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The Influence of Customer-Specific Adaptations on the Performance of Third Party Logistics Relationships
- Empirical Results -

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Abstract

This paper strives to answer the question whether there is an impact of partner-specific adaptations by both the third party logistics provider and its customer on the performance of the relationship, the level of satisfaction and the degree of loyalty. Data was collected from logistics providers and customers. The evaluation based on customers' data shows that adaptations by providers exert positive influences on performance, satisfaction and loyalty. Since own adaptations are felt as an effort, there is a negative impact of customers' adaptations on performance. Based on providers' data, there is no influence of customers' adaptations on performance, satisfaction or loyalty but there are effects of adaptations by the providers on performance and satisfaction. This study delivers first ideas for a better understanding of the nature of specific adaptations in third party logistics. Nevertheless, some questions were raised that make further research efforts necessary.

Content

Keywords

Third party logistics, service buying, international sourcing

1 Purpose and Research Objectives

Third party logistics services consist of various types of logistics activities and include the co-ordination and control of these services. In comparison to traditional transport and warehousing services, third party logistics services “are more complex, encompass a broader number of functions, and are characterized by longer-term, more mutually beneficial relationships” (Africk and Calkins, 1994, p. 49). Furthermore, a long term orientation and a more relational approach were emphasized in literature (Knemeyer and Murphy, 2004, p. 35). Therefore, the business model of third party logistics is essentially based on the creation of customer-specific services and hence on adaptations by providers. Specific adaptations to the systems and procedures of the customer as well as extensive monitoring and reporting responsibilities are natural. Third party logistics contracts can include detailed stipulations concerning a provider’s responsibilities (van Hoek, 2000, p. 18, 21) and many third party logistics providers complain about one-sided adaptation to customers’ systems and procedures (Lieb and Bentz 2005, p. 602). For example, the customer insists on a specific location, demands specific procedures, expects the usage of his equipment or requires the report of a specific set of key performance indicators. Consequently, Hertz and Alfredsson (2003, p. 140) emphasize that the ability of customer adaptation is a crucial characteristic of third party logistics providers.

On the other hand, the adaptation by the customer to the logistics provider could be an appropriate strategy to establish efficient third party logistics relationships. These providers are specialized in logistics and therefore customers could acquire efficient and effective procedures. Furthermore, non-specific equipment of the third party logistics provider such as existing warehouses can be used efficiently for several customers. Therefore, next to adaptations by providers, adaptations by the customers come into the research focus.

This research strives to investigate the influences of these adaptations on the success of third party logistics relationships. Success is conceptualized in a broader sense covering the performance of the relationship as well as the satisfaction of both partners and the loyalty of both the customer and the provider. Generally, the scientific knowledge of the influence of adaptations on the success of business relationships is contradictory and rather limited. For example, Knemeyer and Murphy (2004, p. 46) found that there is no influence of customer-specific investments on customers’ perceptions of the relationship performance. In contrast, based on the investigation of general buyer-seller relationships, Cannon and Perreault (1999, p. 454) provide evidence of the influence of specific adaptations on customer satisfaction.

Most of the previous studies have focused on outsourcing and have, therefore, taken customers’ perspective on third party logistics relationships (e.g. Large and Kovács, 2001; Lieb and Kendrick, 2002). However, customers and providers might have divergent perceptions. For example, it is plausible that they perceive own adaptations

as rather negative and the adaptations by the partner as rather positive. Therefore, this paper strives to answer the following research questions:

- What effects on performance, satisfaction and loyalty result from the degree of partner-specific adaptations by both the third party logistics providers and their customers?
- How important are differences between customers' and providers' perceptions?
- Is there an influence of contextual factors (e.g. the complexity of the service) on the degree of partner-specific adaptations by providers and customers?

2 Literature

The main purpose of the research described in this paper is to acquire a better understanding of the factors that influence third party logistics performance. Therefore, previous literature was analyzed to fathom out whether or not specific adaptations exert an influence on the performance of third party logistics. This literature research focused on third party logistics, relationship marketing and transaction cost theory. Customer adaptation and customer satisfaction are common constructs in relationship marketing. Therefore, relationship marketing has been chosen, because general insights in the nature of supplier-customer relationships can be transferred to the special topic of third party logistics relationships. The transaction cost theory deals with the effects of customer-specific investments on the efficiency of business transactions. Therefore, a better understanding of the impact of adaptations based on customer-specific assets can be expected. To understand these influences the meaning of the performance of third party logistics relationships must be clear. The next part of this paper strives to achieve a better understanding of performance in the third party logistics business.

2.1 Performance

First, performance could be understood as the degree of goal accomplishment in a third party logistics relationship. Most of the previous research focused on customers' perceptions of third party logistics performance. Knemeyer and Murphy (2004, p. 39) defined third party logistics performance as the „perceived performance improvements that the logistics outsourcing relationship has provided the user". Performance improvements include, e.g. reduced logistics costs, reduced cycle times, more efficient handling of exceptions and improved system responsiveness (Knemeyer and Murphy 2004, p. 39, Sinkovics and Roath 2004, p. 53). Stank et al. (2003, p. 29) identified three distinct dimensions of logistics performance: operational performance, relational performance and cost performance. This research conceptualizes the performance of a third party logistics relationship by using an adapted version of Stank, Daugherty and Ellinger's (1996, p. 49) reflective scale of logistics provider performance.

Parasuraman, Zeithaml and Berry (1988, p.16) emphasized the distinction between service quality and satisfaction: „incidents of satisfaction over time result in

perceptions of service quality“. On the other hand, customer satisfaction can be seen as the result of an ongoing evaluation of perceived service quality. In that respect, Stank et al. (2003, p. 30, 54) used customer satisfaction in third party logistics to describe customer’s contentedness with the overall relationship with the provider. Likewise, Cannon and Perreault (1999, p. 448) used five general items to measure customers’ satisfaction with suppliers. In this research these measures were used together with four additional items developed in a distribution context (Daugherty, Stank and Ellinger 1998, p. 40).

