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Working Paper 113

Effective Logistics Alliance Design and Management

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Effective Logistics Alliance Design and Management¹

Purpose: We argue that the productive analyses of logistics alliances in the literature have led to a multitude of heterogeneous contributions. These should be consolidated and systematized in order to (a) synthesize the existing findings in a meaningful way and guide future research for effective design and management; and (b) improve logistics alliance performance in practice.

Design/methodology/approach: We use a systematic literature review to screen and consolidate current knowledge on effective design and management of logistics alliances.

Findings: This article categorizes the logistics literature on vertical and horizontal alliances into four key areas in order to systematically consolidate key performance factors, their sub-constructs and performance effects to identify implications for both research and practice.

Research implications: Within our research agenda, we develop concrete research opportunities in four areas: horizontal logistics alliances; vertical logistics alliances; transfer of new research streams into the context of logistics alliances; and the incorporation of impediments and negative effects.

Practical implications: By consolidating existing research results, we provide guidance for managers looking to establish or adapt logistics alliance structures and management systems.

Originality/value: The consolidation of key performance impact factors on logistics alliances (both vertical and horizontal) provides a platform for further research. The developed agenda offers specific research opportunities to improve our understanding of logistics alliance performance.

Keywords: Strategic alliances, logistics (business), collaboration, cooperation, 3PL, Logistics Service Providers, Literature review

Type of paper: Literature review

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1 Introduction

Despite the proliferation of logistics alliances (Daugherty, 2011; Stank et al., 2011), many do not meet the partners' expectations and may even be considered failures (Kampstra et al., 2006; Stank et al., 2011; Wilding and Juriado, 2004). Logistics scholars have spent considerable efforts to explain why some logistics alliances are successful, while others are not. However, major gaps remain in our understanding of these arrangements. There are a number of reasons for these gaps, including incomplete alliance models offered by the nascent logistics discipline (Daugherty, 2011), a lack of practical knowledge on how to manage logistics alliances successfully (Lambert et al., 1999), and limited interest in cooperation related pitfalls and risks (Cruijssen et al., 2007b; Lambert et al., 1999; Zineldin and Bredenlow, 2003). An additional explanation for these perceived gaps could be the sheer quantity and variety of contributions, which are often based on the heterogeneous usage of terms, constructs, and theories that follow different methodologies and research traditions. Although this variety and heterogeneity can be enriching, it can also hinder progress. One step towards a better understanding of logistics alliances is to systematize and consolidate extant scholarship to offer a platform for more targeted research.

This paper provides a systematic literature review in order to comprehensively identify, assess, and synthesize current knowledge on logistics alliances design and management. We have analyzed scholarly work on both vertical and horizontal logistics alliances. Logistics alliances are understood here as formalized, long-term, cooperative relationships between at least one logistics service provider (LSP) and other legally independent actors in a supply chain for mutual competitive advantage. The specific analysis and consolidation of both horizontal and vertical logistics alliances and their respective (hitherto mainly independent) research streams provides a comprehensive picture of LSP alliance design and management. In particular, it allows to identify and develop concrete research avenues that draw from the cross-fertilization between vertical and horizontal logistics alliance literatures. Our results are likely to have direct and indirect impacts on practice logistics management. The direct impact is that consolidated research results enable practitioners to gauge research results and derive meaningful managerial implications. The indirect impact is that our review results can spur additional research with particular managerial relevance in logistics alliance management and design.

We acknowledge and complement existing logistics and supply chain literature reviews in various ways. Our review and consolidation systematizes the comprehensive findings on

logistics alliances management and design in order to go beyond a chronological review of value creation in buyer-supplier relationships (Mentzer et al., 2008). It extends both Daugherty's (2011) evolutionary overview of research topics and the trends and future directions found in Stank et al. (2011).

The rest of the paper is structured as follows. We start by briefly summarizing the understanding and scholarly treatment of logistics alliances, both vertical and horizontal. We then explain the literature review approach and provide a structured presentation of the review results along four broad research foci. Based on these results, we identify further research avenues with which to address major gaps in logistics alliance research and management.

2 Logistics Alliances and LSP

Despite the lack of a common definition of logistics alliances, there is consensus in terms of describing logistics alliances as long-term (Bagchi and Virum, 1998; Cruijssen et al., 2007b; Gentry, 1996b; Nyaga and Whipple, 2011; Nyaga et al., 2010; Park, 2003; Schmoltzi and Wallenburg, 2011, 2012) and voluntary (Park, 2003; Schmoltzi and Wallenburg, 2012) relationships between two or more independent actors of a supply chain. We understand logistics alliances as formalized long-term, cooperative relationships between at least one logistics service provider (LSP) and other legally independent actors in a supply chain striving for mutual competitive advantage. LSPs are "companies which perform logistics activities on behalf of others" (Delfmann; et al., 2002: 204). From an LSP perspective, such logistics alliances can either be horizontal (LSP with other LSP) or vertical (LSP with client). Both types of alliance have attracted substantial attention in the logistics literature.

Vertical logistics alliances are "long-term formal or informal relationship[s] between shippers and logistics providers to render all or a considerable number of logistics activities for the shipper" (Bagchi and Virum, 1998). Research on these arrangements developed as a response to the increasing outsourcing of logistics functions to LSP in the 1980s. Outsourcing was seen as an adequate response to meet the increasing customer demands for speed, reach, quality, and affordability of logistics services (Daugherty, 2011; Ellram and Cooper, 1990; Tranfield et al., 2003). Since then, vertical alliances among supply chain actors, such as manufacturers, suppliers, retailers and customers and LSPs, have become increasingly important (Bowersox et al., 2000; Cruijssen et al., 2007b; Daugherty, 2011). One rationale underlying this trend is that outsourcing allows clients to focus on their core assets and

activities, thereby enhancing their productivity and service levels (Daugherty, 2011; Kleinsorge, 1991; Slack, 2002). These advantages emerge due to specialization and size effects for LSPs in general; specifically, their process-related expertise (Wagner, 2008) and the opportunity for them to consolidate shipments and services.

Many studies have investigated the drivers (Bagchi and Virum, 1998; Lambert et al., 1999), types (Gardner et al., 1994; Rogers and Daugherty, 1995) and success factors (Gibson et al., 2002; Lambert et al., 1999; Tate, 1996) of vertical alliances. This vibrant and fertile research activity has led to a wide yet insular knowledge base with sometimes contradicting results and implications, which have left future researchers and practitioners puzzled about how to effectively design and manage such alliances.

With regard to horizontal logistics alliances, extant research can be laid out quite differently. Horizontal logistics alliances are “voluntarily initiated, long-term relationships among autonomous LSPs that operate on the same stage of the supply chain ...[and] strive for benefits that could not be achieved by the individual companies alone” (Schmoltzi and Wallenburg, 2012: 54). These benefits are realized through the pooling and leveraging of partner’s resources and competencies (Schmoltzi and Wallenburg, 2011) in order to achieve efficiency gains and to extend their service portfolio. Some logistics alliances put greater emphasis on efficiency gains through cost reductions and increased productivity; for example, through better asset utilization and reduction of empty mileage (Crujssen et al., 2007b), while for others, the broadening of their members’ service portfolios via the combination of complementary assets is the primary *raison d’être*.² In any case, horizontal LSP alliances are highly fragile as the independence of, and rivalry among, partnering LSPs increases the threat of opportunistic behavior as well as the alliance management complexity (Crujssen et al., 2007b; Schmoltzi and Wallenburg, 2012).

Research on horizontal alliances between LSP remains in its infancy (Crujssen et al., 2007b; Schmoltzi and Wallenburg, 2011). Pioneering studies in this area have had two main aims: (a) to identify potential cost savings based on analytical and simulation approaches, and (b) to identify performance impact factors based on econometric analyses (Crujssen et al., 2007b; Schmoltzi and Wallenburg, 2011, 2012).

² The logistics literature has tended to focus on the former, as our review will illustrate.

Therefore, for logistics alliances in general, we observe two different research streams that have been developing largely independently from each other.³ This isolation would not be problematic if it were justified by substantial and relevant differences in the object of inquiry. We argue that -- while there are major differences between horizontal and vertical logistics alliances -- these differences do not justify the relative isolation of their research streams that has marked the field to date, especially with regard to questions of logistics alliance design and management. The major conceptual differences between vertical and horizontal logistics alliances are delineated below.⁴

Motivation: Vertical and horizontal logistics alliances are seen to differ in terms of the reasons for their foundation and in terms of the primary beneficiary of the alliance's success. Vertical logistics alliances (that is, alliances between LSP and their clients⁵) are formed primarily to enhance productivity and services for the client. This clear client focus as a shared goal helps to align interests among partnering firms. Such a shared goal is less prominent in horizontal alliances which emphasize efficiency increases and/or improved service offerings for each individual LSP⁶ through the alliance.

Nature of the relationship: Vertical and horizontal alliances differ in the nature of the relationship between partnering firms. Vertical relations between client and LSP build on a clear differentiation of assets, capabilities and purpose of each partner, as they are active on different stages in the supply chain. The immediate threat that the one party will "take over" the client of the other is minimal. This is different for horizontal LSP alliances, where partners are competitors and each partner could – in principle – also serve its partner's clients. Relationships in horizontal LSP alliances are therefore marked by an increased threat of opportunism.

Interdependence: Vertical alliances are characterized by resource interdependence among partners based on the complementary nature of their resources and competences (Gulati,

³ This phenomenon is not specific to the logistics field, as Belderbos et al. suggested: "vertical and horizontal alliances have both been the subject of investigation in prior research, but the two streams of literature appear to have developed in relative isolation" (Belderbos et al., 2012: 1818).

⁴ Analogous to Rindfleisch's (2002) view on buyer-supplier relationships, we identified key differences between vertical and horizontal logistics alliances capturing their respective idiosyncrasies.

⁵ The term client is used throughout this paper to describe any partnering supply chain actors, such as buyers, manufacturers, suppliers, retailers, or customers.

⁶ The term LSP is used throughout this paper to describe the provider of logistics services, such as carriers, and Third Party Logistics (3PL).

1995). Partnering LSP, on the other hand, are quite independent of each other's resources to perform in business. As the extent of dependence determines the commitment of involved parties towards the alliance (Lambert et al., 1999; Makukha and Gray, 2004), the low degree of interdependence in horizontal alliances increases the risk that rivalry and opportunistic behavior will impair alliance stability (Schmoltzi and Wallenburg, 2012).

