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From outsourcing logistics towards interactive learning in the supply chain: drivers, bottlenecks, enablers, and spatial effects

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**Developing 4th party services:
Empirical evidence on the relevance of dynamic transaction-cost
theory for analysing a logistic system innovation**

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ABSTRACT

Logistics, 4th party logistics and reverse logistics are relevant but under-researched issues in economic geography (Visser & Lambooy 2004). A first problem to be dealt with in research on 4th logistics, however, is that this type of logistic system innovation (Van Klink & Visser 2004) does not develop automatically. This is due to the risks associated with this type of services and the need to develop a partnership relation connecting large logistic service providers and even larger clients: MNEs. Drawing on dynamic transaction-cost theory, we may specify three problems: dependence, vulnerability to spill-over, and conservatism. We empirically test the relevance of this theory in the setting of a reverse logistics business relation between TNT Logistics and one of its principal clients: Hewlett-Packard. This case-study evidence is used to interpret survey results regarding the importance of 4th party logistics in The Netherlands. The paper shows that new ICTs are a cause rather than a solution to the problems associated with 4th party service development, that dynamic transaction cost theory goes a long way in explaining the slow development of 4th party logistics in the Netherlands (and probably also elsewhere), and that conservatism is the main of the three problems. Some aspects of conservatism have little to do with dynamic transaction-cost theory, however, and should be taken into account in future research.

Keywords: 4th party logistics, logistic innovation, ICT, dynamic transaction costs

INTRODUCTION

Logistics has become a key element in the competition strategies of multinational enterprises (MNEs). These firms are called 'business owners', as they increasingly focus on marketing, R&D and defining service-levels for final users, outsourcing other activities: both manufacturing and logistics. They compete, among other factors, on the basis of logistic performance (e.g. the reliability and flexibility of their supply chains, and service differentiation), but may at the same time not be fully *willing* or *able* to allow their core subcontractors: logistic service providers, to solve the optimisation problem of maximising service at minimum costs.

Logistic analysis is highly relevant from an economic geographer's point of view. Changes in logistic strategies alter the spatial-functional organisation of MNE supply chains: the actors involved, the functions they fulfil, the locations they choose, and the relations they maintain along and across supply chains. Logistic strategies may include outsourcing, the

development of alliances or partnerships in supply chains, and/or a focus on logistic innovation, e.g. the development of 4th party logistics (which is a system innovation, see Van Klink and Visser 2004). All this is relevant for the analysis of spatial shift in MNE supply chains (Visser and Lambooy 2004). A breakthrough of 4th party logistic service provision is especially likely to yield significant spatial effects, such as relocation decisions of the logistic firms themselves, (de)centralisation of different distribution activities, and (de)consolidation of freight flows. However, 4th party logistic services do not develop automatically, due to several risks associated with partnership development involving large logistic service providers and MNEs (co-shipperships). New ICTs may contribute to the development of these co-shipperships, but residual transaction costs remain to be solved, along with other issues related with existing power structures, conservatism, trust, strategic capabilities and learning. So, elsewhere we proposed to use dynamic transaction-cost theory to analyse the development of 4th party logistic services (*ibid*).

The purpose of this paper is to empirically test the relevance of this theory. We propose four steps to achieve this purpose. One is to describe the competitive impetus for 4th party logistic service provision. The second is to specify a theoretical framework containing the major factors hindering or triggering the development of this type of services. The third is to analyse case study evidence concerning the development of 4th party logistics in the setting of a reverse logistics business relation between TNT Logistics and Hewlett-Packard. This evidence will also be used to interpret the outcomes of the fourth step: a survey aimed at assessing the state of development of 4th party logistics in the Dutch logistic service industry.

The paper is structured as follows. Section 1 defines 4th party logistics and briefly deals with its spatial implications. Section 2 specific three problems that may hinder the development of 4th party services. Section 3 explains case-study methodology. Section 4 presents the results of the case study. Section 5 presents the survey evidence. Section 6 presents conclusions.

1. THE DEVELOPMENT OF 4TH PARTY LOGISTICS

Over the past decades, MNEs looking to improve global competitiveness emphasize the supply chain as their principal unit of analysis (www.supply-chain.org). Awareness is growing that it is not individual firms, but supply chains that compete with each other when selling products to final users (Bradley & Nolan 2000, Evans & Wurster 1997, Normann & Ramirez 2000, Rayport & Sviokla 1995). It is the total cost/service performance of a supply chain that is relevant for final users making a purchasing decision. A chain, however, is as strong as its weakest link.

Hence, supply-chain management (SCM) implies a collective strategy of all actors involved in the provision of raw materials, the making of components, the assembly of products, transport, trade and logistic functions, and the marketing, sale and distribution of products, so as to fine-tune activities in such a way that redundancies, stocks and other sources of logistic costs can be minimised, mistakes are avoided, and service levels are improved. SCM points at the integration of all activities in a chain so as to fulfil the demand of final customers more effectively and efficiently (Berglund *et al.* 1999, Ludema 2002). This is often preceded by supply-chain reversal, *i.e.*, using demand information earlier in the chain so that demand-pulled activities substitute for supply-pushed activities.

The increasing emphasis on SCM yields variety in terms of various organisational forms competing in product markets. This variety consists of individual firms involved in vertical and horizontal competitive linkages; traditional hierarchically organized supply chains led by a dominant and powerful party, often a large producer or retailer; and more networked supply chains that are orchestrated by MNEs, a large logistic service provider (LSP) or another party focusing on continuous improvements in the cost/service performance of the chains. The role of LSPs is key in the process of enhancing differentiation as well as organisational innovation in MNE supply chains, as these service firms have to move towards new positions in the chain. In fact, 2nd party LSP—subcontractors simply performing a transport or logistic function for the 1st party, *i.e.* the ‘business owner’—have to transform into a 3rd or even a 4th party LSPs (Peper & Van Goor 2001). In the 1980s, logistic outsourcing led to the rise of 3rd party LSPs, whose task is to optimise supply-chain performance by subcontracting operational tasks, such as transport or warehousing, to second-tier suppliers; screening, selecting and contracting the latter, and monitoring and evaluating their performance. A 3rd party LSP thus orchestrates supply chains, but its client (a MNE) retains strategic control over the basic supply-chain concept that is being used. Hence, 3rd party LSPs improve the operational effectiveness of a chain, but they are not involved in strategic discussions concerning basic logistic concepts. By contrast, 4th party LSPs advise on how to spatially and functionally reconfigure supply chains so as to save total supply-chain costs and to improve customer service. These LSPs develop knowledge-intensive logistic competencies and provide research-based advice to their clients for improved supply-chain performance. So, 4th party LSPs advise, design, and implement new supply-chain solutions.

