are not easily granted if project uncertainties exist.
The above-mentioned theoretical considerations will be confronted with the practical reality in the next paragraph.

4. Materials and results

4.1. Description and methodology

Experiences with measuring and (re-)-distributing costs and benefits in supply chains have been gathered by means of semi-structured interviews with participants in 20 supply chain projects of different Dutch subsidizing agencies ACC, DKE and SenterNovem. A total of 5 DKE-projects were taken into account, of which 4 were initiated by private business. Of the ACC-projects 13 have been reviewed, of which 9 were initiated by private business and 4 by a research institute. Only two SenterNovem projects were considered. The themes that are covered are diverse and range from cost reduction to chain positioning, quality assurance and re-use of waste. After selecting suitable projects in a meeting with the subsidizing agencies (ACC, DKE and SenterNovem), key informants were contacted during July-November 2006. In semi-structured interviews, among other the following questions had been addressed:

- who invests in the project, and are these investments made on an individual or a collective basis?
- does a situation of value dependency occur?
- does a situation of result proportionality occur?
- does a situation of value displacement occur?
- do negotiations take place/have they taken place with respect to the distribution of costs and benefits?
- how are the costs and/or benefits of the project measured?

4.2. Results

As some of the projects were still in progress when the interviews took place, information was not always available on the complete set of questions. In case of doubt or lack of reliable data to date of performing the research (mid 2006 – end of 2006), conclusions were postponed. The main results for the 20 projects are included in the Annex. The results of the structured interviews contained also statements of problems encountered during the execution of projects, personal notes, as well as motivations and observations which were perceived to be relevant for decision making about continued participation (or the alternative: opting out).
In the previous sections, the theoretical considerations were were underpinned with reference to individual cases. With respect to the more general results, the most robust ones are mentioned here.

1. In a significant number of projects no formal estimations were made about future results. If such calculations were made, the methods used were primitive in most cases, the calculations were not very robust and were made on an individual basis, instead of a collective one. So, from a TCE-perspective, there appears to be considerable uncertainty about the future results of projects.
2. Opting out comes, in most cases, as a surprise, and can be explained by often involuntary in-transparency and lacking commitment from the start on. Each sub-contract (see § 2.2) is governed by its own rules and deeper motivations. Different time horizons and strategic considerations play a significant role. For one partner a

motivation to participate is watching and observing “so that the boat is not missed”. Another partner the consultant or research institute that wishes to use surplus research capacity. Also the project time for scientific institutes is shorter than for the supply chain partners, who will have to go on long after the research institute has proposed solutions for chain problems. So research institutes will include different cash flow streams than project partners, and are by nature less interested in survival of the consortium.

3. Supply chain projects unroll in respective stages: orientation phase, feasibility assessment, design stage, realization and exploitation. In each stage different accounting methods are used. This can partly be explained by the participants’ psychological inclinations. In each stage the commitment of participants is different, and motives to continue participation are different.. In the orientation phase, generally the focus is on the benefits, and no critical review takes place of the financial consequences of chain cooperation beyond the direct costs of project meetings. In the subsequent stage, a feasibility study will include a serious evaluation of one or several alternatives on the future cost and benefits. The involvement of scientific research in many of the case base projects causes that the supply chain, as an abstract unit of calculation, is put central, at the cost of clarity on the pay-off to individual partners. The result of the study-of-feasibility phase should be an overview of intended investments and their financing as well as a plan for execution of the project. In the execution-phase the focus is on control of expenses and receipts. It should be noted, that in this phase expenses will exceed receipts, because of initial investment obligations. Last, during realization and exploitation the focus is on detailed monitoring, measuring outcomes and redistribution.
4. Some projects came were successful.. Surprisingly, a number of projects which were meant to create a long-lasting cooperation and commitment to solve shared problems (with respect to quality, safety, environmental impacts etc.) came to a halt after the study-of-feasibility-phase. Even if they concluded good feasibility and recommended the project’s continuation forthwith. So indeed there seems to be a barrier between the study- and the design phase, as we concluded from cost accounting considerations. Stated reasonswere not just that the practical usefulness of the project was doubted, but also the lack of individual commitment from the start, and possibly the existence of hidden agendas. The eventual lack of structural commitment could have been brought to the surface at the start of projects, but for opportunistic reasons this is often “not done”.
5. Project initiations will not be sustainable if each party can pertain to its original strategy and does not have to commit itself to the initiated project, from the top-level of the organizations down. Involvement of top-management of the individual partners guarantees that project goals are regarded as significant to all participants. If such support is lacking, negotiations about measurement and redistribution of costs and benefits will have to be made in two cycles: the project team level and the firm-level. Agreement within the project team will not necessarily be supported by authorities of individual firms.