Although these differences are substantial, they are also well-defined. Horizontal and vertical logistics alliances actually share a variety of commonalities that suggest the usefulness of a wide array of results across the direction of the cooperative relationship. Common to both streams are the particular industry context, the pivotal role of LSP as alliance partners, and the specific type of interorganizational relationships (cooperation/alliances) that they investigate. We argue that despite the important differences, the shared foundations of logistics alliance research have resulted in a large yet untapped pool of results that is relevant to both streams. Therefore, our literature review helps to bridge these streams by simultaneously increasing their specificity and relevance. We do this by presenting the results of our comprehensive review along four distinct areas that apply to both horizontal and vertical logistics alliances and thereby stress their commonalities, which are: (1) alliance composition, (2) alliance structure, (3) relational behavior, and (4) operational process design. We present the findings of the literature streams on horizontal and vertical logistics alliances separately along these four areas, and then juxtapose the different approaches, topics, and results for the two streams in order to finally offer, in the final section of the paper, our cross-fertilizing synthesis that emerges when comparing these different foci.

3 Methodology: Review Scope and Selection Criteria

In order to arrive at a broad, comprehensive, and scholarly relevant literature basis for our analysis, we reviewed high-ranking academic journals with primary domains of logistics, operations management, and supply chain management (Mentzer et al., 2008). The focus on these domains enabled us to capture a broad scope of logistics scholarship along its functional (planning, controlling, and executing intrafunctional activities), cross-functional (operations management), and cross-organizational management levels (SCM) (Mentzer et al., 2008). Because there is no global consensus regarding which logistics journals should be considered "top-tier," we consolidated a list of 40 high-ranking journals based on three ranking systems that are widely acknowledged beyond their countries of origin. These are: (a) the Journal

Citation Reports provided by Thomson Reuters, (b) the JourQual2 ranking published by the German Academic Association for Business Research, and (c) the logistics and transportation journal ranking from the Institute of Transport and Logistics Studies (ITLS) at the University of Sydney (see Table 1).

Next, in keeping with Daugherty's (2011) notional review on interfirm relations in logistics, we searched the article abstracts or topics (Web of Science) within the selected journals for the following terms: "alliance", "partnership", "collaboration", "cooperation", "joint venture" and "buyer-supplier relationship". The search returned a total of 1,037 articles published between 1990 and 2012. To identify relevant articles on logistics alliances, we then defined and employed inclusion and exclusion criteria to analyze the articles' titles and abstracts (Petticrew and Roberts, 2006; Tranfield et al., 2003). We included all articles that studied alliance design and management parameters and linked them to the explanation of logistics alliance performance. We excluded articles that studied (a) the choice of alternative governance options to alliances (for example, alliances vs. mergers and acquisitions), (b) relations with governmental actors or relations among geographically proximate but heterogeneous actors (as in urban studies), and (c) non-LSP relationships, such as manufacturer–retailer relations.⁷ The first author performed the selection in this step, and the second author was consulted in cases of ambiguity and uncertainty (142 articles). Upon screening the full texts, both authors reached agreement on inclusion or exclusion from further analysis. As a result, a total of 48 articles were selected as relevant, which provided the basis for our review.

In a fourth step, we reviewed these articles in depth, then consolidated and synthesized them using a data-extraction form (Carter and Ellram, 2003; Tranfield et al., 2003) structured around the research foci, including title, author, publication details, research focus, study type, methodology, sample, independent and dependent variables, findings, and implications.⁸ We also coded each study with keywords to identify emerging themes (Wassmer, 2010). Thus, we were able to systematically and visually record our narrative review process and extract the data from which our results emerged.

⁷ We included all studies that included LSP at least as part of their sample of supply chain collaborators (as in: Fawcett et al., 2008; Fawcett et al., 2006; Zacharia et al., 2009).

⁸ The full table of analysis can be provided upon request.

Table 1: Journal selection and respective number of articles identified and included in this study

Top-tier Journals	ITLS	Journal Citation Reports	Jour-Qual 2	Article hits	Article selected
Accident Analysis and Prevention	X			1	0
Discrete Applied Mathematics			X	0	0
Environment and Planning A	X			0	0
European Urban and Regional Studies	X			35	0
International Journal of Logistics Management	X	X		9	0
International Journal of Logistics: Research and Applications	X			32	3
International Journal of Operations & Production Management		X		104	2
International Journal of Physical Distribution and Logistics Management	X	X	X	102	12
International Journal of Shipping and Transport Logistics		X		3	0
Journal of Business Logistics		X	X	64	13
Journal of Economic Geography	X			13	0
Journal of Environmental Economics and Management	X			12	0
Journal of Operations Management	X	X		62	2
Journal of Purchasing and Supply Management		X		45	2
Journal of Supply Chain Management		X	X	41	3
Journal of the American Planning Association	X			30	0
Journal of the Operational Research Society	X			41	2
Journal of Transport Economics and Policy	X			5	1
Journal of Transportation Engineering	X			3	0
Journal of Urban Economics	X			5	0
Land Economics	X			25	0
Management Science	X		X	101	0
Maritime Policy & Management	X			43	2
Naval Research Logistics	X			2	0
Networks & Spatial Economics	X			3	0
Operations Research		X		28	0
Production and Operations Management	X			22	0
Public Transport	X			0	0
Regional Science and Urban Economics	X			6	0
Regional Studies	X			101	0
Supply Chain Management – An International Journal		X		14	0
The Town planning review	X			13	0
Transportation	X			3	0
Transportation Research Part A: Policy and Practice	X		X	19	0
Transportation Research Part B: Methodological	X		X	5	0
Transportation Research Part C: Emerging Technologies	X			8	1
Transportation Research Part D: Transport and Environment	X			2	0
Transportation Research Part E: Logistics	X		X	25	4
Transportation Science	X		X	8	1
Transportmetrica	X			2	0
Sum: 40	32	10	9	1037	48

Selection criteria: ITLS (all journals (32) ranked in the top two categories (tiers 4 and 3) of the ITLS ranking (http://sydney.edu.au/business/itls/research/journal_rankings)); Journal Citation Reports (all journals from the Business and Management category maintaining either Logistics, Supply Chain Management or Operations Management in their title and with an impact factor > 1); JourQual2 (all A- and B-ranked logistics and transportation subset journals of the German JourQual2 ranking (Schrader and Hennig-Thurau, 2009))

Based on this systematic extraction, we made a differentiation between studies that focused on vertical alliances and studies that emphasized horizontal relationships; this was done in order to incorporate the respective idiosyncracies of these alliance types in logistics alliance design and management. Finally, we structured the identified research issues of both vertical and horizontal alliances along four main categories (see Figure 2 for an overview). The review results are discussed in the following section.

4 Review results along the key research categories

Scholarly interest in logistics alliance design and management has increased in recent decades (see Figure 1). The number of articles on the subject indicates that it has drawn particularly high interest from the more strategy-oriented logistics journals (see Table 1). The majority of the selected studies have applied a quantitative research design (15 vertical, six horizontal logistics alliance articles). The next most common research designs were qualitative (10 vertical), mixed quantitative and qualitative (four vertical), analytical (two vertical, six horizontal), and conceptual (three vertical, two horizontal) (see Table 2).

Figure 1: Number of selected articles published per period in top-tier logistics journals that fulfilled the search/selection criteria.

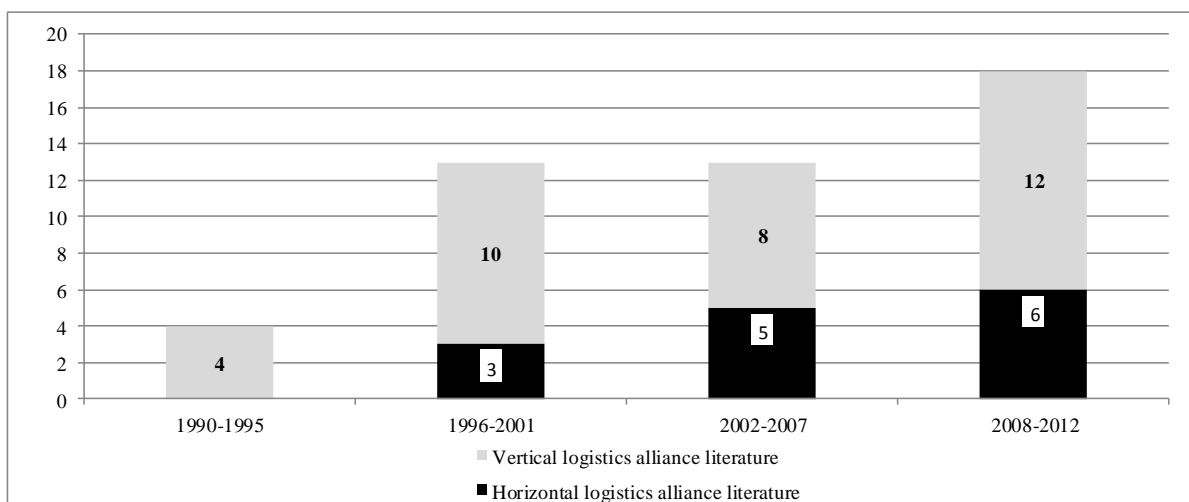
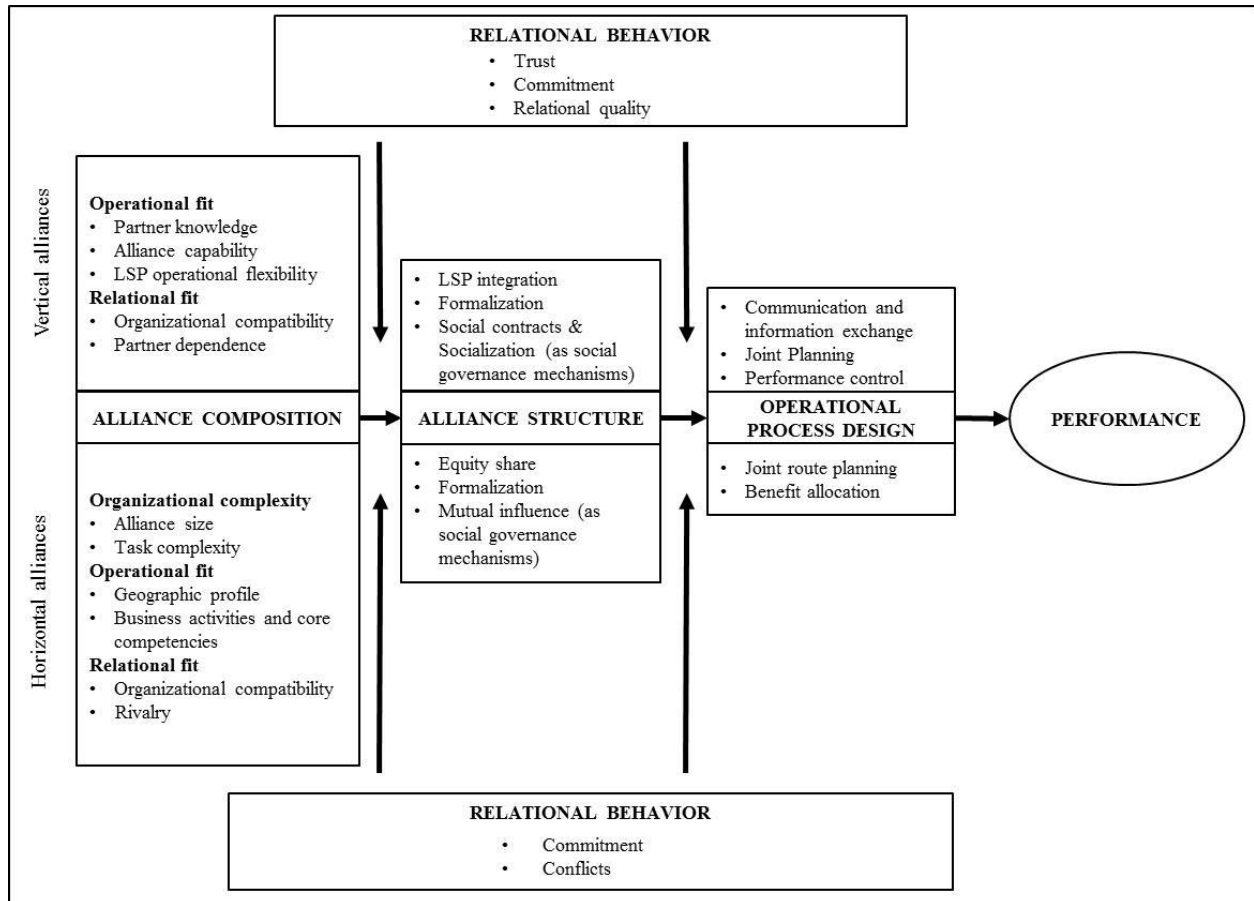