Furthermore, loyalty is a valuable concept reflecting the long term performance of a relationship (Daugherty, Stank and Ellinger 1998, p. 36). Loyalty stands for the commitment of the partners to maintain and if applicable to renew the contract. Summing up, three constructs were used to model outcome issues in this research: performance, satisfaction and loyalty.

2.2 Relationship Marketing

Generally, relationship marketing has emphasized the importance of adaptations by sellers to customers’ systems and procedures. On the other hand, Morris, Brunyee and Page (1998, p. 366) found evidence of a low willingness of customers to change their behaviors and procedures in order to enhance cooperation with their suppliers. Cannon and Perreault (1999, p. 442) developed a typology of customer-supplier relationships from a variety of characteristics which can be regarded as „relationship connectors“. These relationship connectors are: information exchange, operational linkages, legal bonds, cooperative norms, adaptations by sellers, adaptations by buyers. Therefore, partner-specific adaptations can be regarded as important characteristics of close relationships. Two types of relationships with extensive adaptations were found (Cannon and Perreault 1999, p. 442). The first one is „customer is king“ type which involves extensive adaptations only by the seller. The second type of relationship is „mutually adaptive“ which requires adaptations by both the seller and the supplier. Surprisingly, there seems to be limited influence of sellers’ adaptations on customer satisfaction (Cannon and Perreault 1999, p. 454). Customer satisfaction with adapted relationships such as „customer is king“ is almost as low as customer satisfaction with basic buying relationships. Furthermore, when a business relationship requires considerable adaptations by the customer, satisfaction is low. Following this model, potential influences on the degree of adaptations are the availability of alternative relations, characteristics of the supply market, the importance and the complexity of the supply.

2.3 Transaction Cost Theory

Transaction cost theory is of vital importance to gain a better understanding of third party logistics relationships (Maloni and Carter 2006). As shown in the first section, third party logistics consist of recurrent, complex services based on a long-term contract between a provider and a customer. For such settings, the transaction cost theory predicts the existence of specific investments by the providers (Williamson, 2008, pp. 8-9; Williamson 1979, pp. 246-247). Asset specificity is a precondition to

meet the specific requirements of the customer and to efficiently support the recurrent transactions (Williamson 1984, p. 202). Following Williamson (1979, p. 247), Figure 1 displays the relationship between frequency, asset specificity and logistics contract characteristics. Detailed and long-term agreements (hybrid contracting) like third party contracts are necessary to safeguard these specific investments and to reduce the risk of opportunism (Williamson, 2008, p. 9). Additionally, if the frequency of service transactions is low it is difficult to recoup the investments in the third party relationship. Therefore, third party logistics is not appropriate for occasional transactions. Van Hoek (2000, p. 21) proved that customer-specific third party logistics services such as final assembly, display building or warehousing are positively related to the existence of detailed contracts.

		Asset Specificity		
		No	Medium	High
Frequency	Occasional	contract of carriage	forwarding contract	forwarding contract / contract of employment
	Recurrent	contract of carriage / warehousing contract	forwarding contract / cooperation agreement	third-party logistics contract / contract of employment

Figure 1: Asset specificity and logistics contract characteristics

Initially, Williamson distinguished between four important types of asset specificity: site specificity, physical asset specificity, human asset specificity and dedicated asset specificity (Williamson, 1984, pp. 214-215, 1991, p. 281).

In the case of site specificity, the location of the third party logistics facility is stipulated by the customer. For example, the customer demands that a warehouse is located in the proximity of an existing assembling plant. For this reason, the provider is not able to use an existing facility located in a different area. Consequently, there is a need for new customer-specific investments in a warehouse at this demanded location.

If the customer expects adaptations to his own systems and procedures, the provider is forced to invest in customer-specific equipment to meet these requirements. Thus, physical asset specificity is created. Examples of such investments include specific warehouse capacity and dedicated electronic link-ups for inventory control (Knemeyer and Murphy 2004, p. 42). Usually, such customer-specific equipment is not suitable for alternative usage. „Inasmuch as the value of this capital in other uses is, by definition, much smaller than the specialized use for which it has been

intended, the supplier is effectively „locked into“ the transaction to a significant degree“ (Williamson 1979, p. 240). Therefore, the third party logistics provider not only hesitates to behave in an opportunistic way, but also hesitates to terminate the relationship earlier than planned. Likewise, the customer is not able to turn to alternative providers due to the necessity of new specific investments (Williamson 1979, p. 240). Therefore, the transaction cost theory expects a mutual commitment to the third party logistics relationship.

Human asset specificity refers to specific investments in human resources. For example, if the customer places special demands on the knowledge and skills of a provider’s staff, specific training is necessary. The effects of human asset specificity on third party logistics relationships are the same as in the case of physical asset specificity. The term „dedicated assets“ indicates non-specific equipment of the provider such as general warehouses or means of transportation. These capacities are intended for the exclusive use of one particular customer. Furthermore, dedicated assets involve the expansion of an existing warehouse on a special customer’s request.

One common reason for asset specificity in third party logistics is the need for customer-specific performance measurement (Large and Kovács 2001, p. 49). Usually, the customer places specific demands on the service provider concerning performance measurement and reporting. For example, the third party logistics company is required to provide specific key performance indicators and detailed management reports, which enable the customer to monitor the performed service. In order to meet these requirements, the provider is forced to invest in specific data processing procedures or to adapt to the existing monitoring systems. Likewise, specialized personnel is necessary in order to fulfill these special demands.