This development draws attention, as 4th party LSPs and MNEs engage in strategic alliances, partnerships or ‘co-shipperships’ (De Wit & Van Gent 2001), which are the basis for LSPs to propose and develop new logistic products and processes. One link with spatial change is that 4th party LSPs have other location preferences than traditional logistic companies. They may e.g.

move out of (trans)port hubs in case of diseconomies of agglomeration operating as push factors, and living and labour market conditions elsewhere acting as pull factors (Van Klink *et al.* 1999). Another link is that processes of (de)concentration of supply-chain activities may be enhanced in terms of magnitude and speed as 4th party LSPs propel new decision-making concerning (a) the type of activities performed in a supply chain; (b) the number and type of actors involved in these activities, (c) the type of linkages or relations between these actors, (d) the location of the latter, (e) the need for physical, organizational or cultural proximity between actors, and (f) ways to connect them, involving a physical transport as well as information and payment systems. Together, these aspects may produce spatial shift of global supply chains.

So far, empirical data are missing about the extent to which 4th party logistics develops in different countries and regions, while also little is known about the associated spatial effects. The extent to which 4th party logistics develops in different (selection) environments and (market and regional) contexts should be analysed, with a view to identifying barriers and triggers. There is enough reason, both for MNEs facing increasingly complex global logistic problems and LSPs facing decreasing profit margins in highly competitive logistic service markets (Van Klink & Visser 2004), to embark on the road towards 4th party service provision. Yet, it also seems to be a *risky path* to follow. The present paper focuses on this last aspect.

2. VARIABLES INFLUENCING THE DEVELOPMENT OF 4TH PARTY SERVICES

This section focuses on variables hindering or facilitating the development of 4th party service provision in a setting of co-shipperships involving MNEs and LSPs focusing on effective SCM. One may hold that such simply requires the implementation of new ICTs, such as EDI, b2b e-commerce, APS, ECR, CRM, or another type of b2c e-commerce.¹ We do not adhere to this view, however, but use dynamic transaction cost theory and innovation theory (Nooteboom 1992, 2000, 2002) to describe three central problems in the development of 4th party logistic services, which need to be solved through the use of new ICTs together with

¹ In a setting of logistics, De Wit & Van Gent (2001) distinguish between three types of ICT applications: 1) transaction systems: Electronic Data Interchange (EDI: the electronic transfer of structured data by agreed message standards from one computer application, with a minimum of human intervention, connecting all parties in a supply chain), interactive telephone systems, and e-commerce: a. business-to-business (B2B) e-marketplaces enabling the global procurement of inputs and logistic services, directly by the shipper (S2L) or by a so-called third-party logistic service provider (L2L), or b. business-to-consumer (B2C) on-line sales to consumers, which in turn can be complemented by Efficient Consumer Response (ECR) or Customer Relationship Management (CRM) systems; 2) operational planning systems: all sorts of logistic decision support and route planning software, e.g. Advanced Planning and Scheduling (APS), which enables the design, planning and operation of supply chains, including performance measurement for all participants in the chain; Enterprise Resource Planning (ERP) systems, which enables the processing, recording and fulfilment of orders, e.g. in warehouses or stores; and DSRC—route planning software designed to avoid congested roads based on digital maps and real-time traffic information; 3) control systems: mobile communication (phones), tracking-and-tracing systems (incl. barcode-scanning for packages and palettes), tracking vehicles with Global Positioning Systems (GPS), measuring vehicle performance with ‘black boxes’ (containing

other mechanisms. The nature of the concept of transaction costs (properly understood as the costs of managing risks of dependence and spillover in inter-firm relationships) implies that the transaction-cost reducing effect of new ICTs is limited and that residual risk has to be managed in other ways (Visser and Lambooy 2004). Below, we describe the three central problems that MNEs and LSPs encounter on the road towards 4th party logistic service development.

Problem 1: Dependence

According to transaction cost economics, specific investments induce a risk of dependence (relational risk), as these investments are lost in the case of opportunistic behaviour of the other party. One may distinguish between physical asset specificity, human asset (or knowledge) specificity, location (or site) specificity, and dedicated assets. Depending on the importance of suppliers (in terms of sales in absolute or relative figures), MNEs outsourcing logistics increase their dependence on LSPs, which may be perceived as risky in a situation where the cost/service performance of supply chains is key in global competition, and logistic failure may cause a loss in market share. Vice versa, however, LSPs make specific investments, in warehouses (physical assets), at certain locations required by clients (site specificity), software (dedicated assets), and/or training (human capital or knowledge specificity). Hence, both parties perceive a risk of dependence. In the case of 4th party logistics, the problem worsens, as MNEs request LSPs to develop novel solutions for complex logistic problems, requiring both parties to invest time and money in knowledge exchange and to make specific investments in a common language, mutual understanding and trust (Nootboom 2002).² The real problem with these dynamic transaction costs is the elapse of time between risk perception at the start of a relationship, and future compensation in terms of improved supply-chain performance based on yet uncertain benefits of learning by interaction (Visser and Lambooy 2004).

We may measure risks of dependence from the viewpoint of the supplier or the buyer, distinguishing between gross and net dependence. Gross dependence reflects the one-sided dependence as perceived by the supplier on the buyer. Net dependence reflects the degree to which one party perceives itself to be more dependent on the other than vice versa. Hence, four measures of dependence obtain.

logistic data), and Automatic Equipment Identification (AEI). These three application types may be computer-mediated (extranets and intranets) or based on Internet/web technology.

² Transaction costs are thus also important in a dynamic perspective. The traditional argument is that asset-specificity induces sunk and switching costs, creating lock-in in the relation with the firm for which the investment was done. Nootboom (*ibid.*) argues that specificity is also related with “investments in crossing cognitive distance: in building appropriate absorptive capacity and capacity to make oneself understood by the partner”. This argument is based on a cognitive theory of learning, where learning is thought to take place on the basis of cognitive categories (rules of thought), which ‘condition knowledge in the double sense of enabling and limiting it’ (Nootboom, 2000, p. 154-156).

Solutions to perceptions of risk of dependence fall apart in three categories: a) balancing; b) compensation; and c) eliminating causes (related with the foundations of TCE: opportunism, bounded rationality, specific investments, uncertainty and transaction frequency; see Visser and Lambooy 2004). Balancing refers to the above-mentioned point that both parties are vulnerable to behavioural risks on the side of the other party. Compensation refers to safeguards (contracts, hostages). In the category of eliminating the causes of transaction costs, ICT may serve to reduce bounded rationality on the side of buyers by disclosing the performance of supply chains and the role of various parties, including 4th party LSPs. This helps to reduce transaction costs of the buyer, however, but augments vulnerability and transaction costs on the side of suppliers insofar as they are responsible for investing in specific software or hardware, etc.