Table 2: Descriptive review results

	1990-1995	1996-2001	2002-2007	2008-2012	Sum
Unit of analysis: Vertical alliance					
Alliance size					
Bilateral	3	7	6	11	27
Trilateral	1	2	1	-	4
Multilateral	-	1	1	1	3
Not specified	-	-	-	-	-
<i>Sum</i>	4	10	8	12	34
Research methodology					
Conceptual	1	2	-	-	3
Analytical	1	-	-	-	1
Survey	1	2	4	8	15
Case study	-	3	1	3	7
Interviews/expert panel	-	1	1	1	3
Interviews/case study and survey	1	2	1	-	4
<i>Sum</i>					
Research foci					
Alliance composition	-	5	4	5	14
Alliance structure	2	6	5	3	16
Relational behavior	1	4	3	5	13
Operational process design	2	5	4	6	17
<i>Sum</i>	5	20	26	19	
Empirical context					
US	2	5	1	1	9
EU	-	1	5	5	11
Asia	-	1	-	1	2
International	-	-	-	2	2
Absent	2	3	2	3	8
Unit of analysis: Horizontal alliance					
Size of horizontal alliances					
Bilateral	-	-	3	2	5
Trilateral	-	-	-	-	-
Multilateral	-	2	2	1	5
Not specified	-	1	-	3	4
<i>Sum</i>	-	3	5	6	14
Research Methodology					
Conceptual	-	1	-	-	1
Analytical	-	1	4	3	8
Survey	-	1	-	2	3
Interviews/expert panel	-	-	-	-	-
Interviews/case study and survey	-	-	1	1	2
<i>Sum</i>		3	5	6	14
Research foci					
Alliance composition	-	2	1	2	5
Alliance structure	-	1	-	3	4
Relational behavior	-	-	-	2	2
Operational process design	-	1	5	3	9
<i>Sum</i>	-	4	6	9	
Empirical context					
US	-	-	-	1	1
EU	-	-	2	4	6
Asia	-	-	-	-	-
International	-	1	-	1	2
Absent	-	2	4	1	5

Our review shows four main research areas across horizontal and vertical logistics alliances: (1) alliance composition, (2) alliance structure, (3) relational behavior, and (4) operational process design (see Figure 2). We elaborate on each of these four areas below; first in the context of vertical logistics alliance and then with a focus on horizontal logistics alliances.

Figure 2: Overview of the identified four research fields in logistics alliances



4.1 Vertical Logistics Alliances

4.1.1 Alliance composition in client-LSP alliances

Researchers focusing on vertical alliances have emphasized the importance of the fit of partner's individual resources and competences (a) towards the alliance tasks (operational fit), and (b) towards each other (relational fit) as determinants of alliance effectiveness and productivity (see Appendix 1 for more details)⁹.

Operational fit: Partner knowledge

Knowledge about partners benefits both LSPs and clients (Zacharia et al., 2009). It fosters the level of cooperation between LSPs and clients, and yields increases in alliance outcomes and client performance. Thus, this knowledge compensates the additional efforts invested in gaining these partner insights (Zacharia et al., 2009). From a client's perspective, knowledge about LSPs facilitates the evaluation of competences, reputations and organizational profiles, which enhances the selection of qualified LSPs (Bagchi and Virum, 1998; Zacharia et al., 2009). From an LSP perspective, the positive impact of a deep understanding of the client's business rests upon three mechanisms. First, being able to put oneself in a client's place improves openness and cooperation between LSPs and clients (Bagchi and Virum, 1998; Chen et al., 2010; Hartmann and De Grahl, 2011; Lambert et al., 1999; Zacharia et al., 2009). Second, client knowledge enables LSP to customize their services yielding operational improvements (Bagchi and Virum, 1998). Third, client knowledge also enables LSPs to anticipate and acquire necessary capabilities in order to flexibly cope with changing customer demands, which ensures ongoing value creation (Bagchi and Virum, 1998; Hartmann and De Grahl, 2011). This value creation is a prerequisite for customers to engage in logistics alliances (Gibson et al., 2002; Hartmann and De Grahl, 2011). Empirical findings support the logic behind client knowledge, indicating that it improves the LSP-client collaboration (Chen et al., 2010) and LSP flexibility, thereby indirectly driving customer loyalty (Hartmann and De Grahl, 2011). However, partner knowledge requires both LSPs and

⁹ An overview of performance impact factors of vertical logistics alliances is available from the authors upon request.

clients to be willing to spend time and effort to understand each other (Bagchi and Virum, 1998) and implies a clear articulation and explanation of a firm's business and its expectations from the alliance (Bagchi and Virum, 1998; Panayides and Gray, 1999; Tate, 1996; Zacharia et al., 2009). Logistics scholars suggest that continuous and systematic access to valuable partner insights (Tate, 1996; Zacharia et al., 2009) can be realized by, for example, involving LSPs in a firm's planning process (Tate, 1996), implementing intense exchange and specific cross-firm trainings among employees, hiring alumni or other experts, and/or establishing educational and research facilities (Hartmann and De Grahl, 2011).

Operational fit: Alliance capability

Partners looking to cooperate effectively in supply chains require specific alliance capabilities to unfreeze, transform, and continuously improve their interactions if they are to achieve high levels of collaboration that yield competitive advantages (Fawcett et al., 2008). Taking a client perspective, Chen et al.'s (2010) empirical findings indicate that a client's capability to drive vertical alliances depends on the client's top management championship facilitating client-LSP collaboration, thereby indirectly enhancing client logistics performance (Chen et al., 2010). From a LSP perspective, empirical findings show that LSP alliance capability fosters client loyalty (Hartmann and De Grahl, 2011), alliance outcomes (Deepen et al., 2008) and business performances (Zacharia et al., 2009). The logic behind this is that the cooperative attitude (a) helps LSPs overcome the "not-invented-here" syndrome (Zacharia et al., 2009), (b) enhances the exchange of valuable information (Hartmann and De Grahl, 2011), and (c) facilitates continuous alliance improvement (Bagchi and Virum, 1998; Deepen et al., 2008; Gibson et al., 2002). To achieve greater collaboration, Zacharia et al. (2009) suggested frequent face-to-face meetings, a high level of joint decision-making, open sharing of information, free flow of useful and novel ideas, openness to new ways of thinking, and discovering new knowledge among LSPs and clients. Bagchi and Virum (1998) emphasized employees' motivation and training as crucial determinants of excellent services and empowerment to act. Empirical findings show that alliance capability as joint exploitation of alliance opportunities fosters a client's market performance; interestingly, this capability has no significant impact on its logistics performance, which was blamed on these factors' late occurrence (Sinkovics and Roath, 2004).

Operational fit: LSP operational flexibility

Given the focus on operational performance in vertical alliances, it is not surprising that both LSPs and clients perceive operational flexibility as a major performance impact factor (Gibson et al., 2002). From a client's perspective, operational flexibility is recognized as the main evaluation and selection criterion of qualified LSPs (Gibson et al., 2002). For LSPs, operational flexibility reflects their ability to meet changing customer demands (Bagchi and Virum, 1998; Hartmann and De Grahl, 2011; Makukha and Gray, 2004) and/or to create proactively alliance improvements (Bhatnagar and Viswanathan, 2000; Deepen et al., 2008; Gentry, 1996a; Gibson et al., 2002), which determines the likelihood of achieving client satisfaction (Gibson et al., 2002), loyalty, and competitive advantage (Hartmann and De Grahl, 2011). In addition, operational flexibility can be seen as a result of mutual adjustments and specific processes for flexibility within vertical alliances (rather than a specific LSP capability). Logistics scholars who held this view found empirical evidence for operational flexibility having a positive impact on alliance improvements (Bhatnagar and Viswanathan, 2000) and on the logistics and market performance of clients (Sinkovics and Roath, 2004; Tate, 1996). However, empirical results indicate that clients are not yet satisfied with LSPs' operational performance in terms of yield cost reductions (Gibson et al., 2002) and perceive LSPs as having insufficient capabilities to organize and manage the entire or large parts of their supply chains (Makukha and Gray, 2004). This distrust of clients in LSPs' operational performances impedes a stronger integration of LSP in client's business on a more strategic level (Gibson et al., 2002; Makukha and Gray, 2004).

Relational fit: Organizational Compatibility

Organizational compatibility is generally acknowledged as a performance impact factor on alliance success (Tate, 1996). However, it does not seem to be perceived as a major success factor in vertical alliances by LSP and/or clients, as both ranked it relatively low in importance (ranked 10th (client) and ninth (LSP) out of 13 factors) (Gibson et al., 2002).

Relational fit: Partner dependence

Partner dependence, which has been defined "as the way in which different firms perceive they need each other to perform their work and reach certain outcomes" (Zacharia et al., 2009: 103),

emerges due to the complementary assets, skills, and knowledge resident in the partnering firms. To prevent failure, both LSPs and clients need “a realistic chance of obtaining significant benefits from the relationship” (Lambert et al., 1999: 169). Zacharia et al. (2009) indicated that a partner’s interdependence positively impacted collaboration, which in turn impacted operational, relational, and business performance outcomes. To counter mutual dependency, Makuhka and Gray (2004) suggested concentrating on core business and pursuing mutual benefits.