In conclusion, the transaction cost theory predicts extensive investments by third party logistics providers. In other words, the transaction cost theory expects one-sided adaptations by the provider rather than mutual adaptations by both parties. Furthermore, the transaction cost theory suggests positive impacts of asset specificity on the performance of third party logistics. As shown above, asset specificity contributes to the commitment of both parties, resulting in a trustful relationship between the partners. Surprisingly, Knemeyer and Murphy (2004, p. 46) found that a buyer’s perception of specific investments by a third party logistics provider is not related to the level of trust toward this provider. In contrast, Kwon and Suh (2004, p.6) proved that supply chain partners’ investments increase the level of trust between the partners. On the other hand, own investments exert a negative influence on the level of trust of the other party (Kwon and Suh 2004, p.6). Artz (1999, p. 122) found evidence of a negative relationship between the level of specific investments by the customer and the performance of a supplier-customer relationship, although, reciprocal investments by the supplier can increase customer’s satisfaction. One possible explanation is the mutual dependence of both parties (Artz 1999, p. 122). Likewise, Heide and Stump (1995, p. 62) found evidence

for a negative impact of buyers' investments in supplier-specific assets on the perception of relationship performance.

2.4 Third Party Logistics

In the first part of this paper, the ability of customer adaptation was introduced as a key characteristic of third party logistics providers. Hertz and Alfredsson (2003, p. 141) emphasized the importance of the general ability to solve problems and of the ability to undergo customer adaptations. Both characteristics were used to differentiate between third party logistics providers and traditional logistics firms. Furthermore, Hertz and Alfredsson developed a typology of third party logistics providers based on these characteristics. So-called „customer adapters" (providers with a relatively high ability to solve general problems and a high ability to carry out customer adaptations) usually take over existing activities of several customers and try to improve the performance of these processes. The second type of providers, consisting of companies with both a high ability of carrying out customer adaptations and a high ability of solving general problems, is described as a „customer developer". This type develops advanced customer solutions for each customer.

Knemeyer, Corsi and Murphy (2003, p. 102) used three indicators to measure the level of adaptations by third party logistics providers:

- „The third party has gone out of its way to link us with its business.
- This third party has tailored its services and procedures to meet the specific needs of our company
- This third party would find it difficult to recoup its investment in us if our relationship were to end."

Extensive behavioral adaptations by third party logistics providers require a considerable amount of asset specificity. Therefore, two additional items adapted from Sharland (1997, pp. 397-398) were utilized to measure the degree of adaptation in the proposed model.

3 Methods

3.1 Structural Equation Modeling

Structural equation modeling (SEM) was used to answer these research questions. The SEM approach combines a path model (relationships among the constructs) and a measurement model (set of items for each construct) (Giménez, Large and Ventura, 2005, Hair et al., 2006). The first step of using SEM as a research method is the development of the structural model, in other words, the specification of the constructs and the causal relationships among them. Literature was used to deduce the following constructs:„performance of the relationship" (PERF), „loyalty" (LOY), „satisfaction" (SAT), „adaptation by the provider" (PSPEZ) and „adaptation by the customer" (CSPEZ) and to establish a first structural model. As there is a lack of profound knowledge of the relationships among these constructs, the character of this model is mainly explorative. Therefore, relationships among all constructs were

assumed. Furthermore, potential influences such as „customer's fixed assets" (INV), „complexity of the service" (COMP) and „desired level of monitoring" (MON) were included. If the customer is no longer in a position to use existing facilities and equipment, these assets are sunk costs. Therefore, the customer expects the further use of these assets and hence the adaptation by the third party logistics company. For that reason the influence on adaptation by the customer was hypothesized negatively. All other effects were presumed to be positive.

Customers and providers could have divergent perceptions. It is obvious that they perceive their own adaptations as rather negative and the adaptations by the partner as rather positive. Thus, the model was divided into two separate models for customers and providers. These two models were proved by using customer and provider data independently. The effect of adaptations on the degree of loyalty based on the transaction cost analysis was assumed in both models as positive (Figure 2 and Figure 3).

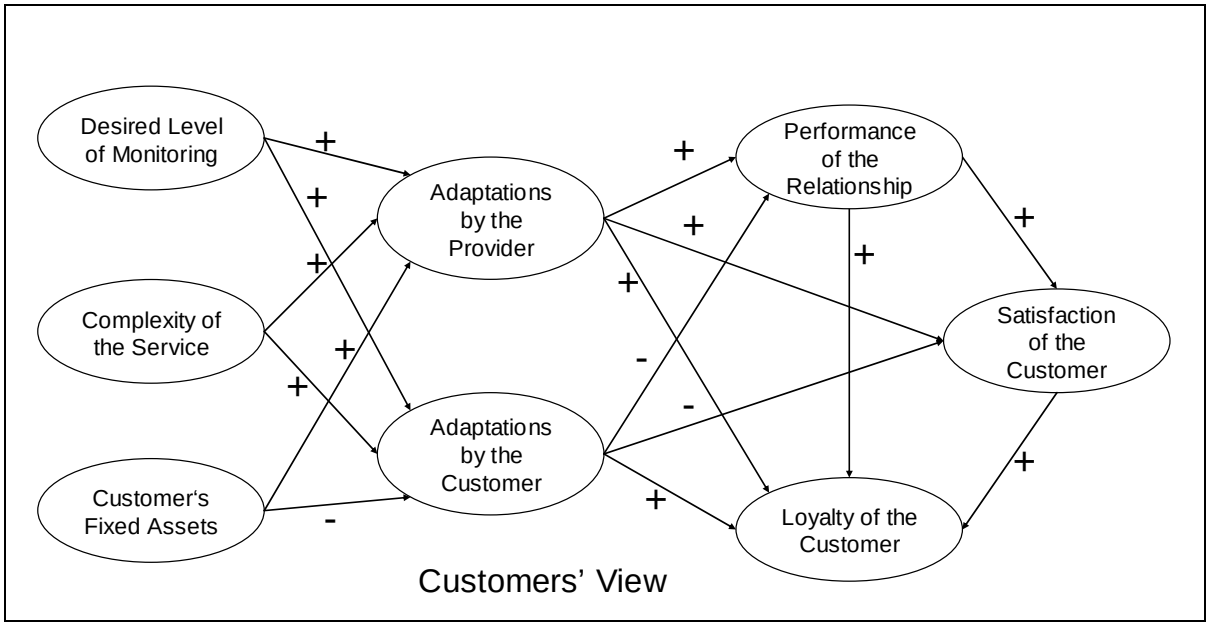

Figure 2: Hypothesized path model: Customers' View.