Trust is another helpful mechanism (in eliminating causes), as it tackles issues of opportunism as well as bounded rationality. Nootboom (2002) distinguishes between trust: a) in the financial and physical resources of the other party (material trust, in the LSP); b) in the capability to effectively use these resources (competence trust, in the LSP); c) in the capability to effectively outsource, delegate responsibilities and pursue a fertile cross-firm dialogue (competence trust, in the MNE); d) in the loyalty or benevolence of the other party to use resources and competences to their best (intentional trust, as observed by both parties); e) in external conditions enabling actors to use resources and competences in line with intentions (conditional trust, as observed by both parties); f) in the information transparency and quality of information provided by the other party, regarding resources, competences, intentions and conditions (informational trust, as observed by both parties).

A final mechanism in the category of eliminating the causes of transaction costs is dynamic capabilities. These reflect a capacity to foresee the future benefits of a logistic alliance (learning and innovation: new logistic products, processes and/or supply-chain configurations that lower supply-chain costs and enhance service levels) and trade these off these benefits against perceived risk. Dynamic capabilities counteract bounded rationality, while reducing opportunism as parties align short-term behaviour with long-term benefits. For operationalisation purposes (see also section 4), we may take various forms of knowledge exchange as proxies for dynamic capabilities, especially if such takes place in a setting of long-term projects not yielding immediate benefits.

Problem 2: Unwanted loss of knowledge

Oursourcing also involves a risk of unwanted loss of knowledge (spill-over risk). MNEs outsourcing logistic activities lose in-house logistic know-how, while the supplying LSPs accumulate the know-how required for the (specific) supply chains of the outsourcing party. This effect of experience (first-order learning) yields oligopolistic power for the LSP, which is reinforced by internal economies of scale and scope in logistic operations. Risks of spill-over become evident, however, in the case of knowledge exchange between LSPs and MNEs working together to arrive at new solutions for complex global logistic problems. Such yields dynamic transaction costs related with uncertainty about innovative logistic know-how leaking away towards competitors.

The causes of spill-over risk are fourfold, and relate to learning by interaction (relevant for both parties), competition (in the case that suppliers also work for a buyer's competitors, which is a threat to the latter), integration (in the case that a buyer includes supplier know-how into its operations, insourcing instead of outsourcing, which is a risk for suppliers) and competition between suppliers (where buyers may use various suppliers, urging them to adopt innovative or best practices of each other). Hence, we may measure perceived risks of unwanted loss of knowledge from both viewpoints, in gross and net terms, so that four expressions of vulnerability obtain.

Solutions to spill-over risks are in the same categories as mentioned above, in the case of dependence risks. Hence, balancing is possible, as both MNEs and LSPs are vulnerable. Compensation may be possible, with the help of safeguards such as an extensive contract specifying a long duration of supply, that the LSP may not work for competitors of the buyer, etc. In the case of logistics, compensation may thus prevent the use of multi-user infrastructure. In the category of eliminating causes, ICT is of little help, as it is likely to be specific, consisting of tailor-made software and other infrastructure, which may not be used for competitors for technical or contractual reasons. By its specificity, investing in ICT rather augments transaction costs for the investor, often the LSP. Trust is a helpful mechanism, however. In the case of spill-over risks, trust in loyalty (intentional trust) is important for both parties, next to conditional trust (also for both parties) and informational trust (idem). Dynamic capabilities can also counteract the problem of spill-over as parties opt for the long-term benefits of logistic partnerships, in stead of the short-term gains of opportunism.

Problem 3: Cognitive conservatism

The general problem preventing 4th party logistic service development is a lack of supply-chain awareness among actors involved in supply chains and/or the co-shippership. This includes an inability and/or unwillingness to think in terms of the total costs of procuring, transacting, transforming and innovating, along with an inability of unwillingness to consider the collective nature and roots of supply-chain excellence, based on the insight that a chain is as strong as its weakest link.

On the side of MNEs, we may think of path dependence and routines in procurement departments where personnel may continue focusing on procurement prices, although these are but a fraction of total procurement and supply-chain costs (inability). Next, procurement managers may decide to stick to a divide-and-rule model and exert traditional buying power, whereas effective supply-chain management requires constructive relationships with suppliers, not antagonistic ones (unwillingness). On the other side, path dependence and routines also play a role in aspirant 4th party LSPs, which often develop out of traditional logistic service firms that have grown on the basis of traditional transport, storage or forwarding activities, with well-proven and long-standing rules of behaviour, which seem attractive—in good and in bad times—compared with the uncertainties associated with innovation.

The causes of the third problem of cognitive conservatism thus relate to past business experience of parties (in terms of work and knowledge domains—what is it that we do in our business; model specification—how do we usually solve problems within our domain; and solution patterns—how do we get at our solutions: what works, what doesn't?), the legacy of past and existing relations (memory of events, feelings of hurt, pride and humiliation), and self-centredness (so that vested interests and power at the personal or organisational level induce partiality of approaches).

Solutions may comprise ICT (insofar as it promotes supply-chain transparency, thus solving the problem of insufficient awareness while eroding vested interests), incentives for change-oriented behaviour (although these depend on the dynamic capabilities of top managers), trust (in the capabilities of the other party to understand the importance of SCM, logistic alliances, and system innovations; in the intentions of the other party to actually move in these directions, and in the conditions enabling actors to do so), and dynamic capabilities. The latter should promote knowledge exchange to an extent that the parties involved can break through their walls of cognitive conservatism (Nooteboom 1992, Visser 1996, Nooteboom 2000).

Hypotheses

Fourth party logistics comprise services that can best be described as credence products (using the well-known distinction between search, experience and credence products, see Visser and Lambooy 2004). The more goods and services display the characteristics of credence products, the more trust is required for transactions to take place and for relations to develop, and the less likely it is that new ICTs contribute to enabling transactions, developing inter-firm relationships, and promoting innovation. An aspirant 4th party LSP thus has to invest in its track record and reputation, specialise in certain activities and sectors (e.g. automotive or consumer electronics), and find other ways to reveal its trustworthiness. New ICTs may help to catalyse the development of logistic partnerships *after* their start, however, as an ICT-enabled chain provides information on the performance of the various actors involved and the chain as a whole. New ICTs thus seem to be fit to enhance the efficiency and quality of 3rd party logistics, rather than fuelling the step towards 4th party logistics. The last implies transforming an arm's length buyer-supplier linkage into a strategic alliance, which is contingent on residual transaction costs along with issues of trust, dynamic capabilities, routines and power. So, we have two rival theories and hypotheses, which we may be able to test in a case-study setting. One hypothesis is that ICT alone can do the job, the rival hypothesis being that other variables (related with dynamic transaction cost and learning theory) matter too for the effective development of 4th party logistics. A second objective for our study is to test the relative significance of the above three problems for 4th party logistic service development.

3. CASE STUDY METHODOLOGY

Case studies may have exploratory, descriptive or explanatory purposes. Case study research is a research strategy that can be chosen depending on: 1) the nature of the research problem (with 'how' and 'why' questions being fit for case study research, and 'who', 'what', 'how much' and similar questions being fit for, e.g., survey research), 2) the degree of control over events (if high, one may opt for an experiment; if low, one may select a case study, survey or another strategy), and 3) the ongoing nature of the event or process being studied (with case studies being suitable for studying ongoing events and processes).