4.1.2 Alliance organizational structure in client–LSP alliances

In pursuit of an effective governance system of LSP–client alliances, partnering firms face the challenge of driving “strong operational excellence and corporate competence while simultaneously promoting inter-organizational process collaboration” (Fawcett et al., 2006: 30). To cope with this complexity and to optimize the interactions among LSP and clients in order to accomplish the alliance goal(s), logistics scholars have emphasized (a) the degree of LSP integration, (b) the extent of formalization, and (c) social governance mechanisms.

LSP integration

“Integration is the hallmark of logistics” (Bagchi and Virum, 1998: 207). Therefore, the integration of the LSP into a client’s business operations is widely acknowledged and empirically supported as major impact factor on the effectiveness of the inter-firm coordination (Bagchi and Virum, 1998), and on the responsiveness of LSP’ services to client’s changing demands (Rogers and Daugherty, 1995). From a client’s perspective, closer integration of LSPs allow for “customized or tailored logistics solution providing a unique or superior service for a shipper’s customers” (Makukha and Gray, 2004: 368), which improves both the client’s operational and the overall supply chain performance (Gentry, 1996a, b). However, clients are reluctant to fully integrate LSPs due to their concerns about LSP’s abilities to autonomously design, manage, and develop their whole logistics strategy, to keep control and reduce their dependence (Makukha and Gray, 2004). Thus, they prefer joint management and planning teams that are controlled by the client (Makukha and Gray, 2004). From the LSP’s perspective, stronger integration of LSP increases their importance, as perceived by the clients (Gentry, 1996a, b). LSP’s involvement in the buyer–supplier negotiation process is required to optimize the supply linkages, while it increases the

number of concerns to be solved in the negotiation phase (Carter and Ferrin, 1995). Hofenk et al.'s (2011) results indicate a negative relationship between a carrier's thoroughness during contract negotiation and the alliance's effectiveness for the LSP, with no effect on customers. However, there are integration barriers to the requirement of data availability and sharing between partners, negotiation of transfer payment, legal ramifications, and coordination of operating schedules (see Carter and Ferrin (1995) for details). Scholars have suggested specific organizational modes that can steer the LSP integration effectively, such as employees stationed full-time on the client's premises (Bagchi and Virum, 1998), cross-functional and interorganizational teams (Fawcett et al., 2006; Makukha and Gray, 2004), and a modified reporting structure to enhance communication and coordination among partners (Fawcett et al., 2006). Makukha and Gray (2004) observed that, overall, the majority of client-LSP alliances are still more operational than strategic in nature, as "shippers tend to avoid close integration with LSPs, whereas LSPs claim to be true strategic partners but remain unable to provide the service required" (Makukha and Gray, 2004: 361).

Formalization

Formalization refers to the specification of roles, responsibilities, policy guidelines, and procedures (Makukha and Gray, 2004; Tate, 1996) and their codification within the contract design (Lambert et al., 1999; Lei et al., 2006; Makukha and Gray, 2004). Thus, formalization helps to synchronize a broad scope of activities (Tate, 1996). Formalization defines the desired behavior and outcomes of involved parties based on enforceable agreements and sanctions (Frankel and Whipple, 1996). It also determines the formal alliance power and control relations among LSP and clients, both within the alliance (Gibson et al., 2002) and internally in the organization (Emberson and Storey, 2006). Research results from Hofenk et al. (2011) indicated a positive relationship between contract formality and alliance effectiveness, both for LSPs and customers, in building effective, productive working relationships, carrying out mutual responsibilities and commitments, developing and maintaining relationships, and creating alliance satisfaction.

Despite these advantages, empirical evidence interestingly indicates ambiguity regarding the perceived importance of written contracts as a significant impact factor for both clients and LSPs on the success of an alliance (Frankel and Whipple, 1996; Gibson et al., 2002). In addition, even with written mutual agreements, alternative corporate strategies and priorities

may brush aside alliances, revealing the general dependencies and vulnerability of alliances in practice (Emberson and Storey, 2006).

Social governance mechanisms

Alliance performance depends on the interplay between formal and relational alliance design (Hofenk et al., 2011) to develop mutual understanding, cooperation and commitment among partnering LSPs and clients (Kee-hung, 2009). Social contracts, as “unwritten agreements between firms which are enforced not by formal authority and power but rather by the desire to create and maintain a positive reputation for integrity and fairness” (Frankel and Whipple, 1996: 49), facilitate interest alignment without formal enforcements (Frankel and Whipple, 1996). However, they also require organizational commitment to human resource development for individuals involved in the alliance, particularly at the senior executive level (Frankel and Whipple, 1996). Logistics scholars have recently recognized socialization as an important mechanism to foster personal familiarity, communication, and alliance improvements (Cousins and Menguc, 2006; Van De Vijver et al., 2011). Socialization unfolds over time through such means as cross-functional teams, social events, joint workshops, on-site visits, and regular conferences (Cousins and Menguc, 2006; Van De Vijver et al., 2011). However, there has not yet been any unanimity regarding socialization’s positive performance impact. For example, Cousins and Menguc (2006) found a strong direct relationship between the LSP’s socialization and its operational and communication performances, allowing for improvements in the client’s perceived level of contractual conformance. Van De Vijver et al. (2011), on the other hand, maintained that socialization does not invariably have a positive impact on communication quality because socialization tactics must be tailored to the history and current phase of the relationship.

4.1.3 Relational behavior in client–LSP alliances

The third area identified in our literature review concerns the relational quality that partners display based on (a) the trust among LSPs and clients and (b) their alliance commitment.

Trust

Trust is the extent to which alliance partners believe in each other's credibility, while goodwill between LSPs and clients (Nyaga et al., 2010) is the key driver of alliance success (Gibson et al., 2002; Lambert et al., 1999; Tate, 1996). Trust enhances an open and fair attitude towards partners, at the same time as reducing the perceived risk regarding specific investments and dependency (Makukha and Gray, 2004). Trust emerges over time due to joint communication and relationship efforts (Hofenk et al., 2011; Nyaga et al., 2010) that demonstrate goodwill and facilitate trust among partners (Nyaga et al., 2010). It provides the groundwork for an effective alliance management for both buyers and carriers adding to alliance effectiveness (Hofenk et al., 2011), alliance commitment, and satisfaction (Nyaga et al., 2010).

Commitment

Commitment is widely acknowledged by both academia and practitioners (LSPs and clients) as a major determinant of the alliance's effectiveness (Hofenk et al., 2011), and of alliance and firm performance (Nyaga et al., 2010) allowing for competitive advantages (Fawcett et al., 2006). Commitment is embodied in partners' perceptions of the relationship as something valuable (Hofenk et al., 2011) and can be conceptualized as having four types of managerial support: top management support, broad-based functional support, channel support, and infrastructural/governance support (Fawcett et al., 2006). However, Nyaga et al.'s (2010) empirical results indicated that the effect of commitment is positive only on the client's performance, and does not ensure the LSP's performance; therefore, trust remains the main impact factor on performance for LSPs. Logistics scholars have identified two main determinants of continuous alliance commitment. The first is individual champions who convince the involved parties of the alliance's benefits (Emberson and Storey, 2006), and the second is dedicated alliance investments that create dependencies and reduce the threat of opportunism (Gardner et al., 1994; Lambert et al., 1999; Nyaga et al., 2010). Interestingly, Nyaga, et al.'s (2010) results support the idea that investments positively impact commitment, but not – interestingly – trust, both for clients and LSPs.

Relational quality

Logistics scholars strive to capture the different dimensions of relational behavior within a multi-dimensional second-order construct of so-called relational quality or social exchange behavior (Moore and Cunningham III, 1999; Nyaga and Whipple, 2011). Nyaga and Whipple (2011) empirical findings indicated that the greater the level of so-called relational quality, the better the supply chain's operational performance and satisfaction, both for buyers and the LSP (Nyaga and Whipple, 2011). However, the relational quality of a LSP-client alliance depends more on the effectiveness of the relationship than on the underlying relationship type (transactional versus alliance agreement) (Nyaga and Whipple, 2011), which shifts the managerial focus from how business is transacted to performance issues (Moore and Cunningham III, 1999).

4.1.4 Operational process design in client–LSP alliances

The fourth category of performance impact factors in logistics alliances refers to the management factors, which determine how alliance potentials are achieved (Lambert et al., 1999). Logistics scholars have emphasized three major components in LSP–client alliances: (a) communication and information exchange, (b) joint planning, and (c) performance control. Each of these are examined in turn below.

Communication and information exchange

Logistics scholars have elaborated on the articulation of client's expectations (Bagchi and Virum, 1998) and on the communication structures and processes (Bagchi and Virum, 1998; Gibson et al., 2002; Panayides and Gray, 1999; Tate, 1996). This knowledge and data base forms the basis for the alliance's implementation and benefit realization (Mortensen and Lemoine, 2008). It also enables a seamless, smooth, and timely exchange of information and ideas (Zacharia et al., 2009) and, thus, the coordination and synchronization of joint alliance activities. Empirical findings have indicated that frequent, open, computer-based communication and information sharing facilitates joint problem-solving, cost reduction programs, and improvement-oriented evaluation of carriers (Gentry, 1996b). Empirical evidence has shown (a) that information sharing mediates the impact of trust and commitment on alliance satisfaction and performance (Nyaga et al., 2010), and (b)

that communication directly impacts the degree of cooperation, and indirectly proactive improvements of an alliance (Deepen et al., 2008). Linking communication, flexibility, and alliance outcome, Hartmann's empirical study indicated that communication has a direct positive effect on LSP flexibility and an indirect positive effect on customer loyalty through their relationship to collaboration (Hartmann and De Grahl, 2011).

Joint Planning

Logistics scholars have acknowledged and provided empirical evidence for the positive relation between joint planning in client–LSP alliances and channel profitability (Lei et al., 2006). To foster joint planning, scholars suggest joint planning teams (Lambert et al., 1999; Makukha and Gray, 2004) and the integration of LSPs into the planning process (Gibson et al., 2002). Although Cousins and Menguc (2006) found that joint planning has a positive impact on communication performance and clients' perceptions of the level of an LSP's contractual conformance, they found no relationship between this kind of integration and operational performance. The major impediment of joint planning lies in the lack of aligned information systems among partners (Cousins and Menguc, 2006).

Performance control

Logistics scholars have pointed out the importance of effective systems to measure alliance performance over time (Gibson et al., 2002; Kleinsorge, 1991) in order to steer and monitor the execution and outcomes of LSP–client alliances. Therefore, the essential performance variables must be developed and applied in order to initiate the required adaptations and maintain expected alliance performance (Bagchi and Virum, 1998). Examples include cost-based pricing tools for transportation services, which improves information exchange and efficiency for both clients and LSPs (Bø and Hammervoll, 2010).

Adequate performance measurement forms the basis for assessing risks and rewards and allocating them among the partners. These “pie-sharing” mechanisms are another potential performance impact factor for logistics alliances (Lambert et al., 1999; Wright et al., 2010). Risk-sharing improves the client's perception of the LSP and increases the LSP's asset utilization because of guaranteed business and fair compensation agreements (Gentry, 1996b). Although the

logistics literature generally acknowledges the impact of risk- and reward-sharing and control processes on alliance success, Gibson et al.'s (2002) empirical results showed that both shippers and carriers rank these factors lowest in terms of importance.