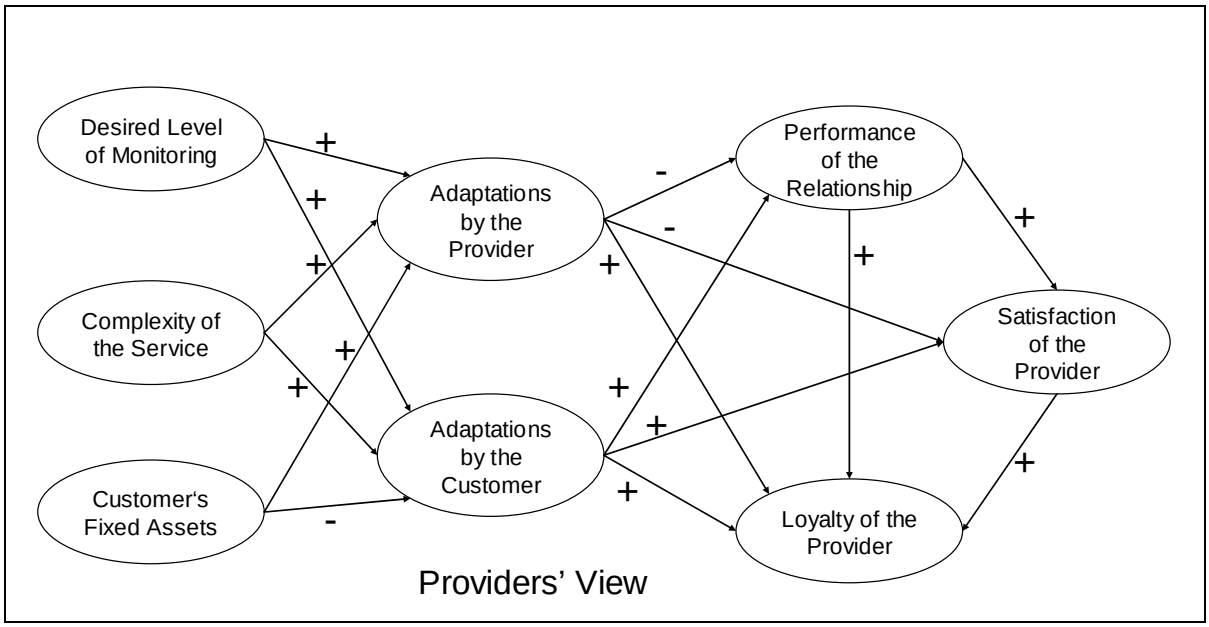

Figure 3: Hypothesized path model: Providers' View.

3.2 Sampling and Data Collection

Two corresponding questionnaires were designed to collect customers' and providers' data. The first part of the questionnaire consists of general questions about third party logistics. The second part refers to a specific third party logistics relationship of the company. Reflective multi-item scales were used to measure the constructs. As far as possible proven scales were adopted (Stank, Daugherty and Ellinger, 1996; Daugherty, Stank and Ellinger, 1998; Knemeyer and Murphy, 2004; Sharland, 1997). However, in most cases new scales had to be designed.

The questionnaire for service providers was sent by e-mail to 129 chief executives or sales managers of third party logistics companies. The questionnaire for customers was distributed by e-mail to 403 purchasing or logistics managers in industry and trade. Both samples were drawn from a mailing list of the author. Additionally, the logistics newsletter of the German Association of Purchasing and Logistics (BME) was used to enlist additional participants. Altogether 45 provider questionnaires (University: 36, BME: 9) and 79 customer questionnaires (University: 64, BME: 15) were available for statistical analysis. 42 of the providers and 45 of the customers have already established at least one third party relationship. Based on the number of questionnaires distributed the response rates are 27.9% (providers) and 15.9% (customers).

3.3 Partial Least Square Method (PLS)

SmartPLS 2.0 (Ringle, Wende and Will, 2005) was used for the analysis of the two path models shown in Figure 2 and Figure 3. This structural equation modeling (SEM) software package is an application of the Partial Least Square Method (PLS) (Chin, 1998, Tenenhaus et al., 2005). Covariance based SEM procedures such as LISREL or AMOS perform a simultaneous estimation of the totality of the model parameters. Therefore, these procedures require very large samples if models are complex (Bentler and Chou, 1987, p. 89). In contrast, the PLS estimation is based on a set of multiple regressions. The significance of the parameters was tested with the bootstrapping procedure. Therefore, in comparison to covariance based procedures the PLS algorithm is advantageous if the model is complex and the sample size is small (Chin, 1998, p. 311). Furthermore, the PLS approach is more suitable for explorative studies where the level of theoretical knowledge and scale development is rather low (Chin, 1998, p. 295). Summing up, PLS is most appropriate to analyze the data of this study.

3.4 Measurement Assessment

An important precondition for structural equation modeling is scale purification for each single construct, especially in the case of new or adapted scales. In this study each path model consists of eight latent variables. Thus a reflective measurement model was chosen. The questionnaire includes 41 indicators. Reliability analysis and explorative factor analysis with SPSS were performed. The evaluation was based on the criteria provided by Hair et al. (2006). Table 1 shows sufficient degrees of reliability and convergent validity after scale purification.