The design of case studies is closely related with the underlying theoretical framework. The researcher has to elaborate the research questions, preferably by using alternative theories (which, in the terminology of the previous section, are in fact 'cognitive structures': rules of thought used to create mental maps of problems defined within a certain domain of observation).

Then, one may derive propositions (claims), from alternative explanations (theories). Next, the unit of analysis should be identified. One may, for example, interview entrepreneurs to understand the nature of a process of clustering, or managers to understand the development of a logistic partnership. In such cases, the unit of analysis is the cluster and the partnership, respectively, while the sources of data are called ‘embedded cases’. Next, the data to be collected should be identified, and the questions used in case study research should be closely linked with theory. The data collection itself can take place through archival analysis or interviews.

The analysis of case-study data differs from, for example, statistical analysis of survey data. Case-study analysis is based on so-called ‘pattern-matching’, where the question is to what extent the data match with different propositions derived from rival theories. This logic of relating case-study data with theory is called ‘theoretical generalisation’ (in so-called ‘statistical generalisation’, cases are part of a population, and statistical rules are used to relate these cases with that population, and not directly with a theory concerning that population). A critical case study can thus be used to collect and match data with rival theoretical propositions (predictions), where the results of the matching can be used to accept or reject one of the rival theories.

The below case study fit this purpose. We use it to test the proposition that new ICTs are insufficient and notions from dynamic transaction cost theory are necessary to explain the development towards 4th party logistic service provision. Such is not at all easy. Nooteboom, however, observes that “variables such as asset specificity, transaction costs, innovation and trust are difficult or perhaps impossible to measure, [...] but there are methods to treat such variables as ‘latent ones’, which can be seen as being ‘spanned’ or ‘indicated’ by indicators than can be measured, often as judgment by people, on a five- or seven-point Likert scale. The methodology is based on factor analysis and derived from psychographics. The indicators can be combined into a joint variable, as an indirect measurement of the underlying latent variable” (2002, pp. 156). When constructing indicators, one may adopt “an interpretative (..) approach, [taking] into account that the effect of events or conditions on behaviour is not direct, but is mediated by the perceptions, interpretations and value judgements of people. Thus, the relevant variable is what people perceive and how they evaluate that. Therefore, many indicators reflect perceptions or opinions” (*ibid.*).

4. CASE-STUDY EVIDENCE: THE HP/TNT SDO ALLIANCE

In July and August 2004, we conducted a case study on the Service Delivery Organisation (SDO) of Hewlett-Packard (HP) and TNT Logistics (TNT). We held in-depth interviews with managers on both sides of the alliance. Information concerning the background of SDO can be

derived from Dorlandt (2002). Below, we summarize this information before dealing with the new evidence.

Background of the TNT/HP SDO operation

In 1996, HP signed a contract with the Pan-European Alliance for Computer Transport (PACT) for the distribution of HP products to large (MNEs, government agencies) and smaller customers (retailers, SMEs, consumers) in nine European countries: Spain, Portugal, Greece, Turkey, France, Finland, Belgium, Luxembourg, the Netherlands (with a line haul to the UK). Originally, two logistic firms participated in PACT: Kühne & Nagel and Sernam. Both firms held shares in PACT. Later, TNT joined the alliance in the quality of subcontractor, not as shareholder. TNT's share in PACT amounted to about one third of the contract value, however. TNT was responsible for the Benelux and Finland. The three logistic firms involved in PACT were responsible for their own shipments, but shared information about these operations.

On the basis of the PACT experience, HP asked TNT to develop the SDO operation covering the Benelux and the Iberian market. This operation is additional to the PACT business. PACT is about distributing final HP products from HP depots towards customers, involving storage, transport and cross-docking activities³; SDO is about return flows of individual malfunctioning products, which is a necessary activity in the context of customer service contracts, but also costly, as one product needs to be transported back from a customer to a repair or production site. The SDO operation grew by 400 percent in 2003 (oral communication Ruud Moerkerken, Director Hi-Tech Logistics at TNT, 25 June 2004). So, today TNT and HP maintain a direct relation. TNT perceives HP to be an “innovative client, with progressive ideas concerning logistics, outsourcing and partnerships” (*ibid.*). However, the relation is also prone to drawbacks and mixed feelings (*ibid.*), thus seemingly providing interesting material for our present purposes.

The TNT/HP SDO operation: new evidence

We firstly consider TNT's view of its relation with HP (mainly, but not always) in the SDO context, and then turn to HP's view on this relation. So far, we interviewed two managers on both sides of the relationship who are primarily involved in developing this business. The interviews took place in a face2face setting (TNT) and by telephone (HP, following e-mail communication preparing for the interview by sending out the questionnaire with questions concerning the type of activities, relationship, problems, causes and solutions; appendix 1).

TNT's view

Activities: In general, clients are the primary responsible actor for designing and improving logistic chains. When outsourcing logistic services, requirements for logistic service firms are quite standard. Consequently, TNT always considers if it can do a certain job for a client, or that it can only be done provided that TNT is allowed to improve the supply chain, by designing, proposing and implementing alternative processes and using products so as to support the optimisations. So, TNT's work for a client almost always consists of a bundle of simple outsourced tasks, after which TNT starts launching proposals for more effective SCM. Clients expect logistic firms to do so, without contractually and formally requiring this, however. As a result, knowledge intensive logistic work is not an explicit part of the contract and it is not paid for in an explicit manner.

On their side, TNT managers reserve resources in a project budget for R&D activities, while contacts are sought with different (technical) universities, so as to promote applied research linked to ongoing business. Examples are a research project on Repair Return (Delft Technical University), a project called 'The Perfect Transaction'—in which each step in a supply chain is evaluated on potential for improvement (Twente University); a project on the cost/service performance of different supply chain configurations (Utrecht University); this research endeavour (Utrecht University). The implicit inclusion of some resources in a project budget for research feeds into continuous improvements in the supply chains that TNT manages for its clients. Responsible teams usually comprise one or two recently hired employees with an academic degree, whose task is to interact with older team members with different educational backgrounds and to undertake research activities with a view to process design and optimising supply-chain performance. Product development is also important in this regard, especially new IT systems enabling performance improvements for various clients.

So, clients start out giving a logistic service provider little room to provides 4th party services, while expecting their suppliers to develop activities in this direction, however, even in the absence of explicit payment mechanisms. TNT solves this problem following two guidelines: 1) follow the client in its desire to improve supply chains and invest in this direction, also if such goes against current financial interests; 2) pursue new solutions, as long as these do not cannibalise current business. This means that TNT does not *want* to move fastly towards 4th party logistic service provision. Such may go against its short-term financial interest (based on the delivery of standard distribution services), which can not be compensated by the sale of

³ HP sells hundreds of different products in Europe, varying between simple personal computers and high-quality servers facilitating the operation of computer networks of large businesses. HP has several factories in Europe, with warehouses or depots at or near these sites.

intelligent services, due to the nature of these services—of credence goods, in which case a client cannot know—before, during nor after a transaction, whether the service serves its interests or not. This is the cannibalising effect of an innovation like 4th party services.