5. Conclusions and recommendations

Conclusions can be drawn from a transaction cost perspective. The following statements are put forward to provoke discussion, rather than as a solid and proven methodology. However, within a grounded theory approach, they can serve as a benchmark for improving future project management. The remarks with respect to accounting of projects we make here, have

been combined with socio-psychological insights in a report to SenterNovem (Broens and Bremmers, 2007). A cd-rom (Senter Novem, 2007) was developed to help chain partners with including all the factors regarding project contributions and outcomes in their considerations in a more valid way.

1. To reduce the possibilities to shirk and to enhance mutual trust and commitment at the beginning of projects, firm's goals and expected results of a project should be stated in advance. An interactive multi-criteria approach can be applied. Chain-projects have to fit in the strategic agenda of each participant. Parties in chain projects could pretend commitment with the (only) purpose to gather information on the strategic intentions of fellow-companies. Opening up limits the opportunities to take advantage of hidden information and agendas. It is advised to make the goals of all project participants explicit by means of scoring tables (simple approach) or by means of Saaty's Analytical Hierarchy Process (AHP).
2. To limit the possibilities of double negotiations (at the project team level as well as firm level), which induces considerable transaction costs within the project, it should be ensured throughout whether the firm's representative to the project has enough commitment from the delegating. This limits costs of negotiating contracts in the execution stage of a supply chain project.
3. Cash accounting should prevail in the feasilibity stage, in stead of accrual accounting. Accrual accounting lacks transparency to fellow chain-partners. It has been observed, that many projects start with accrual accounting combined with a process-orientation, and gradually change to cash accounting and an asset-orientation. It is preferable to stick to one set of techniques, which is relatively independent of the individual firms' accounting systems.
4. There are several ways of compensating for differences in costs and benefits of projects to individual firms. Partners should be informed about alternative ways to measure and distribute chain project results.
5. The Shapley-Aumann value provides a fair distribution of costs and benefits. However, in practice slack for negotiation, possibilities to opt out and not explicitly formulated goals play a prominent role.

In conclusion, a more systematic approach in project management can improve the survival rate of supply chain projects, which is in the interest of all participants involved.

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Appendix Projects included in the study[3]

Project	*Intiative*	*Expected result*	*Who invests?*	*Value dependency?*	*Investment dependency?*	*Result proportionality?*	*Value displacement?*	*Negotiations to (re)distribute advantages?*	*Calculation method used?*
Coordinating party: DKE									
A	ACC	knowledge; energy reduction	Limited, on individual basis	NO	NO	YES	NO	NO	Energy usage reduction
B	Private business	Knowledge, Strengthening position in the supply chain	Limited on individual basis	NO	Limited	YES	NO	NO	None
C	Private business	kennis; positionering	Limited, on individual basis	n/a	NO	n/a	n/a	n/a	n/a
D	Private business	Cost reduction/energy usage reduction	On individual basis	n/a	YES	n/a	n/a	Not yet	Spreadsheet calculation
E	Private business	Cost reduction/energy usage reduction	Not applicable	YES	YES	n/a	YES	Not yet	Rentability of processing

[3] As of mid-end 2006.

Coordination ACC									
F	Research institute	Energy and cost reduction; quality improvement	On individual basis	NO	YES	n/a	YES	NO	ABC
G	Private business	Quality improvement through knowledge building	On individual basis	n/a	YES	n/a	Probably	Not yet	Cost price of production
H	Research institute	Value creation of waste	Together	NO	YES	YES	n/a	YES	“Sum of net benefits/3”
I	Research institute	Reduction of failure costs	Limited, individual basis	NO	NO	n/a	n/a	n/a	n/a
J	Private business	Value creation of waste	Together	NO	YES	YES	NO	YES	None
K	Private business	More sales/cost reduction	Together	NO	NO	NO	YES	YES	Processoptimisation technique
L	Private business	Chain building and positioning	Limited, together	n/a	YES	n/a	NO	NO	None
M	Research institute	Knowledge; risk reduction and chain positioning	Limited, individual basis	n/a	NO	n/a	Probably	NO	None
N	Private business	Cost reduction, strengthening partnerships	Limited, individual basis	n/a	Limited	n/a	n/a	n/a	Economic feasibility

O	Private business	Product development/better usage of production capacity	Limited, individually	n/a	YES	n/a	n/a	NO	n/a
P	Research institute	Knowledge	Limited, individual basis	n/a	NO	n/a	n/a	NO	n/a
Q	Research institute	Knowledge, increase of sales, product quality improvement	On an individual basis	n/a	Limited	n/a	n/a	NO	None
R	Research Insitute	Knowledge; strengthening market position	Externally	YES	NO	Not applicable	NO	NO	None
Coordination SenterNovem									
S	n/a	Energy reduction	Not applicable	NO	YES	n/a	YES	Not yet	n/a
T	Knowledge institute	Value creating by-products	Together	NO	NO	n/a	n/a	Not yet	None