4.2 Horizontal Logistics Alliances

The literature on horizontal alliance design and management can be systematized along the same major categories regarding the explanation of alliance effectiveness as the literature on vertical alliances (see Appendix 2 for details)¹⁰.

4.2.1 Alliance composition in LSP alliances

Logistics scholars have emphasized the three following major performance impact factors of LSP alliances: (a) organizational complexity based on the alliance size and alliance task complexity, (b) operational fit, and (c) relational fit among partnering LSPs.

Organizational complexity: Alliance size

LSP alliances with a higher number of involved parties (both LSPs and business functions) offer the opportunity for pooling more resources to either broaden LSPs' service offerings or to optimize their resource utilization within the alliance. Thus, the greater the alliance size, the higher the potential for service improvements, for lower prices, and for higher profitability and profit margins within LSP alliances (Schmoltzi and Wallenburg, 2011, 2012). However, increasing alliance size comes with greater alliance complexity due to two reasons. The first emerges simply due to a significant increase in coordination efforts to synchronize logistics products, processes, and systems and to steer partners' behavior and outcomes among a growing number of partnering LSP. Second, the higher number of partnering LSP adds to the likelihood of goal inconsistency, hidden agendas, and opportunistic behavior raising coordination and monitoring efforts (Schmoltzi and

¹⁰ An overview of performance impact factors of horizontal alliances is available from the authors upon request.

Wallenburg, 2011, 2012). The potential of intra-alliance competition, overlaps, and redundancies increase challenges an effective alliance management (Schmoltzi and Wallenburg, 2011, 2012), and drives instability by, for example, impeding smoothness and pace of decision-making (Midoro and Pitto, 2000). Empirical findings indicate that the alliance size and the accompanied increased organizational complexity impacts the functioning of structural coordination mechanisms. For example, it hampers the positive impact of social governance mechanisms, at the same time as increasing the importance of formal governance mechanisms for alliance effectiveness, success, and satisfaction (Schmoltzi and Wallenburg, 2012). Similarly, Midoro and Pitto (2000) found that bilateral alliances are the most efficient and stable agreement in the shipping industry. However, data on the German logistics industry shows that the majority of horizontal LSP alliances are multilateral agreements with up to 100 LSPs, which indicates the strong organizational complexity of LSP alliances (Schmoltzi and Wallenburg, 2011) and the requirement for effective LSP alliance management.

Organizational complexity: Task complexity

Task complexity in LSP alliances emerges due to the scope of activities (Evangelista and Morvillo, 1999; Hernández et al., 2011; Midoro and Pitto, 2000) and the environmental uncertainty in which these tasks are performed (Midoro and Pitto, 2000). The scope of alliance activities – which vary in their nature (Evangelista and Morvillo, 1999), geographical reach, transportation modes, and areas of value creation (Schmoltzi and Wallenburg, 2011) – determines the alliance potential of value creation (Midoro and Pitto, 2000), the degree of partner integration (Evangelista and Morvillo, 1999), and the operational performance of LSP alliances (Evangelista and Morvillo, 1999; Schmoltzi and Wallenburg, 2011). The environmental uncertainty surrounding the alliance activities (that is, specific antitrust laws) adds to the task's complexity, thereby causing further market instability (Midoro and Pitto, 2000).

Operational fit

Operational fit is achieved if the partners' similar or complementary resources and competencies can be synergistically combined. Operational fit implies at least some familiarity with the alliance tasks and facilitates interorganizational coordination among partnering LSP. Therefore, it has a

major impact on alliance performance (Cruijssen et al., 2007b; Schmolzi and Wallenburg, 2011, 2012). Empirical evidence suggests that the most effective alliances are formed by LSPs with complementary contributions—(i.e. highly complementary geographical networks and customer portfolios) but similar business activities and competencies. This operational fit reduces the degree of managerial complexity and rivalry between partnering LSPs (Schmolzi and Wallenburg, 2011). However, the lower the similarity of LSP's geographic and service profile, the less familiar the partner will be with the alliance tasks. Also, lower geographic and service similarity increases the likelihood of task-related information asymmetry and the risk of exchange hazards, hampering the harmonization of joint market offerings, and thus resulting in alliance failure (Schmolzi and Wallenburg, 2011). On the other hand, empirical findings indicate that high similarity between LSP's contributions to the alliance still leads to significant managerial complexity. For example, significant overlaps in geographical and competences profiles causes intra-alliance competition, which compromises both interfirm coordination and decision-making processes (Schmolzi and Wallenburg, 2012).

Relational fit

Relational fit refers to how the partners fit with each other, as reflected in the degree of corporate culture similarity and rivalry between the partners (Schmolzi and Wallenburg, 2012). Empirical findings indicate that the most effective LSP alliances are formed by LSPs with similar corporate structures (Schmolzi and Wallenburg, 2011). However, other empirical evidence shows that competitive tensions emerge due to overlaps in geography and competences, which hinder alliance value creation (Schmolzi and Wallenburg, 2012). Given the importance of strategic know-how for LSPs' competitive advantages and the lack of safeguards (for example, regarding intellectual property rights) in this industry, there is a high risk of inadvertent exchange of strategic knowledge and threat of rivalry (Schmolzi and Wallenburg, 2012). To face the threat of intra-alliance competition, Midoro and Pitto (2000) suggested limiting the number of partners, differentiating their roles and contributions, and coordinating sales and marketing activities. They noted that the adequacy of a partner's resources, competencies, and familiarity were not as important to alliance success as the firm's ability to leverage these competencies efficiently.

4.2.2 Alliance structure in LSP alliances

Given the low interdependence and the rivalry among partnering LSPs in horizontal alliances, the effectiveness of an alliance structure underlies specific and significant challenges. To foster effective alliance execution and reduce the threat of opportunism, logistics scholars have emphasized three social governance mechanisms: equity share, formalization, and mutual influence. These are discussed in turn below.

Equity share

Equity is frequently seen as an effective instrument to align partner interests in alliances (Albers, 2005). Echoing this general finding, studies concentrating on LSP alliances suggest that the importance of equity involvement grows with the strategic importance of the alliance for its members (Schmoltzi and Wallenburg, 2011) and with the scope of alliance activities performed (Evangelista and Morvillo, 1999).

Formalization

Formalization, in the form of mutually binding agreements or written contracts regarding areas such as tasks, activities, and authority structures, builds an agreed-upon basis among the partnering LSPs (Schmoltzi and Wallenburg, 2012). This basis facilitates the alignment of the partners' various interests, steers the day-to-day interactions, and provides transparency about the relationship behavior, processes, and outcomes, all of which enhance the alliance's commitment and effectiveness (Schmoltzi and Wallenburg, 2012). While formalization increases in importance with increased alliance complexity (high number of partners, high degree of rivalry), it causes conflicts among LSPs, due to two reasons. The first is its limitations regarding foreseeing and capturing all possible contingencies ex ante. The second is inflexibility, in terms of coping with these deviations from expectations, which raises conflicts among involved decision makers about sticking to and deflecting predefined rules (Wallenburg and Raue, 2011). Thus, the more formalized an LSP alliance is, the higher the extent of conflicts hampering goal achievement, improvements of productivity, and competitive position and overall alliance satisfaction (Wallenburg and Raue, 2011).

Social governance mechanisms

Another viable way to improve alliance performance is to facilitate the creation of mutual influence. Mutual influence, in the form of self-regulative imperatives combined with moral perspectives (Schmoltzi and Wallenburg, 2012), creates an atmosphere of forbearance, respect, and balanced reciprocity among the partnering LSPs (Wallenburg and Raue, 2011). The generally positive impact of mutual influence on alliance commitment, and effectiveness, depends on the alliance complexity. This impact grows as the heterogeneity of a partner's geographical or business activities increases, but decreases with the growing number of LSPs and business functions involved (Schmoltzi and Wallenburg, 2012). Interestingly, empirical findings indicated that the functioning of both formalization and mutual influence depends of the underlying type and degree of alliance complexity (organizational and strategic) reconciling the ambiguity of the governance–performance link (Schmoltzi and Wallenburg, 2012).

4.2.3 Relational behavior in LSP alliances

The third category implies performance impact factors on the relational behavior level of horizontal LSP alliances, including the commitment (Schmoltzi and Wallenburg, 2012) and conflict among partnering LSPs (Wallenburg and Raue, 2011).

Commitment

Commitment – as reflected in the partners' attitudes towards long-term investments, resource dedication, and alliance-specific sacrifices – emerges due to the partners' expectations of positive alliance benefits in the future and their identification with the collective goals and values (Schmoltzi and Wallenburg, 2012). Empirical evidence indicates that commitment increases an alliance's effectiveness and that even its importance rises in the context of highly complex alliances (organizational and strategic) (Schmoltzi and Wallenburg, 2012).

Conflicts

Conflicts among partnering LSP impact the alliance's performance and innovativeness (Wallenburg and Raue, 2011). Wallenburg and Raue's (2011) differentiated between the extent of

conflict and the conflict functionality, finding that the extent of conflict has a significant negative impact on the LSP alliance performance (in fact, there was even a slightly positive impact on alliance-based innovation), which can only partially be balanced by the positive effect of conflict functionality. The reasoning behind this is that horizontal LSP alliances are “predominantly based on smooth operations that do not require creative tensions and constant innovation” (Wallenburg and Raue, 2011: 393). Thus, unresolved conflicts among LSPs lead to increased coordination costs in terms of resources and managerial efforts and disunity of efforts, which hinders information exchange and alliance success (Wallenburg and Raue, 2011). To reduce the extent of alliance conflicts, empirical findings indicate that LSPs should invest in their relational capital based on close personal interactions, mutual respect and trust, personal friendship, and high reciprocity, as these factors positively influence the functionality of conflicts, enhancing both alliance performance and alliance-based innovation (Wallenburg and Raue, 2011).

4.2.4 Operational process design in LSP alliances

The fourth category of performance impact factors refers to management components on the operational level of LSP alliances, including joint route planning, and profit allocation impacting alliance success.