Initial explorative factor analysis of partner-specific adaptations with five items resulted in a two-factor solution. Therefore, the items CSPEZ3 and PSPEZ3 were excluded because of considerable cross-loads. The percentage of variance extracted and the loadings indicate that the level of adaptation of the two partial samples has to be measured by different items. From the view of the providers their own as well as the customers' adaptations are reflected in the characteristics of specific investments. That is why the items of behavioral adaptations were eliminated from the measuring model of the service provider data. On the contrary, the customers emphasize behavioral adaptations, e.g. the partner-specific tailoring of processes. Therefore the adaptation on the basis of customer data was measured by the two items standing for behavioral adaptations. To emphasize this new perspective, the constructs were renamed: „specific investments by the provider" and „specific investments by the customer" in the case of providers' data and „behavioral adaptations by the provider' and „behavioral adaptations by the customer' in the case of customers' data.

		Provider			Customer		
Construct	Indicator	C.A.	Loading	Variance explained	C.A.	Loading	Variance explained
		>0.7	>0.7	>50%	>0.7	>0.7	>50%
Performance of the relationship	PERF1	0.70	0.860	65.19	0.84	0.797	76.71
	PERF2		0.760			0.897	
	PERF3		0.798			0.928	
	PERF4						
Loyalty	LOY1	0.90	0.911	84.60	0.72	0.828	64.30
	LOY2		0.929			0.740	
	LOY3						
	LOY4		0.919			0.834	
Satisfaction	SAT1	0.90		68.46	0.93		75.87
	SAT2		0.778			0.947	
	SAT3		0.776			0.883	
	SAT4		0.801			0.850	
	SAT5						
	SAT6		0.852			0.886	
	SAT7		0.910			0.769	
	SAT8		0.840			0.882	
	SAT9						
Customer's fixed assets	INV1	0.75		67.90	0.80		71.76
	INV2		0.882			0.801	
	INV3		0.752			0.826	
	INV4						
	INV5		0.833			0.911	
Complexity of the service	COMP1	0.68	0.785	61.36	0.74	0.842	65.37
	COMP2		0.767			0.826	
	COMP3		0.798			0.755	
	COMP4						
	COMP5						
Desired level of monitoring	MON1	0.88		82.82	0.77		69.43
	MON2		0.937			0.698	
	MON3		0.949			0.927	
	MON4		0.840			0.858	
	MON5						
Adaptation by the provider	PSPEZ1	0.90		91.37	0.85	0.935	87.46
	PSPEZ2					0.935	
	PSPEZ3						
	PSPEZ4		0.956				
	PSPEZ5		0.956				
Adaptation by the customer	CSPEZ1	0.84		86.97	0.87	0.944	89.09
	CSPEZ2					0.944	
	CSPEZ3						
	CSPEZ4		0.933				
	CSPEZ5		0.933				

Table 1: Reliability and validity of the measuring model (calculations with SPSS).

Finally SmartPLS was used to evaluate the scales of the two models. Common criteria to evaluate reflective measures of PLS path models are the average variance extracted, the composite reliability and the communality (Stone-Geisser Q^2) (Chin,

1998, p. 316-321). The results of these calculations are shown in Table 2 and Table 3.

	Average variance Extracted > 0.6	Composite reliability > 0.7	Stone-Geisser Q^2 (communality) > 0	Cronbach Alpha > 0.7
Complexity of the service	0.65	0.85	0.65	0.73
Customer's fixed assets	0.58	0.81	0.58	0.80
Desired level of monitoring	0.64	0.84	0.64	0.77
Behavioral adaptation by the customer	0.89	0.94	0.89	0.88
Behavioral adaptation by the provider	0.87	0.93	0.87	0.86
Performance of the relationship	0.77	0.91	0.77	0.85
Satisfaction	0.76	0.94	0.76	0.92
Loyalty	0.64	0.84	0.64	0.72

Table 2: Evaluation based on customers' data (calculation with SmartPLS).

	Average variance Extracted > 0.6	Composite reliability > 0.7	Stone-Geisser Q^2 (communality) > 0	Cronbach Alpha > 0.7
Complexity of the service	0.61	0.83	0.61	0.68
Customer's fixed assets	0.67	0.86	0.67	0.76
Desired level of monitoring	0.83	0.93	0.83	0.89
Specific investments by the customer	0.85	0.92	0.85	0.85
Specific investments by the provider	0.91	0.95	0.91	0.91
Performance of the relationship	0.65	0.85	0.65	0.73
Satisfaction	0.71	0.93	0.71	0.90
Loyalty	0.85	0.94	0.85	0.91

Table 3: Evaluation based on providers' data (calculation with SmartPLS).

4 Results and Discussion

The path relationships (standardized regression coefficients) of the two models were estimated performing SmartPLS. The bootstrap procedure (Efron, 1979, Diaconis and Efron, 1983) was used to obtain t-statistics in order to evaluate the significance of the parameters. The coefficients of determination (R^2) for each dependent construct provide a signal whether the independent variables of the model exert substantial influence on this construct (Chin, 1998, p. 316-317).

4.1 Results Based on Customer Data

The results of this estimation on the basis of customer data are shown in Table 4 and Figure 4. There is evidence that behavioral adaptations by the third party logistics provider (PSPEZ) exert positive influences on the performance of the relationship

(PERF), the level of customer satisfaction (SAT) and the degree of loyalty (LOY). Behavioral adaptations by the service provider are crucial for third party logistics and are therefore expected from the customer. Insufficient willingness to adapt leads to negative performance evaluations by the customer and hence to customer dissatisfaction. In the long term it may reduce the probability of contract extension.