To sum up, two parties make that 4th party logistics develops only slowly: a) the client, who needs time and experience so as to substitute trust for doubts concerning the value added of new services; and b) the logistic firm, whose financial interests are closely linked with an adequate deployment of current assets (*c.p.*: in the absence of strategic decisions to sacrifice current profitability and invest in future profitability through strategic renewal). In the setting of the SDO operation, TNT does not move towards the position of 4th party logistic service provider, despite its capacity to do so. With a view to the doubts of HP concerning the value added of such services, it even goes so far as to reinforce 3rd party and 2nd party activities, showing the client it gets value for money. So, insourcing is sometimes as important as outsourcing and upgrading.

Relation: Despite the above, TNT considers the HP/TNT relation to be moving towards a partnership, where interactions take place so as to find out the relative strengths and weaknesses of solutions and the parties involved, mistakes, the causes of these mistakes, who can be trusted the role of solution provider, etc. Recently, a meeting was held during which HP and TNT managers discussed the direction of their relationship. This meeting reinforced the position and role of TNT as a logistic solution finder, following some critical evaluations of recent HP initiatives.

Problems: Turning to the three problems that according to our theoretical framework may hinder 4th party logistic service development (dependence, vulnerability to spill-over, and conservatism), TNT originally stated that dependence may be the principal, vulnerability the second, and conservatism may be the least important problem. Later, however, the problem of conservatism appeared to be not well understood at the beginning of the interview. Other arguments that cropped up during the interview and later communications induced a higher ranking of this problem (on an ordinal scale), which brought TNT's perception more in line with that of HP (see table 1).

Starting with the problem of dependence, TNT mentions five factors: human asset specificity, investments in IT, knowledge exchange between HP and TNT managers, the importance of TNT for HP (in terms of financial impact) and vice versa (in terms of turnover). Human asset specificity arises due to specific investments in know-how regarding reverse logistics. IT system development also initially requires specific investments in interface

development and data entry, but TNT devotes a lot of effort into turning these specific systems into generic products that are marketable to other clients as well. Research is key in this regard, as it allows TNT to better understand what should be measured, how the performance of return logistic systems in general should be evaluated, and what activities can be standardised. This experience, knowledge, and the supporting IT can be included in other service offerings as well.⁴ Specific investments in human capital do not induce high levels of dependence of TNT, however. TNT's net dependence on HP is rated to be 'low'.

Solutions to the problem of dependence do not comprise investing in IT, extensive contracts, or incentive schemes, but mostly involves trust: intentional trust, informational trust, material trust, and competence trust, in order of importance. Dynamic capabilities (the capacity to foresee future benefits of an alliance in terms of lower supply-chain costs and/or better service, and to trade these off against current risks and costs) are also found important to solve the problem.

Regarding vulnerability to spill-over, one mechanism is labour mobility. For example, an engineer involved in the development of FIRST moved to a competitor, where he develops a similar system. This will take about 1.5 years, however, due to the embedded nature of the system, which only works on the basis of TNT's experience with return logistics, interface development, team work, etc. Another mechanism is the client passing on logistic novelties of TNT towards its competitors. Informal agreements not to do so are sufficient however, and prevent this problem to hinder the development of 4th party services. Monitoring agreements is easy, as the logistic service industry is a 'small world'. Overall, TNT considers itself not so vulnerable in gross terms, while it assesses its net vulnerability to be negligible.

Regarding conservatism, both parties are considered to be 'a bit conservative'. Reverse logistics may be a special case, however, as it is a necessary activity (due to service contract obligations) that is costly (often involving one sole product left at the site of purchase). There is plenty of scope to bring down transport and cross-docking costs, which requires creativity. In other chains, however, e.g. spare parts, storage and warehousing activities are important, so that investment in physical infrastructure in these chains is higher compared with the SDO operation. With this, attention for fill rates of the warehouses becomes a focal point in the minds of managers, along with the risk of stocks piling up that cannot be sold at a later stage, due to technological progress and the shorteing of PLCs. Also in these chains, procurement managers in client firms may have incentives (discounts on larger purchases) or exert power imposing sourcing decisions despite diverging viewpoints and disagreements with marketing or service

⁴ In the context of SDO, an IT system was developed named 'FIRST'. This is a modular transport management system, which works on the basis of the know-how of team members, TNT's experience in the SDO context, and available hardware. The new

departments (within those client firms) or logistic partners, so that stock levels increase more than they should from a logistic or marketing point of view. Finally, logistic services may be purchased on a cost basis, disregarding quality and the potential of logistic specialists to design and implement solutions that drive down total supply-chain costs, including significant economies in the costs of stocks, storage and warehousing. So, conservatism may lead to ‘penny-wise, pound-foolish’ outsourcing arrangements preventing a relationship to grow into an effective logistic alliance. This, once again, may be the case in other chains in which TNT is involved, not so much in the SDO context.

The major outcome of TNT’s view is that it is not only our three theoretical problems that put a brake on 4th party logistic service development, but also the credence product nature of this type of services, the lack of explicit financing mechanisms, the possible cannibalising impact of 4th party logistics on the volume and profitability of transport and warehousing activities, and the lack of a strategic jump forward by logistic firms to reroute investment from physical assets towards human capital, specific experience, and reputations that induce the (intentional, informational, competence and material) trust required for a faster development of 4th party logistics. So, the problem of conservatism is important after all. Dynamic capabilities and the quality of coordination of processes of transformation from 2nd and 3rd to 4th party logistics are the variables that really matter for logistic innovations such as 4th party logistics, rather than the static problems of dependence and vulnerability to spill-over.

HP’s view

TNT’s activities: Considering TNT’s activities in the setting of the SDO operation, HP does not consider TNT to move towards the role and position of a 4th party logistics provider. Design and optimisation services “spring from our own organisation”. HP is similar to other clients, e.g. Philips, who also previously did their logistic work in-house, building up expertise in this field that is fully tailor-made. If 4PL services develop, it is within these firms—the clients of LSPs. Clients may set up a new department or a BV to design, optimise and implement new supply-chain solutions, as Karstadt/Metro did. HP is currently still in the process of merging the logistic operations of Compaq and HP. There is value added in bundling and centralising these activities, including procurement, but they rather do it in-house, instead of trusting this type of work to logistics specialists. This is partly due to problems of dependence and conservatism, as we will see below.

tool is currently also included in offerings to other clients in the area of return logistics. TNT sets a price that is not so high that it encourages competitors to invest in similar systems, however.