Joint route planning

Joint route planning among partnering LSPs is acknowledged as a key impact factor on the alliance operational performance as it allows effective synchronization of joint activities and reduction of inefficiencies, redundancies, and overlaps. Empirical evidence shows that joint planning – understood as the pooling of all partner’s distribution processes to serve customer requests – allows for cost savings of up to 30 percent (Crujssen et al., 2007a; Krajewska et al., 2008). Specifically, this pooling can reduce the distance traveled by up to 30 percent, load factors by over 95 percent, and reduce fleets by up to 50 percent (Crujssen et al., 2007a). Crujssen et al.’s (2007a) findings suggest that joint route planning is most beneficial in horizontal alliances with a high number of LSPs with a “uniform and not too large size” (Crujssen et al., 2007a: 302). However, these benefits are based on trade-offs between waiting for more affordable collaborative capacity and

incurring higher holding costs (Hernández et al., 2011). Therefore, they require reliable and sufficient exchange of data among the partnering LSPs, which may be constrained by the misalignment of indispensable information and communication technology (Crujssen et al., 2007b). Focusing on horizontal alliance in the aviation industry, scholars have differentiated between three forms of planning and scheduling: (a) complementary (pooling a partner's network while only one partner operates on these routes); (b) parallel (pooling flights of the same route with all partners operating on these routes) (Chen and Chen, 2003; Park, 1997); and (c) mixed route (combination of parallel and complementary) (Yan and Chen, 2007). The empirical results of the abovementioned studies show that the impact of joint planning and scheduling varies across the planning type (complementary, parallel, or mixed). The mixed alliance type outperformed coordinated flight scheduling in terms of operating cost reductions and profit increases (Yan and Chen, 2007), while parallel alliances allow for higher load factor increases than complementary alliances do (Chen and Chen, 2003). However, a complementary alliance is likely to increase economic welfare, while a parallel alliance is like to decrease it (Park, 1997). Bilotkach (2007) analyzed the impact of airline partners' pricing and scheduling choices under different degrees of coordination (only joint scheduling versus joint scheduling and pricing). The mathematical calculations in that study show that cooperation in prices and scheduling leads to lower prices, higher product quality, and higher consumer welfare compared to cooperation only in scheduling.

Benefit allocation

Given the differences in contributions and bargaining powers among partnering LSP, a major concern in horizontal alliances is the distribution of realized cost savings and profit gains in the alliance (Crujssen et al., 2007a). Krajewska et al. (2008) found that a fair and stable distribution mechanism of total alliance gains is based on the benefits allocating weighted sum of each partner's alliance contribution. In a similar vein, in the context of airline alliances, Wright et al. (2010) found that static revenue-sharing mechanisms as fixed transfer prices are outperformed by dynamic transfer prices ("bid prices") based on the actual value of seat inventory. Despite their advantages, dynamic mechanisms are constrained by significant impediments; specifically, technical incompatibilities among revenue management systems within an alliance, competitive considerations, and antitrust laws (Wright et al., 2010).

5 Synthesis and Research Agenda

Our review findings inform both practice and research on effective logistics alliances design and management. The reviewed studies have primarily focused on understanding four individual components of logistics alliances: (1) their composition (absolute and relative partner characteristics), (2) the organizational structure that links the alliance partners, (3) the partners' relational behavior towards each other, and (4) the design of the underlying operational value-adding activities and processes that ultimately drive the alliance benefits. Our review has identified relevant performance impact factors of logistics alliances. However, guidance on their effective deployment for an increased logistics alliance performance is lacking. To address this gap, we now derive and discuss our review implications. We do so by leveraging the hitherto neglected cross-fertilization potential of research results from horizontal for vertical logistics alliances, and vice versa. We also formulate concrete managerial implications from our review results that should aid logistics alliance practitioners (see Figure 3 and 4). In addition, our research agenda highlights a number of research opportunities that we believe have the strongest impact on logistics alliance performance and may guide further research.

5.1 Effective Design and Management of Horizontal Alliances

Horizontal LSP alliances are mostly seen as an instrument for LSP to realize synergies by exploiting similar resources. Our findings show five main levers to capitalize the alliance value (see Figure 3). However, further research could still improve our understanding of LSP alliance performance by further analyzing the significant organizational complexity and competitive tensions horizontal alliances are facing in realizing alliance success.

Our review highlights that logistics research still lacks evidence on how to cope with the threat of rivalry and significant complexity within horizontal logistics alliances. Formalization, fair benefit distribution systems, and relational capital have been identified as important factors to cope with these impediments. Research findings from vertical logistics alliances research provide evidence that interdependence, partner integration, and socialization are important for alliance success. Studies on performance impacts of horizontal logistics alliances, however, have not taken these factors into account, even though all three address relevant mechanisms in these settings as well.

This is of significant interest to explore how to take the identified performance impact factors into account in order to create and sustain alliance success.

Figure 3: Managerial implications for horizontal logistics alliances

Main performance levers of horizontal logistics alliances

- Select LSPs as partners that have similar corporate structures, business activities, and competencies, but complementary geographical networks and markets. This will increase the likelihood of an effective alliance value creation and reduce the threat of rivalry (Crujssen et al., 2007b; Midoro and Pitto, 2000; Schmoltzi and Wallenburg, 2011, 2012).
 - Adapt the formalization degree (specialization/codification of tasks, activities, and authority structures) to the alliance context (alliance size). This facilitates alliance commitment and effectiveness and reduces the threat of conflicts for goal achievement. (Schmoltzi and Wallenburg, 2012; Wallenburg and Raue, 2011).
 - Secure alliance commitment (for example, through mutual influence mechanisms) to enhance alliance effectiveness, especially in the context of high alliance complexity. However, the positive impact of mutual influence on alliance commitment and effectiveness increases as the heterogeneity of an LSP's geographical or business activities increases, but diminishes as alliance size. (Schmoltzi and Wallenburg, 2012)
 - Implement joint planning (in the case of large alliances), pricing, and revenue-sharing systems among partnering LSP to coordinate interactions. This enhances the potential for cost savings and profits. (Bilotkach, 2007; Chen and Chen, 2003; Crujssen et al., 2007a; Crujssen et al., 2007b; Park, 1997; Yan and Chen, 2007)
 - Develop an alliance capability that enhances the likelihood of leveraging partner's resources and competences pooled within the LSP alliance and of orchestrating effectively the alliance activities (Midoro and Pitto, 2000).
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5.1.1 Multifaceted reality of horizontal logistics alliances

To gain a more comprehensive understanding on the design, management and performance of horizontal LSP alliances, research would benefit from a broader perspective on these arrangements. Only recently scholars (3 out of 14) have begun to investigate the interrelationships among alliance composition, alliance structure, relational behavior, and operational process design (Midoro and Pitto, 2000; Schmoltzi and Wallenburg, 2011, 2012; Wallenburg and Raue, 2011) (see 'Moderating' column in figure 2). As the logistics literature suggests, additional research efforts on these interdependencies would be worthwhile. For example, the alliance size and the level of partner rivalry (alliance composition) affect the functioning of formalization, mutual influence (alliance structure), and commitment (relational behavior) (Schmoltzi and Wallenburg, 2012). A more holistic and multilevel understanding of logistics alliances would therefore advance

a more comprehensive understanding of alliance success. We encourage scholars to conduct survey studies to explore the linkages and interdependencies among performance impact factors. This knowledge is of major importance to understand, explain and consider existing moderating effects for an effective design and management of horizontal LSP alliances.

5.1.2 Contingency factors

A significant opportunity for further research lies in the ambiguity of identified impact factors' effects. Contingency theory suggests that it is very unlikely that a specific factor, mechanism, or arrangement, will be universally more effective than another – its effectiveness is rather influenced by contextual parameters (Donaldson, 2001). A further elucidation of such contexts could help to resolve present ambiguities and offer further insights on relevant conditions (“contingency factors”) of effective logistics alliance activity. Candidate contingency factors include alliance size (bilateral versus multilateral), alliance strategy (exploitative versus explorative) (Pettigrew, 1990), and industry context as they are applied in the strategic management literature (Albers et al., 2013). We would expect that the underlying alliance type has a major influence on the effectiveness of specific alliance designs and management forms. Thus, multiple case studies and survey studies need to incorporate contingency factors in order to identify patterns of alliance design and management for different alliance types. For example, an alliance for the exploitation of existing resources will most probably be designed and managed differently than an explorative alliance aiming to gain new knowledge among LSPs.

5.2 Effective design and management of vertical alliances

Based on our review, we observed that the performance of vertical alliances depends primarily on the ability of both clients and LSPs to become familiar and interlined with each other. Our findings reveal the major performance impact factors facilitating vertical alliance success (see Figure 4).

Figure 4: Managerial implications for vertical logistics alliances

Main performance levers of vertical logistics alliances

- Create operational fit between LSP and client in relation to the specific alliance tasks based on the specific knowledge the partners have regarding the other's business, the firm-specific alliance capability, and the LSP's operational flexibility. The operational fit facilitates the selection of valuable partners, which enhances the likelihood of higher collaboration degree, operational flexibility, and alliance adaptability, all of which contribute to the alliance's success.
 - Create interdependence to enhance the degree of LSP–client collaboration and alliance performance, while corporate compatibilities are not considered a major performance factor.
 - Strengthen the LSP integration in the client's business to facilitate the customization of services provided by the LSP and to enhance LSP's reputation. Consider that clients are reluctant to pursue stronger LSP integration due to their lack of belief in LSP capabilities.
 - Adapt the formalization degree to increase alliance effectiveness and satisfaction, even if it is not perceived by clients or LSPs as a major success factor.
 - Consider the impact of socialization on alliance performance which depends on the alliance's history and current phase (its impact is discussed ambiguously in literature)
 - Increase the relationship quality (that is, the trust and commitment of the partnering LSP and clients) to increase alliance performance and satisfaction. Consider that this quality depends more on the alliance performance than on the underlying alliance type.
 - Strengthen the communication and information exchange to enhance the degree of collaboration, proactive improvements, LSP flexibility, and the alliance's effectiveness and client's loyalty. In addition, this exchange mediates the impact of trust and commitment on alliance outcomes.
 - Conduct joint planning to improve the channel profitability, communication, and the client's perceived level of LSP's contractual conformance. The impact of joint planning on operational performances is not yet confirmed.
 - Control performance to monitor desired behavior and outcomes and to facilitate the adaptability of the alliance over time.
 - Share risks and rewards to increase LSPs' asset utilization and the client's perception of LSP, even it is not perceived as a major success factor.
-

The majority of studies focused on bilateral client-LSP arrangements (27 out of 34). However, logistics scholars have indicated a trend towards so-called supply chain collaborations among multiple supply chain actors, including manufacturers, suppliers, retailers, and LSPs. We argue that these alliances among multiple supply chain actors come with an increase in complexity. This complexity emerges due to (a) the higher number of involved partners with differing interests, (b) a broader scope of activities as more value creation processes are integrated in the alliances, and (c) a shift in the power relation between LSPs and clients as the LSP gains a more importance as central coordinator in the supply chain. Thus, further research is needed to redress this complexity

increase in vertical alliances challenging the above-discussed governance mechanisms which base on a clear power structure within vertical alliances (Daugherty, 2011). While the horizontal alliances literature provides some initial evidence (e.g. captured in the impact factors of organizational complexity, joint planning and revenue-sharing (research impulses can come from the general management literature (Albers et al., 2015; Das and Teng, 2002), more conceptual work and case studies are needed to explore this emerging type of vertical alliances.