	PLS Path coefficient	Bootstrap sample mean	Standard error	t-value	Significance
COMP ⇨ CSPEZ	0.16	0.15	0.09	1.703	0.089
COMP ⇨ PSPEZ	0.29	0.29	0.08	3.683	0.000
CSPEZ ⇨ LOY	0.30	0.30	0.08	3.802	0.000
CSPEZ ⇨ PERF	-0.36	-0.36	0.06	6.150	0.000
CSPEZ ⇨ SAT	0.11	0.11	0.05	2.124	0.034
INV ⇨ CSPEZ	0.17	0.11	0.19	0.926	0.355
INV ⇨ PSPEZ	0.14	0.08	0.16	0.842	0.400
MON ⇨ CSPEZ	0.04	0.04	0.17	0.268	0.789
MON ⇨ PSPEZ	0.16	0.17	0.10	1.683	0.092
PERF ⇨ LOY	0.10	0.10	0.14	0.687	0.492
PERF ⇨ SAT	0.84	0.84	0.04	18.779	0.000
PSPEZ ⇨ LOY	0.35	0.35	0.08	4.353	0.000
PSPEZ ⇨ PERF	0.58	0.59	0.05	10.744	0.000
PSPEZ ⇨ SAT	0.15	0.15	0.05	3.004	0.003
SAT ⇨ LOY	0.35	0.35	0.14	2.609	0.009

Table 4: Parameter estimation on the basis of customer data (calculation using SmartPLS).

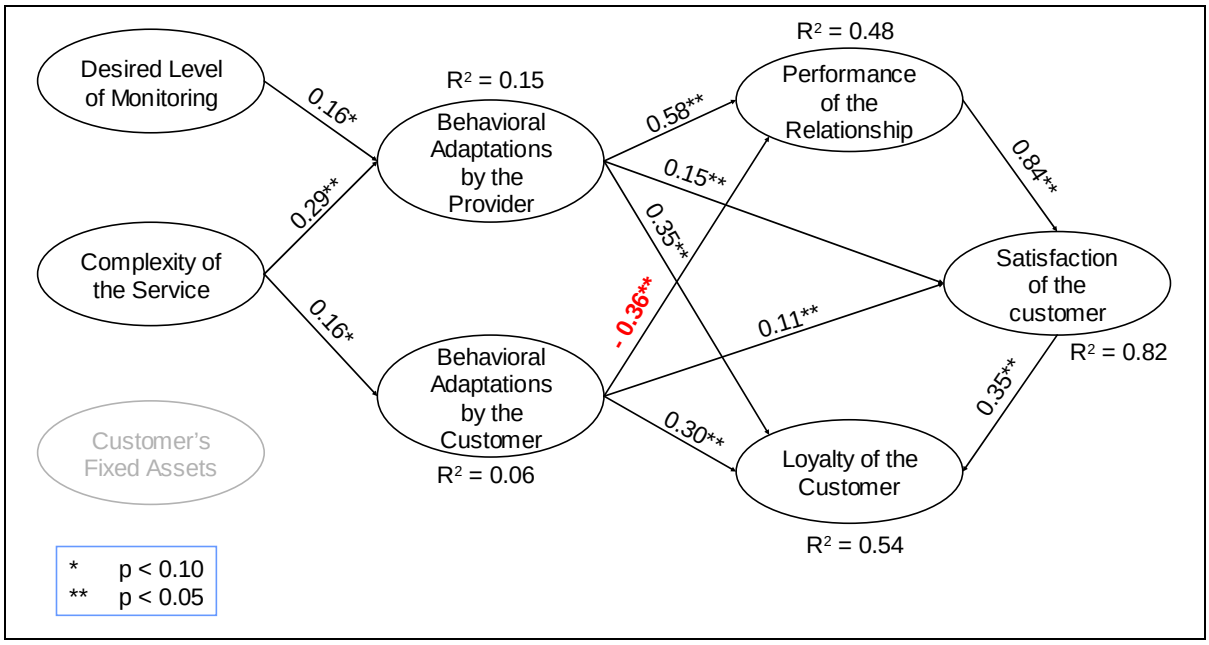

Figure 4: Approved structural model on the basis of customer data.

Since own adaptations are felt as an effort, there is a negative impact of specific adaptations by the customer (CSPEZ) on performance. If customers have to adapt to providers, they will judge the performance of the resulting relationships as insufficient. This result corresponds to the insights of Cannon and Perreault (1999, p. 454) concerning the adaptations of customers in general supplier-customer

relationships. On the other hand, the satisfaction of the customers (SAT) grows with a rising level of their own adaptations. However, the strong positive effect of the perceived performance of the relationship (PERF) on the satisfaction of the customer has to be regarded. This impact combined with the negative influence of CSPEZ on PERF causes an indirect negative effect of the behavioral adaptation of the customer (CSPEZ) on his or her satisfaction (SAT), which exceeds the positive direct effect. The positive direct effect of the adaptations by the customers on the degree of their loyalty (LOY) corresponds to the predictions of the transaction cost theory that assumes mutual commitment in the case of partner-specific adaptations (Williamson, 2008, p. 8; Williamson, 1979, p. 240). However, this effect will be slightly weakened through a negative indirect impact of CSPEZ on LOY, transmitted by PERF and SAT. Altogether the values of the coefficients of determination (R-square) of PERF (R^2 = 0.48), SAT (R^2 = 0.82) and LOY (R^2 = 0.54) give evidence that this part of the model is appropriate.

In contrast, the R-square of the behavioral adaptation by third party logistics providers is small (R^2 = 0.15). Even smaller is the R-square of behavioral adaptations by customers (R^2 = 0,06). Contrary to the expectations of the transaction cost theory there is no significant influence of the level of customers' fixed assets (sunk cost) on the level of behavioral adaptations by both customers and providers. The desired level of monitoring (MON) slightly affects the behavioral adaptations by the customers. Only the complexity of the service (COMP) was identified as an important reason of adaptations by both the customers and the providers.