In the view of HP, TNT is not a 4PL. The latter sometimes outsources activities, e.g. to UPS, but that is all. The interviewee considers this to be a weakness of TNT, not even a sign of 3rd party logistic service provision by a specialist capable of effectively and efficiently outsourcing logistic work. TNT subcontracts UPS for cost reasons, so “why would I not directly deal with UPS?”, asks HP. “Cut the middlemen, is hot in the world of supply chains”.

Relation: Notwithstanding the above, the HP/TNT SDO relation can be described as a partnership. “We call our suppliers ‘partners’, due to the increasing connectivity between firms, the need to adjust, finetune and connect IT systems, the time it takes to do so (so many mandays, no: years!), and the understanding that we need of each other before we can work together. Ask our suppliers, and they’ll say that HP is complex; there is a lot of understanding about what we want, what is possible, what is not possible, how long it takes to change something, etc.” So, there is a sense of interdependence, due to specific investments in IT and human resources, and also in mutual knowledge. Therefore, the HP manager understands a partnership as that one preferably works with existing relations, not changing the last “like one’s underwear”. New firms trying to get in the supply network have a hard time to do so. Their value proposition should be clear, and be related with design services or radically new solutions. Existing relations have the advantage of mutual specific investments, creating a sense of interdependence between HP and its suppliers, including TNT.

Problems: Turning to the three problems that according to the theoretical framework may hinder 4th party logistic service development, HP indicates that a form of conservatism may be the principal, dependence the second, and vulnerability to spill-over the least important problem.

To explain conservatism, the HP manager refers to the rather general problem of a lack of supply-chain awareness among chain actors. This includes an inability and an unwillingness to think in terms of the total costs of procuring, transacting, transforming and innovating, and to consider the utility of collective efforts of promoting supply-chain excellence. Another problem, more related to LSPS, is their asset-based nature: resources spent in more or less specific investments in physical assets, the need to safeguard the profitability of these investments, and the corollary constraints in advisory and design activities. “They can only do the latter after everything else has been taken care off”. The HP manager thus views the problem of conservatism to be very relevant (score 5), both in having a negative impact on 4th party logistic service development and in hindering the further development of logistic partnerships.

Regarding the problem of dependence, specific investments in IT and understanding of each others business processes cause (inter)dependence, high switching costs, less competition, and less possibilities to “squeeze suppliers”. There is “no plug and play in logistics”, but large needs to adjust EDI, XML and other types of IT systems across clients and LSPs. There are so many connections and interfaces, and the systems are so complex, that it takes a lot of experience to effectively work together. This is also true for 2 and 3PL services, not only 4PL functions. According to the interviewee, it takes more than a year to replace one supplier by another: between 12 and 18 months. In the meantime, logistic performance remains a key point of the capacity to compete in today’s global marketplace. So, switching implies a risk of reduced competitiveness, market share, and worse. HP is thus also dependent on its LSPs, because of specific investments in IT and knowledge and the financial impact of logistic failure. Vice versa, suppliers also make specific investments (in warehouses, belts, etc.), so that dependence is mutual. HP in fact expects its LSPs to make such investments in the absence of detailed written contracts specifying transaction volumes, the duration of the contract, penalties, etc.

Regarding vulnerability to spill-over, the risk is present at both sides of the relationship, but it is not so important. Suppliers losing an idea through HP to competitors do not see this as a problem because of geographic complementarity. If TNT covers the Benelux and develops a solution that HP later discusses with Schenker working in Scandinavia, such does not threaten the short-term business interests of TNT. One may say that it reduces its entry possibilities (in other than its current geographical markets) in the longer term. The compensation, however, is that in current business, HP “does not change suppliers like underwear”. For clients, the risk of a LSP learning something from one client and then applying this in another context—of a competitor’s business—is not so relevant. “It does not happen”, “I do not see it”, so it is not so relevant. LSPs are professional enough not to reveal this type of spill-over, or to do it in cautious ways (e.g. Geodis advertising its work for IBM in a general manner, as agreed in a confidentiality agreement with IBM).⁵

The major outcome of this interview is that the theoretical framework worked well, especially regarding the relevance and the structure of the problems of dependence and conservatism. It appeared that the latter problem consists of multiple aspects, while in the questionnaire insufficient attention is paid to the practical point of asset-based suppliers. This point may make

⁵ At the moment of completing this version of the paper, no information was available on the solutions to the main of the three problems. The related questions could not be addressed during the telephone interview, and have been postponed for later discussion. To be continued...

the problems of conservatism mingle with that of dependence, insofar as investments by suppliers in assets are specific.

Summary table (HP's and TNT's view on the relevance, causes and solutions to the three problems of dependence, vulnerability to spill-over, and conservatism)

		HP	TNT
Dependence	Relevance (ranking)	2 nd	1 st (2 nd after correction)
	Causes	- specific investments in IT, and in understanding each others business processes. High switching costs and time - magnitude of competitive and financial impact of logistic failure	- specific investments in human capital, knowledge exchange, and IT - mutual financial importance
	Solutions	n.a. (will be inserted later)	- research to turn specific into generic products (eliminating specificity) - intentional, informational, material, and competence trust (in order of importance) - dynamic capabilities
Vulnerability	Relevance	3 rd	2 nd (3 rd after correction)
	Causes	- spillover of logistic ideas of LSP to its competitors through clients - spillover of logistic ideas of clients to competitors through LSPs	- labour mobility - clients talking to competitors
	Solutions	- geographic complementarity - compensation in terms of reduced substitutability	- embedded and hard-to-copy nature of IT systems, which only work on the basis of team knowledge, specific experience, and highly customized interfaces - it is a 'small world' - implicit norms

	Relevance	1 st	3 rd (1 st after correction)
Conservatism	Causes	<ul style="list-style-type: none"> - inability and an unwillingness to think in terms of the total logistic costs in the supply chain, as well as to understand the utility of collective efforts to promote supply-chain excellence. - asset-based nature of LSPs: investments in physical assets requiring the need to safeguard the profitability of these investments, and limiting the LSP in advisory and design work. 	<ul style="list-style-type: none"> - asset-based LSPs, net cannibalizing effect of logistic innovation - lack of dynamic capabilities and strategic decisions in logistic firms to reroute investment from physical towards human capital, IT, a good track record, and reputations inducing the (intentional, informational, competence and material) trust required for 4th party logistics - credence product nature of 4th party logistics - interests and power of procurement managers in client firms - conflicting interest between procurement, marketing, service departments in client firms... -...and between procurement managers in client firms and LSPs
	Solutions	n.a. (will be inserted later)	n.a. (will be inserted later)
Other		no additional comments	<ul style="list-style-type: none"> - lack of explicit financing mechanisms - quality of coordination of processes of transforming 2nd and 3rd into 4th party logistic service providers

5. STATE OF THE ART: 4TH PARTY LOGISTICS IN THE NETHERLANDS⁶

In May and June 2004, a questionnaire was sent by surface mail to all (143) LSP-members of the Holland International Distribution Council (HIDC). The purpose of the mail survey was to find out to what extent 4th party LSPs is underway in The Netherlands. The question is, in other words, how important are this type of services in the daily operations, tactics and strategy of Dutch LSPs. 42 questionnaires were completed, resulting in a response rate of 29 percent.