5.3 Research opportunities for both vertical and horizontal alliances

Although logistics scholars have devoted considerable attention to both vertical and horizontal alliances as instruments to gain competitive advantage, many of these alliances do not meet the partners' expectations as they unfold over time, and some may even be considered failures (Kampstra et al., 2006; Stank et al., 2011; Wilding and Juriado, 2004). This well-established diagnosis encourages redoubled efforts in two directions: First, concentrating on failed alliances, future studies could investigate concrete pitfalls of logistics alliances and their mechanisms of failure. Second, future studies could analyze alliances' evolution over time, i.e. identify underlying drivers of change and its mechanisms in order to improve logistics alliance performance.

5.3.1 Incorporation of pitfalls and negative effects

Current studies – not only those in the logistics literature – tend to emphasize the positive effects of alliances; therefore, a major research opportunity is the investigation of the negative and lock-in effects of logistics alliances (Daugherty, 2011). As a better understanding of the “dark side” of alliances is required to adequately inform logistics management practice, additional research should explore such potential negative outcomes, pitfalls, and lock-in effects (Crujssen et al., 2007b; Lambert et al., 1999; Stank et al., 2011; Zineldin and Bredenlow, 2003). Empirical studies of logistics alliances have indicated such negative effects as increased complexity, difficulties, and costs of changing relationships because of greater integration and connectedness of firms (Hertz, 2001), or post-contractual lock-ins to supplier dominance because of transaction specific investments (Lonsdale, 2001). Future research is warranted to provide (empirical) evidence that

will elicit ideas for avoiding or managing these negative effects, such as the pioneering work of Narasimhan et al. (2009), which identified specific pricing policies and investment intensity as a means to handle lock-in situations.

5.3.2 Consideration of alliance dynamics

Based on our review we observed that most of the extant inquiries into logistics alliance design and management have been static and performed at a given point in time (Li et al., 2011). This is in line with Daugherty's (2011) observation: "Typically, a great deal of time/effort/resources are expended on the formation of a cooperative relationship. But, how often do companies check on the ongoing viability and vitality of the relationship? Business certainly is not static; you cannot assume relationships will be either" (Daugherty, 2011: 24). However, the logistics industry is dynamic, with some alliances operating for more than a decade and others collapsing even before they begin operations (Albers and Klaas-Wissing, 2012). However, only a few studies of vertical alliances have pointed to the need for alliance transformation over time by referring to a firm's specific strategic (Fawcett et al., 2008) or operational capabilities (Bhatnagar and Viswanathan, 2000; Tate, 1996) of a firm. Additional analysis of such "survivors," which explores their potentially adaptive structures and processes, could generate valuable insights into key management and design practices for maintaining a continuous alliance change/transformation (Stank et al., 2011). A related suggestion for alliance adaptability rests upon specific logistics alliance management capability (Hofer et al., 2009; Li et al., 2011; Williams, 2002; Zacharia et al., 2009) that ensures the continuous reflection, development, and modification of approved alliance management routines in response to changes in contexts or conditions and to shape situations allowing for sustainable competitive advantages for the partnering firm (Brekalo et al., 2013). Conceptualized along multiple levels, this capability builds on operational logistics activities, comprising alliance design, relational governance, coordination and monitoring, and adaptation routines (Brekalo et al., 2013), providing a potential starting point for further research. To uncover the complex nature of logistics alliances, research into alliance evolution would require explorative research designs and qualitative research methods that provide an open approach toward identifying the logistics-specific drivers of alliance evolution.

6 Conclusion

Alliances are a well-studied phenomenon in the logistics field. By analyzing both research streams of vertical and horizontal logistics alliances, we identified four main categories in the domain of effective logistics alliance design and management: (1) alliance composition, (2) alliance structure, (3) relational behavior, and (4) operational process design. Within these categories we present the current state of research by (a) identifying the major impact factors and their effects on alliance outcomes and (b) by consolidating their understanding and conceptualizations discussed in the logistics literature. In line with Daugherty (2011) stating that “previous research provides a solid foundation for future research, and there still seem to be ample research opportunities“(Daugherty, 2011: 27), we provide a comprehensive consolidation of these findings that contributes to both academia and practice by adding to our understanding of logistics alliance performance. First, practitioners get a systematic overview of relevant performance impact factors providing insights into potential managerial levers to improve alliance performance. Second, our consolidation acts as a starting point for scholars who may be encouraged by our developed research avenues *inter alia* benefitting from cross-fertilization between vertical and horizontal alliance literature or may be supported by a comprehensive picture on the state of the research. Overall, these research opportunities will enable scholars to gain additional, meaningful results on logistics alliances and their successful functioning.

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Appendix 1: Overview of performance impact factors of vertical logistics alliances

ALLIANCE COMPOSITION	Understanding and Conceptualization
<i>Operational fit</i>	
Partner knowledge	<ul style="list-style-type: none"> - Understanding partner's business needs: who are you, what are you going to do, what your plans are for the future (Tate, 1996) <p><i>Client perspective</i></p> <ul style="list-style-type: none"> - Knowledge on LSP's cost orientation: ability to take cost out of the operation; the ability to control costs; an emphasis on supply chain cost reduction (Gibson et al., 2002) - Insight to understand partner's skills/capabilities; business model; business risks; products; processes; business objectives; communication style; industry jargon; organizational culture; value they provide to their customer) (Zacharia et al., 2009) <p><i>LSP perspective</i></p> <ul style="list-style-type: none"> - Supply chain partner insight (LSP's understanding of client's skills, capabilities, business model, business risks, products, processes, business objectives, communication style, organizational culture, customer value) (Hartmann and De Grahl, 2011) - Client service expertise (3PL's effort to understand buyer's situation; adequacy of 3PL's knowledge/experience; strength of 3PL's communication skills) (Chen et al., 2010) <p><i>Organizational modes</i></p> <ul style="list-style-type: none"> - Frequent and systematic communication at all levels of organizational structure to build client knowledge (Panayides and Gray, 1999)
Alliance capability	<ul style="list-style-type: none"> - Supply chain collaboration capability: unfreeze, transformation and continuous improving capability (Fawcett et al., 2008) <p><i>Client perspective</i></p> <ul style="list-style-type: none"> - Client's Top Management Championship: level of participation in formulating a strategy; establishing goals and standards to monitor; clear vision (Chen et al., 2010) <p><i>LSP perspective</i></p> <ul style="list-style-type: none"> - Culture of trust and flexibility (Panayides and Gray, 1999) - Openness to new ways of thinking, to discover new knowledge, to improve joint performance (Zacharia et al., 2009) <p><i>Mutual capability</i></p> <ul style="list-style-type: none"> - Joint pulling; joint decision making; mutual respect (Deepen et al., 2008) - Joint exploitation of unique opportunities; looking for synergistic ways to do business; joint development of ideas (Hartmann and De Grahl, 2011) - Joint exploitation of opportunities; looking for synergies; joint idea development; sharing proprietary information (Sinkovics and Roath, 2004) - Redefinition of client's goals (Bagchi and Virum, 1998) - Mutual strategic management knowledge (Makukha and Gray, 2004) <p><i>Organizational modes</i></p> <ul style="list-style-type: none"> - Frequent face-to-face meetings, high level of joint decision-making, open sharing of information, free flow of useful and novel ideas, openness to new ways of thinking and discovering new knowledge. (Zacharia et al., 2009)

LSP operational flexibility	<p><i>Meeting changing demands</i></p> <ul style="list-style-type: none"> - Fit towards client's operational objectives (Bagchi and Virum, 1998) - Management of customers' supply chain; listening and responding to client's needs (Makukha and Gray, 2004) - Handling of unforeseen problems/changes; making adjustments; responding to requests (Hartmann and De Grahl, 2011) <p><i>Proactively improvement</i></p> <ul style="list-style-type: none"> - Proactive management of special needs and exceptions; the ability to handle changing carrier requirements (Gibson et al., 2002) - Proactive improvement: LSP continuously suggests improvements; in case of changes, LSPs modifies the system respectively; LSPs shows initiative to suggest improvements; LSPs shows a high level of innovation (Deepen et al., 2008) - Supply chain re-engineering (applying SC strategies: adapt modes of transport, consolidation/deconsolidation point, inventory centralization, warehouse management, reassignment of roles and responsibilities among supply chain entities) (Bhatnagar, 2000) - Co-operative and continuous improvements as carriers ability to make cost or service improvements when problems surfaced requiring partner's business knowledge (carrier involvement in joint problem-solving efforts with buyers and suppliers, in cost reduction programs; carriers being evaluated for continuous improvement) (Gentry, 1996a) <p><i>Mutual efforts</i></p> <ul style="list-style-type: none"> - Mutual adjustments making; processes for flexibility (Sinkovics and Roath, 2004) - Work together to respond to changing marketplaces and customer's needs (Tate, 1996) - Supply chain re-engineering (applying SC strategies: adapt modes of transport, consolidation/deconsolidation point, inventory centralization, warehouse management, reassignment of roles and responsibilities among supply chain entities) (Bhatnagar, 2000)
<hr/> <i>Relational fit</i> <hr/>	
Organizational Compatibility	<ul style="list-style-type: none"> - Shared culture and values, strategic fit, firm philosophy, vision, commitment to alliances (Tate, 1996) - Compatible strategies, goals and objectives; similar management styles; compatible corporate cultures (Gibson et al., 2002)
Partner dependence	<ul style="list-style-type: none"> - Partners are dependent for an effective solution; needed knowledge/skills the other possessed; needed each other to reach their goal) (Zacharia et al., 2009) - Win-win situation (Lambert et al., 1999)

ALLIANCE STRUCTURE	Understanding and Conceptualization
LSP integration	<p><i>Strength of relationship</i></p> <ul style="list-style-type: none"> - Type of agreement (“arm’s length” versus “strategic alliances”) (Gentry, 1996b; Makukha and Gray, 2004; Rogers and Daugherty, 1995) - Number of involved functions, time horizon, strength of ties and sharing (Lambert et al., 1999) - Long-term commitments; open communications/information sharing; cooperative continuous improvement; sharing of risks/rewards (Gentry, 1996a; b) <p><i>Involvement in process</i></p> <ul style="list-style-type: none"> - Involvement in buyer-supplier negotiation process (Carter and Ferrin, 1995) - Negotiation thoroughness: insisted on integrated logistics management; carefully handled staffing issues; considered quality issues, not just delivery performance (Hofenk et al., 2011) - Employee of logistics providers stationed on-site and full time by the client (Bagchi and Virum, 1998) - Cross-functional/inter-organizational teams (Fawcett et al., 2006; Makukha and Gray, 2004) - Logistics information system as framework (Bagchi and Virum, 1998)
Formalization	<p><i>Specification</i></p> <ul style="list-style-type: none"> - Client's clear definition of logistics management goals (Bagchi and Virum, 1998) - Roles, responsibilities, policy guidelines, and procedures within (Makukha and Gray, 2004; Tate, 1996) - Rules of engagement: written, detailed contract; conflict resolution process; formal process to analyze performance; process to renew, amend, or end contract (Gibson et al., 2002) - Operational business rules and procedures (regarding damage, returns, complaints, record-keeping requirements, etc.) (Tate, 1996) <p><i>Codification</i></p> <ul style="list-style-type: none"> - Contract design (Lambert et al., 1999): Formal/informal (Frankel and Whipple, 1996), explicit/implicit (Kee-hung, 2009) - Contract formality: terms are written down; expectations are communicated; contractual terms are developed for coordination of activities; terms are verbalized and discussed (Hofenk et al., 2011) - Internal authority: Threat of alternative corporate strategies and priorities brushing aside alliances (Emberson and Storey, 2006) - Control/power: equal power in the relationship; mutual authority to end the partnership; authority to require process changes by partner (Gibson et al., 2002)
Social governance mechanisms	<p><i>Social contracts</i></p> <ul style="list-style-type: none"> - Implicit contracts (Kee-hung, 2009) - Unwritten agreements enforced by the desire to create and maintain a positive reputation for integrity and fairness and build trust (Frankel and Whipple, 1996: 49) <p><i>Socialization</i></p> <ul style="list-style-type: none"> - Social events; joint workshops; on-site visits; regular suppliers conferences; team building exercise (Cousins and Menguc, 2006) - Workshops, strategic sessions, informal outings, special events (Van De Vijver et al., 2011)