4.2 Results Based on Provider Data

Accordingly, the results of the parameter estimation based on the data collected from service providers are shown in Table 5 and in Figure 5. As discussed in the methods section the level of adaptation is operationalized as the volume of specific investments. Based on provider data, there is no confirmation for influences of adaptations by the customers (CSPEZ) on performance, satisfaction or loyalty. Similarly, specific adaptations by the providers (PSPEZ) do not have an effect on the level of loyalty. In both cases the transaction cost theory would expect positive effects, because this theory construes specific investments as means to stabilize business relationships (Williamson, 1979, p. 240).

On the other hand, there are influences of the level of specific investments by the service provider (PSPEZ) on the performance of the relationship and on the satisfaction of the provider. In contrast to the expectations, the impact of specific investments by the provider on the provider's perception of performance is positive. The reason for this result could be the understanding of the providers that the existence of customer-specific investments is an essential characteristic of the third party logistics business. However, the explanation of performance through this effect is rather weak, because the R-square of PERF is only 0.18. As expected, an increase in specific investments by providers (PSPEZ) lower their level of satisfaction (SAT). However, there is an additional indirect effect of the specific investments by providers on their satisfaction caused by a very strong impact of performance (PERF)

on satisfaction (SAT). This positive effect exceeds the direct negative effect, so that in total there is a weak positive effect of PSPEZ on SAT. The degree of loyalty (LOY) is positively driven by the performance of the relationship, because a logistics provider, who perceives a relation as positive, wants to continue this business.

None of the three potential factors show significant influence on the degree of specific investments by the customer (CSPEZ). On the other hand an increase in complexity of the service (COMP) raises the level of specific investments by the third party logistics provider (PSPEZ). Also the existence of logistics facilities and equipment (customer's fixed assets, INV) exerts positive influence on PSPEZ. Nevertheless, the R-square of PSPEZ is rather low ($R^2 = 0.29$).

	PLS Path coefficient	Bootstrap sample mean	Standard error	t-value	Significance
COMP ⇨ CSPEZ	0.07	0.04	0.16	0.473	0.636
COMP ⇨ PSPEZ	0.34	0.31	0.13	2.594	0.009
CSPEZ ⇨ LOY	-0.09	-0.10	0.09	1.096	0.273
CSPEZ ⇨ PERF	0.04	0.03	0.10	0.378	0.706
CSPEZ ⇨ SAT	0.04	0.03	0.05	0.830	0.407
INV ⇨ CSPEZ	0.14	0.15	0.10	1.294	0.196
INV ⇨ PSPEZ	0.19	0.20	0.08	2.447	0.014
MON ⇨ CSPEZ	-0.02	-0.02	0.10	0.163	0.871
MON ⇨ PSPEZ	0.18	0.21	0.12	1.466	0.143
PERF ⇨ LOY	0.62	0.57	0.18	3.527	0.000
PERF ⇨ SAT	0.92	0.92	0.05	19.330	0.000
PSPEZ ⇨ LOY	0.10	0.11	0.08	1.238	0.216
PSPEZ ⇨ PERF	0.41	0.41	0.13	3.199	0.001
PSPEZ ⇨ SAT	-0.18	-0.18	0.04	3.939	0.000
SAT ⇨ LOY	0.13	0.17	0.16	0.827	0.408

Table 5: Parameter estimation on the basis of provider data (calculation with SmartPLS).

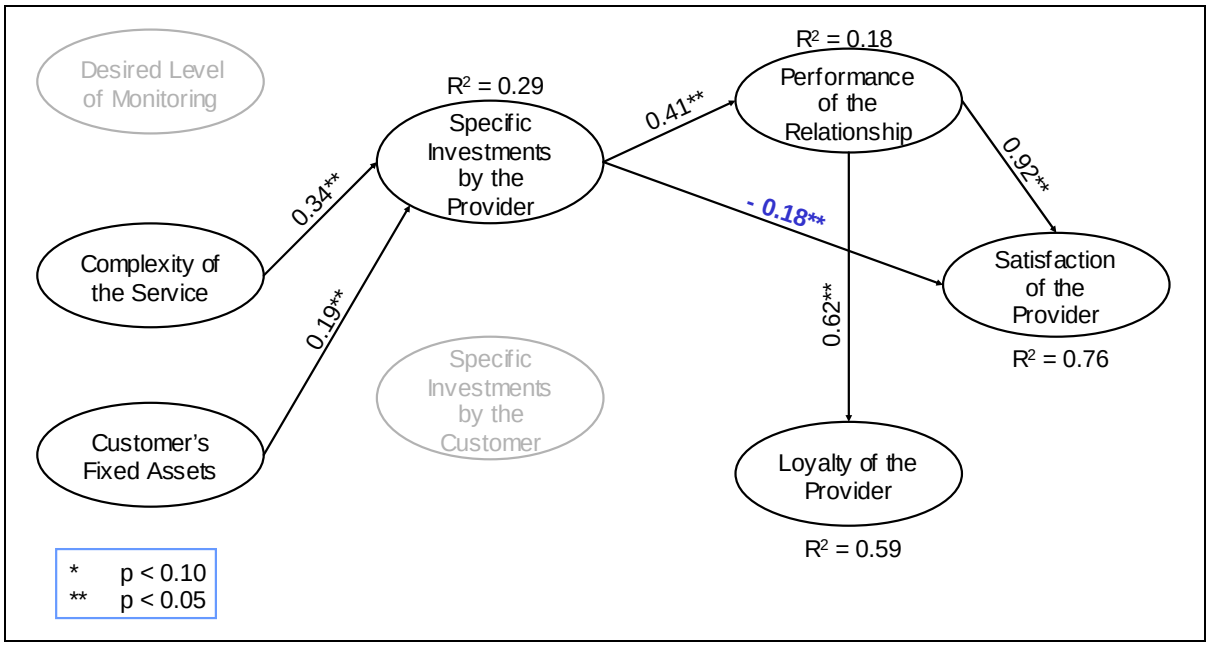

Figure 5: Approved structural model on the basis of provider data.