⁶ Kris Konrad and Roel Salden—two students of International Economics and Economic Geography at the Utrecht University, prepared, designed and carried out the survey, under the auspices of Evert-Jan Visser—their thesis research supervisor. This section is based on ongoing research work of Konrad & Salden.

Indicators

In the questionnaire (see appendix 2), several indicators were used to determine whether an LSP fulfils 4th party logistic services. While specifying these indicators, attention was paid to the distinction between 3rd and 4th party LSPs. Above, we suggested that the main difference is that 3rd party LSPs are not involved in strategic discussions concerning the basic logistic concept of a supply chain, whereas 4th party LSPs are hired to advise, design, develop and implement new supply-chain solutions. Here, we briefly describe the main indicators.

The first is targeted to know whether a LSP works on the basis of existing logistic supply-chain concepts, designed, defined and developed by the client, or whether the LSP is allowed to come up with new concepts. The second indicator regards the extent to which a client requires that a LSP develops strategic industry knowledge. The third indicator refers to the degree of specialisation in 4th party logistic services in specific industries; we assume that a high knowledge intensity hinders 4th party LSPs to be active in a large number of industries, and expect them to specialise. Our fourth indicator refers to the type of relationship with client firms, where we distinguish between transactional, contractual and partnership relations. The fifth indicator concerns the number of linkages that a LSP maintains with actors in the supply chain, including the client. We expect 4th party LSP to communicate with different actors in the supply chain, including the client, but not only the client. The sixth indicator addresses the type of investments LSPs made over the last five years; we distinguish between ICT, client interfaces, technical knowledge, management skills, transportation and warehousing capacity, and other types of investment.

Analysis

The below preliminary data analysis has been divided in three parts. The first addresses the type of activities carried out by Dutch LSPs. Respondents could select four out of twenty-five service activities that contribute most to the firm's total turnover (question 1). Some of these activities correspond with 4th party services. The second part of the analysis regards the 4th party criteria mentioned above. The third step is to combine these analyses, and to consider some other data with a view to tentatively assessing the future course of development of Dutch LSPs.

First part: None of the respondents mention four 4th party activities as the major contributors to the firm's total turnover. No respondent listed three 4th party activities as part of their top-4 turnover generators. Only three respondents marked two 4th party activities, one being the 'advice, design, development and implementation of new supply-chain solutions' and the other varying across the three firms ('managing vendor relationships', 'lead logistic provider' and

‘taking care of of operational optimisation’). Thirteen respondents marked one 4th party activity as part of their top-4 turnover generators: ‘advice, design, development and implementation of new supply-chain solutions’ or ‘lead logistic provider’. This leaves 26 respondents marking no 4th party service at all.

On the basis of these outcomes, only three respondents can possibly be classified as 4th party LSPs. The group of 13 firms mentioning one 4th party service as part of their top-4 turnover generators should be excluded, as they mention ‘transport activities’, ‘the organisation of transport’ and the ‘management of distribution centres, including transshipment and storage and of products’ as their main income generators. These activities require considerable investments that put the aspirant 4th party LSP in a difficult position *vis-à-vis* clients, as we have seen in section 4. In fact, it is striking that 91 percent of our respondents (38 firms) indicate that ‘transport activities’ and ‘the organisation of transport’ for clients make part of their top-4 turnover generating activities. One point is that these are 2nd and 3rd party activities respectively, not 4th party services; another concern is their incompatibility with the development of 4th party services (see section 4).

Second part: For a systematic analysis of the criteria-orientated questions, we developed a scorecard (see appendix 3). Questions in the questionnaire that are focused on the criteria for 4th party LSPs have been assigned a certain weight. The maximum score is 100, which indicates that a respondent is a full 4th party LSP.

A first look at appendix 3 shows that none of the respondents fulfil all criteria. The average score is 26 percent, meaning that the sample firms meet about one quarter of the criteria of which we believe that they are important, one by one, before a LSP can develop into a 4th party LSP and circumvent the hurdles described in previous sections. Three firms (other than the activity-based top-3) come close to the maximum score. A close look at their answers, however, shows that these three firms still admit that clients may switch, albeit not easily, to competitors: other LSPs. So, they fulfil 4th party functions for their clients, but the joint problem-solving abilities and strategic contributions are not of such a nature that a more permanent, mutually beneficial relation is in place. Dynamic transaction cost theory predicts that this would be the case, due to two-sided dependence based on superior problem-solving abilities and supply-chain excellence due to specific knowledge interactions between the LSP and the client. Next, these firms did not show up in the top-3 firms in the activity based analysis, while *vice versa*, the top-3 of the activity-based analysis does not reappear as potential 4th party LSPs in the criteria-based analysis.

It is next striking that most respondents remark that it is not necessary to maintain communication with other actors in the supply chain than their clients. 93 percent of all sample firms answers that they only maintain contact with clients. Communication with other actors in the chain, however, is a condition *sine qua non* for fulfilling 4th party services. So, at this point, we may conclude with more certainty that most firms in the sample do not classify as 4th party LSPs.

Third part: Combining the activity-based with the criteria-based analysis strengthens the above picture. The top-3 firms of the activity-based analysis state that their relationship with clients can be seen as a partnership (see section 4, however, for an example of how one client—HP defines partnerships) and they design and/or implement new logistic concepts for clients. On the other criteria, these firms mark “non-4th party LSP answers” however. All three state, for example, that they generate most of their turnover by ‘carrying out logistic activities, **other than** advising, designing, developing and implementing new logistic concepts’ (emphasis in the questionnaire). Next, they do not specialise in service provision in specific industries, and they indicate that it is possible for clients to switch to other LSPs. Finally, they only communicate with clients, not with other supply-chain actors. Our conclusion for these three firms is they do not classify as 4th party LSPs.

The top-3 firms in the combined activity and criteria-based analysis is the same as in the criteria-only analysis. That is encouraging. We will interview these three firms on a face2face basis at a later stage of this research project, so as to arrive at a more definite conclusion regarding their 4PL status. These firms score well (fulfil) on the criteria, but mention only one 4PL activity in their top-4 turnover generating activities. Next, they direct a high share of their investment budgets towards transportation and warehousing capacity, while we would expect them to prioritise ICT, technical and managerial skills, upgrading of client interfaces, and so on.

A final outcome of the combined activity and criteria-based analysis is that the sample as a whole has an average score of 22 percent—lower than the 26 percent in the criteria-only analysis.