RELATIONAL BEHAVIOR	Understanding and Conceptualization
Trust	<ul style="list-style-type: none"> - Culture of cooperation and trust; adversial views are placed by cooperation and loyalty; expectation of a long-term relationship (Gibson et al., 2002) - High integrity; counted on to do what is wright; sincere in their promise; treats our company fairly and justly; we trust completely (Hofenk et al., 2011) - Concerned about partner's success; consideration of partner's interests; consideration of partner's welfare (Nyaga et al., 2010) - Belief that partner is committed to other's long-term success (Lambert et al., 1999) - Builds over time on mutual understanding, communications, commitment, flexibility and fairness among involved parties (Tate, 1996)
Alliance commitment	<ul style="list-style-type: none"> - Top Management, broad-based functional, channel, and infrastructural/governance support (Fawcett et al., 2006) - Amount of specific investment (Gardner et al., 1994) - Long-term commitment (utilization of long-term carrier contracts; the carrier's participation in the strategic planning process of buyer-supplier partnership; assessment of carriers for their long-term financial stability) (Gentry, 1996a) - Very committed to the relationship; intended to maintain; effort to maintain; do almost everything to keep; cares great about long-term (Hofenk et al., 2011) - Expectation of long duration; committed to supplier/buyer; expectation of growing strength; considerable effort and investments undertaken) (Nyaga et al., 2010) - Dedicated investments: dedicated personnel; proprietary expertise and/or technology; significant investments (Nyaga et al., 2010) - Mutual commitment (all in together to meet our customers' needs, working through hard times) (Tate, 1996)
Relational quality	<ul style="list-style-type: none"> - Guanxi (good relationships between top management; logistics managers; logistics employees) (Chen et al., 2010) - Relationship stability and efficiency (Emberson and Storey, 2006) - Relationship stability (how well partners have worked together) (Kee-hung, 2009) - Social exchange behavior (trust, equity, commitment, conflict and opportunisms) (Moore and Cunningham III, 1999) - Relational quality (trust, relationship-specific investments, commitment, satisfaction) (Nyaga and Whipple, 2011)

OPERATIONAL PROCESS DESIGN	Understanding and Conceptualization
Communication and information exchange	<ul style="list-style-type: none"> - Communication (well working of information exchange; speed of information exchange; reliability of information; suitability of the way of information exchange) (Deepen et al., 2008) - Systematic operational information exchange (Gardner et al., 1994) - Open communication and information sharing requiring multiple levels, access to production forecasts or shipping schedules, computer linkages between carriers (frequent carrier communications with buyers and suppliers; carriers having access to production schedules or - shipping forecast; carriers being linked to buyers and suppliers through computer information systems) (Gentry, 1996a) - exchange of information; speed of exchange; reliability of information; adequacy of exchange) (Hartmann and De Grahl, 2011) - Communications (balanced, two-way, multilevel, joint teams) - Risk/reward sharing (willingness of either party to take a short-term "Hit" for the good of the other) (Lambert et al., 1999) - Information and communications technology: Communication systems (e.g. EDI, Bar codes, track and trace) (Mortensen and Lemoine, 2008) - Information sharing (inform in advance; information is provided; keep informed) (Nyaga et al., 2010) - Communication (horizontal/vertical communication, frequency, systems (media/personal)) (Tate, 1996) - Communication process (meeting frequently; amount of information shared; flow of information (usefulness, novelty) (Zacharia et al., 2009)
Joint planning	<ul style="list-style-type: none"> - Tool for cost-based pricing (fixed (depreciation and interest related to capital investment in vehicles, insurance, administration costs, taxes, others) and variable costs (repairs and maintenance, fuel costs, tire costs, wages, others) (Bø and Hammervoll, 2010) - Supply chain integration (scheduling; order management; forecasting; operation planning) (Cousins and Menguc, 2006) - Planning (Gardner et al., 1994) - Open discussion of demand forecast; joint development of service schedules and goals; participating in each other's strategic planning (Gibson et al., 2002) - Design principles of physical distribution channel (Principle of transportation costs; separation principle; unit load principle; Weber's location principles; selective stocking principle; postponement; uncertainty absorption principle; Principle of data compatibility; Co-ordination principle) (Gill and Allerheilgen, 1996) - Coordination and pricing policies (Lei et al., 2006) - Joint planning (joint teams, regular meetings among managers) (Lambert et al., 1999) - Joint relationship effort (joint teams; joint planning; joint decisions) (Nyaga et al., 2010) - partners used intensive collaborative planning; joint decision making; joint goal setting (Zacharia et al., 2009)
Performance control and measurement	<ul style="list-style-type: none"> - Joint performance measurements (Bagchi and Virum, 1998) - mutual operating controls (Gardner et al., 1994) - Performance measurement tool (Kleinsorge, 1991) - Joint operating controls (jointly developed control measures, changes of partner operations) (Lambert et al., 1999)
Risk/reward sharing	<ul style="list-style-type: none"> - Sharing of benefits and burdens (Gardner et al., 1994) - Sharing of risks and rewards reflected in specialized or dedicated transport equipment/investments, cancellation clause and fair compensation (carriers providing dedicated equipment or drivers; using carrier contracts cancellation or penalty clauses for service failures; carrier being responsive to unforeseen special requests/scheduling changes) (Gentry, 1996a) - Shared risk and reward: specific rewards for outstanding performance; penalties for unacceptable performance; equal distribution of planned and unexpected costs; willingness to share cost savings (Gibson et al., 2002)

Appendix 2: Overview of performance impact factors of horizontal alliances

ALLIANCE COMPOSITION	Understanding and Conceptualization
<i>Organizational complexity</i>	
Number of involved parties	<ul style="list-style-type: none"> - Number of partners, nature of their role and contribution; level of mutual trust (Midoro and Pitto, 2000) - Number of partners and functional scope: areas of value creation (production, marketing and sales, procurement, human resources, research and product development, IT and administration and finance and accounting)(Schmoltzi and Wallenburg, 2011; Schmoltzi and Wallenburg, 2012)
Task complexity	<p>Scope of activities</p> <ul style="list-style-type: none"> - Service scope: mode of transport; value-added services(Schmoltzi and Wallenburg, 2011) - Geographical scope: national versus international scope (Schmoltzi and Wallenburg, 2011) - Scope of alliance activities; environmental uncertainty surrounding these activities; adequacy of skills and competencies within the alliance (Midoro and Pitto, 2000) - Activities (waterborne transport; port terminal; inland transport; logistics services) and nature (joint scheduling; space agreements; joint services; cost and investment sharing; joint marketing activities) (Evangelista and Morvillo, 1999)
<i>Operational fit</i>	
Resource/competence compatibility	<ul style="list-style-type: none"> - Physical assets; less-tangible assets; organizational capabilities (Crujssen et al., 2007b) - Business activities and core competencies, geographical network and customer portfolio (Schmoltzi and Wallenburg, 2011)
<i>Relational fit</i>	
Organizational compatibility	<ul style="list-style-type: none"> - Corporate structure (similarity of companies' financial strength, managerial strength, management style, corporate culture) (Schmoltzi and Wallenburg, 2011)
Rivalry	<ul style="list-style-type: none"> - Competitive tension due to overlaps in geography and competences (Schmoltzi and Wallenburg, 2012)

ALLIANCE STRUCTURE	Understanding and Conceptualization
Formalization	<p><i>Contract design</i></p> <ul style="list-style-type: none"> - Contractual agreements; Joint venture; minority stakes (Evangelista and Morvillo, 1999) - Verbal agreements, contractual agreements that involve no equity stakes, minority equity agreements, joint venture agreements (Schmoltzi and Wallenburg, 2011) <p><i>Formal governance mechanisms</i></p> <ul style="list-style-type: none"> - Operational formalization (Schmoltzi and Wallenburg, 2012) - Formal control mechanism: written documents, detailed standard operating procedures (Wallenburg and Raue, 2011)
Social governance mechanisms	<ul style="list-style-type: none"> - Mutual influence: equal say and influencing right (Schmoltzi and Wallenburg, 2012)
RELATIONAL BEHAVIOR	Understanding and Conceptualization
Commitment	<ul style="list-style-type: none"> - Cooperation commitment (attitude towards long-term investments, resource dedication, cooperation specific sacrifices (Schmoltzi and Wallenburg, 2012)
Conflict	<ul style="list-style-type: none"> - Conflict: extent, functionality (Wallenburg and Raue, 2011)
Relational quality	<ul style="list-style-type: none"> - Relational capital: social control mechanisms: close personal interaction, mutual respect, trust, personal friendship, high reciprocity (Wallenburg and Raue, 2011)
OPERATIONAL PROCESS DESIGN	Understanding and Conceptualization
Joint route planning	<ul style="list-style-type: none"> - Scheduling and price (Bilotkach, 2007) - Joint route planning (parallel; complementary; mixed) (Chen and Chen, 2003; Park, 1997; Yan and Chen, 2007) - Joint route planning (Cruijssen et al., 2007a) - Joint Planning under dynamic capacities (level of discount rates) (Hernández et al., 2011) - Lack of appropriate information and communication Technology (ICT) as impediments (Cruijssen et al., 2007b)
Benefit allocation	<ul style="list-style-type: none"> - Lack of fair allocation mechanism determining and dividing the gains as impediment (Cruijssen et al., 2007b) - Unequal negotiation positions of partners (Cruijssen et al., 2007b) - Request allocation and profit sharing (game theory) (Krajewska et al., 2008) - Revenue-sharing mechanisms (static, dynamic) (Wright et al., 2010)

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