5 Conclusions and Limitations

This study has delivered first ideas for a better understanding of the nature of specific adaptations in third party logistics and the relationship between the level of adaptation and the success of 3pl relationships. Data was collected from logistics providers and customers. The evaluation based on customers' data shows that behavioral adaptations by providers exert positive influences on performance, satisfaction and loyalty. Since own adaptations are felt as an effort, there is a negative impact of customers' adaptations on performance. Based on providers' data, there is no influence of customers' specific investments on performance, satisfaction or loyalty but there are effects of specific investments by the providers on performance and satisfaction. Nevertheless, there are some limitations that make further research necessary.

Firstly, only the complexity of the service exerts considerable influence on adaptations both of the customer and the provider. The influence of monitoring and fixed assets of the customer is rather low. Other potential factors of influence should be included in the model. Secondly, this research is mainly based on new or adopted scales. Adaptation seems to be a two-dimensional construct consisting of behavioral adaptations and partner-specific investments. Therefore, further evaluation and improvements of the scales are necessary. Thirdly, some results contradict the transaction cost theory. In particular, the result that specific investments do not have any influence on the degree of loyalty needs further examination.

A general problem is the small sample size, especially of the provider sample. The reason for this small sample size is the comparatively small number of third party logistics firms operating in Germany. Although PLS is a suitable method, larger samples would allow to use covariance based methods like AMOS or LISREL. The most important advantage of AMOS or LISREL is the availability of goodness-of-fit statistics to evaluate the overall quality of a structural equation model. An appropriate approach to solve the problem of small samples could be the collection of providers' data also in other countries.

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Appendix: Items Used in the Customer Questionnaire

Construct	Indicator	Statement	Source
Performance of the relationship	PERF1	My firm's association with this service provider has been a highly successful one.	Stank, Daugherty and Ellinger (1996) (adapted)
	PERF2	This international service provider leaves a lot to be desired from an overall performance standpoint.	
	PERF3	If I have to give this service provider a performance appraisal for the past year, it would be outstanding.	
	PERF4	Overall, I would characterize the results of my firm's relationship with this service provider as having exceeded our expectations.	
Loyalty	LOY1	The relationship that my firm has with this firm is something we are very committed to.	Daugherty, Stank and Ellinger (1998) (adapted)
	LOY2	The relationship that my firm has with this firm is something my firm intends to maintain indefinitely	
	LOY3	The relationship that my firm has with this vendor deserves our maximum effort to maintain.	
	LOY4	Maintaining a long-term relationship with this vendor is very important to my firm.	
Satisfaction	SAT1	Our firm regrets the decision to do business with this supplier.	Cannon and Perreault (1999), Daugherty, Stank and Ellinger (1998)
	SAT2	Overall, we are very satisfied with this supplier.	
	SAT3	We are very pleased with what this supplier does for us.	
	SAT4	Our firm is not completely happy with this supplier.	
	SAT5	If we had to do it all over again, we would still choose to use this supplier.	
	SAT6	We are delighted with our overall distribution service relationship with them.	
	SAT7	We wish more of our suppliers were like this one.	
	SAT8	It is a pleasure to deal with this supplier.	
	SAT9	There is always some problem or another with this supplier.	
Customer's fixed assets	INV1	Before establishing this relationship we used own logistical facilities.	New scale
	INV2	Before establishing this relationship we performed logistics by ourselves.	
	INV3	This relationship is based on a make-or-buy decision.	
	INV4	It's the first time we source this service external.	
	INV5	Before establishing this relationship we tied up substantial capital to logistical systems.	
Complexity of the service	COMP1	This 3pl-service is very complex.	New scale
	COMP2	This 3pl-service consists of various partial services.	
	COMP3	This 3pl-service consists of diverse partial services.	
	COMP4	The coordination of these partial services is very costly.	
	COMP5	The definition of the service specification was extensive.	
Desired level of monitoring	MON1	We want to have a clear idea of the provider's service level.	New scale
	MON2	We want to monitor the provider's performance at regular intervals.	
	MON3	The provider is compelled to report regularly.	
	MON4	The provider is compelled to provide key performance measures regularly.	
	MON5	We require the usage of key performance measures predefined by our company.	

Construct	Indicator	Statement	Source
Adaptation by the provider	PSPEZ1	This third party has gone out of its way to link us with its business.	Knemeyer and Murphy (2004), Sharland (1997) (adapted)
	PSPEZ2	This third party has tailored its services and procedures to meet the specific needs of our company.	
	PSPEZ3	This third party would find it difficult to recoup its investments in us if our relationship were to end.	
	PSPEZ4	This third party made considerable investments in tools and equipment in its relationship with us.	
	PSPEZ5	Gearing up to deal with us required highly specialized tools and equipment.	
Adaptation by the customer	CSPEZ1	We have gone out of our way to link us with the business of this provider.	Knemeyer and Murphy (2004), Sharland (1997) (adapted)
	CSPEZ2	We have tailored our procedures to meet the specific needs of this provider.	
	CSPEZ3	We would find it difficult to recoup our investments in this provider if our relationship were to end.	
	CSPEZ4	We have made considerable investments in tools and equipment in our relationship with this provider.	
	CSPEZ5	Gearing up to deal with this provider required highly specialized tools and equipment.	