Conclusion: 4th party logistics has not taken off yet in The Netherlands. Both the criteria-based average (26 percent) and the activity & criteria-based average (22 percent) are low enough to conclude that there is a long way to go for aspirant 4th party LSPs. Of course, a debate on our six indicators, the weights we assigned to them, the threshold value we used to evaluate possibilities of developing of 4th party services has yet to take place. We observe, however, that the few firms

generating a considerable part of their turnover with 4th party services do not meet most criteria we developed for classifying LSPs as 4th party providers. Next, firms matching most of the criteria fail to become an indispensable partner in the battle for competitiveness of their clients. Other data also yield doubts on their potential 4th party status (e.g. their investment strategies).

So, what about the future course of 4th party logistics in the Netherlands? Survey data are of course of limited value to make all too explicit statements on this issue, but we may engage in, let's say, a sort of 'qualified guess'. We asked respondents what activity they would say to be the most important activity for their firm and their work for clients from a strategic point of view ('strategic' meaning: with a view to future market and/or technological developments in relevant industries): a) advising on, designing, developing and implementing new logistic concepts; or b) carrying out logistic activities, **other than** advising, designing and implementing new logistic concepts (emphasis in the questionnaire). Almost 35 percent of the respondents are aware of the importance of developing advisory and design services for clients. Such awareness is important for the development of 4th party logistics in The Netherlands, as the previous section shows that LSPs need to make strategic (investment) decisions so as to initiate a transition towards this type of logistic system innovation.

6. CONCLUSIONS

In this paper, we empirically test the relevance of dynamic transaction-cost theory for the analysis of the development of 4th party logistic services. The available case-study data allow us to draw conclusions at three levels of analysis: rival theories, the three problems constituting one of the two theories (dynamic transaction cost theory), and the causes of these problems. The available survey evidence reveals the state of development of 4th party logistics in a particular region (The Netherlands). Mingling this evidence with the outcomes of the case study, we may explain the survey results.

Our first conclusion is that new ICTs cause rather than solve problems associated with 4th party logistic service development. Investing in ICT is a reason for increased dependence (although this is true for both parties: the LSP and its clients, so that dependence is mutual). Dynamic transaction-cost related variables go a long way in explaining the slow development of 4th party logistic service development in the setting of the TNT/HP SDO relationship, *and thus may also serve as an explanation for the slow development of 4th party logistics in The Netherlands and elsewhere*, following the theoretical generalisation rule of Yin (1994).

Our second conclusion concerns the relative significance of the problems of dependence, vulnerability to spill-over, and conservatism. It is interesting that the latter problem of

conservatism ranks first, before the two standard TCE-related problems of dependence and vulnerability to spill-over. This may reflect the increasing role of knowledge and learning in service industries and economies in general, and with this, the increasing importance of dynamic failures in network or cluster contexts (*vis-à-vis* static failures in market settings, see Atzema & Visser 2004). It is probably also due to the dynamic nature of the dependent variable of this study: a logistic system innovation. On the other hand, innovation requires learning, which in turn requires interaction and specific investments in understanding the other party, and which thus yields dependence and dynamic transaction costs. So, the outcome of conservatism ranking first and dependence second is not at all obvious. The problem of dependence is felt at both sides of the relationship, however. The problem of conservatism is less balanced and more varied across the parties, which may be a reason for its importance.

Our third conclusion refers to the causes of the three problems, especially dependence and conservatism. Regarding dependence, specific investments in IT and human resources induce high switching costs and time. This is a key feature of logistic partnerships, defining possibilities of control, entry and competition. Regarding conservatism, the physical asset-based nature of LSPs is an important reason for slow service development. For buyers, this feature reduces the credibility of advice; for suppliers, this feature is a financial motive not to innovate. The credence-product nature of 4th party logistics is a second important problem. The more products display characteristics of credence products, the more trust is required for transactions to take place, relations to develop, and innovations to take place. Trust may well be short in supply, so that financing mechanisms are also missing. An aspirant 4th party LSP thus has to invest in a good track record and reputation, specialise in certain industries, disinvest in traditional activities, *et cetera*—everything it can do to reveal its trustworthiness. The quality of strategic decision-making and dynamic capabilities on both sides of the relationship is thus key to solve the above two aspects of conservatism. But even then, the problem remains how to coordinate transition processes from 2nd and 3rd to 4th party logistics, in the presence of conflicting interests and unequal power distributions involving different managers, departments and firms.

Specific investments in IT, accumulated investments in physical assets, the credence product nature of 4th party logistics, the quality of dynamic capabilities and of coordination skills are thus the five reasons and factors that we may derive from the case-study evidence to explain the main outcome of the survey we conducted in the Dutch logistic service industry: 4th party logistics is hardly getting off the ground in The Netherlands.

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APPENDIX 3: scorecard for the criteria-based analysis (second step, see section 5)

	<i>Q2</i>	<i>Q3</i>	<i>Q4</i>	<i>Q5</i>	<i>Q7</i>	<i>Q8</i>	<i>Q9</i>	<i>Q10</i>	<i>Score</i>
Weight Respondent	15	15	10	15	10	15	15	5	100
59	15	15	10	15	10	15	0	5	85
32	15	15	10	15	10	15	0	5	85
48	15	15	10	15	10	15	0	0	80
49	15	15	10	15	10	0	0	5	70
120	15	15	0	15	0	0	0	5	50
60	15	15	10	0	0	0	0	5	45
173	15	15	10	0	0	0	0	5	45
70	15	0	10	0	0	0	15	5	45
6	15	15	10	0	0	0	0	5	45
109	15	15	10	0	0	0	0	0	40
13	15	0	10	0	0	0	15	0	40
92	15	15	10	0	0	0	0	0	40
102	15	15	0	0	0	0	0	5	35
62	0	15	10	0	0	0	0	5	30
12	15	15	0	0	0	0	0	0	30
51	0	15	10	0	0	0	0	5	30
76	15	15	0	0	0	0	0	0	30
140	0	15	10	0	0	0	0	5	30
147	0	15	10	0	0	0	0	5	30
170	0	0	10	0	0	0	15	5	30
112	15	0	10	0	0	0	0	0	25
168	0	15	10	0	0	0	0	0	25
152	0	0	10	0	0	0	0	5	15
134	15	0	0	0	0	0	0	0	15
68	0	15	0	0	0	0	0	0	15
161	0	0	10	0	0	0	0	5	15
10	0	0	10	0	0	0	0	0	10
81	0	0	10	0	0	0	0	0	10
3	0	0	10	0	0	0	0	0	10
37	0	0	0	0	0	0	0	5	5
82	0	0	0	0	0	0	0	5	5
127	0	0	0	0	0	0	0	5	5
129	0	0	0	0	0	0	0	5	5
132	0	0	0	0	0	0	0	5	5
155	0	0	0	0	0	0	0	5	5
157	0	0	0	0	0	0	0	5	5
97	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0
164	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0

Note: in this scorecard, question 1 was not taken into account, so that the maximum score is 100.