Coordinating the Seaport-Hinterland Interface: Theoretical and Methodological Insights from Scientific Literature

Patrick Specht[1](✉) and Herbert Kotzab[2,3]

[1] Institute of Shipping Economics and Logistics, Bremen, Germany
specht@isl.org
[2] University of Bremen, Bremen, Germany
kotzab@uni-bremen.de
[3] Universiti Utara Malaysia, Sintok, Malaysia

Abstract. Even though supply chain coordination (SCC) is a generally accepted fundamental concept of supply chain management (SCM), academic research indicates different interpretations and perspectives on it. By means of a systematic literature review, this paper investigates research on SCC between seaports and hinterland transportation systems. The analysis provides an overview on research problems that are discussed and relevant in the considered domain. Furthermore, the study gives insights into theoretical perspectives and methodological approaches used to analyze SCC in the seaport-hinterland interface.

Keywords: Supply chain coordination · Maritime transport and logistics chains · Seaport · Hinterland · Systematic literature review

1 Introduction

While it seems to be a well-accepted fact that coordination is one of the fundamental concepts of supply chain management (SCM) (Chan and Chan 2010), scientific discussions involve contradictory views and interpretations of coordination depending on the respective field as well as on the level of involvement of the supply chain actors (Kotzab et al. 2018). Considering this, the paper transfers the concept of supply chain coordination to the seaport-hinterland interface, which is an integral part of maritime transport and logistics chains[1]. The main objective of this paper is to provide an overview of related research within this particular domain, taking into account that establishing the current body of knowledge (Iivari et al. 2004) is a prerequisite for extending the knowledge in a research domain (Webster and Watson 2002). In this regard, we attempt to answer the following questions by the means of a systematic literature review (Cooper 2010):

[1] The terms "maritime logistics chain" and "maritime transport chains" can be perceived in different ways (Talley 2014). For simplicity, we will use both terms interchangeably.

M. Freitag et al. (Eds.): LDIC 2020, LNLO, pp. 89–100, 2020.
https://doi.org/10.1007/978-3-030-44783-0_9

1. What are the central problems addressed so far?
2. Which theoretical perspectives and methodological approaches have been used in order to analyze supply chain coordination in the seaport-hinterland interface?

The remainder of the paper is as follows: To establish a thorough definition of the problem under investigation, the seaport-hinterland interface as a subject to coordination issues will be outlined in the following Sect. 2. Next, the methodological design of the review is described in Sect. 3. Guided by our research questions, the results are presented and critically reviewed in the last section.

2 Need for Coordination at the Seaport-Hinterland Interface

Malone and Crowston (1994) propose a universal definition of coordination by defining it as the management of "dependencies between activities". Due to the fact, that the idea of managing interdependence is consistent with the concepts of "differentiation" and "integration" from organizations theory (Lawrence and Lorsch 1967), it has gained relevance for SCM-research as one of the "most commonly accepted definitions" (Kaur et al. 2008). From an organizational point of view, we characterize supply chains as systems that are differentiated into subsystems based on the division of labor. By means of integration, the inherited tasks are performed in a way that each subsystem contributes to achieve the overall systems goals (Lawrence and Lorsch 1967, Winkler and Pichler 2011). In this regard, the management of interdependencies that become apparent at the interfaces of those subsystems, such as the exchange of information or physical goods (Stefansson and Russel 2008), is of critical importance (Winkler and Pichler 2011).

To better understand the nature of coordination issues, Malone and Crowston (1994) give priority to a systematic identification and analysis of interdependencies and mechanisms used to establish coordination. When it comes to maritime logistics, we see that this has been traditionally discussed from the angle of port or transport centered perspectives (Talley 2014), while a supply chain oriented view not so much applied (Lam 2011; Heaver 2012; Talley 2014). Taking this into account, we describe maritime transport and logistics chains as interorganizational structures involving various companies, modes and means of transport (Lam 2011; Talley 2014) that contain interorganizational dependencies. As can be depicted from Fig. 1, maritime transport and logistics chains typically cover a main-carriage by ocean transport as well as a pre- and on-carriage by rail, road and/or barge (Schönknecht 2009).

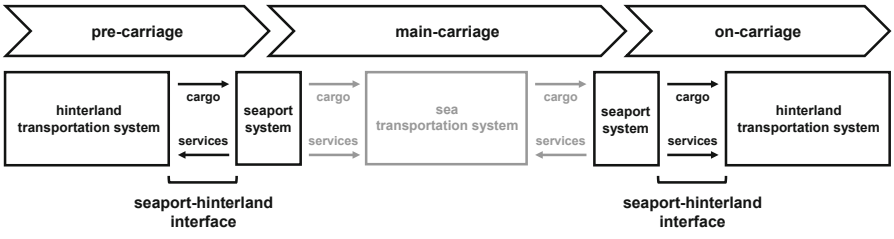

Fig. 1. Seaport-hinterland interface within the maritime transport and logistics chain

Therefore, we distinguish the sub-systems of sea and hinterland transportation. While the seaside system is mainly characterized by mass transportation, the hinterland system includes a high amount of comparably smaller transports. Within this picture, ports represent the interface of those systems (Carbone and Martino 2003), in which a transformation of mass to single transports (and vice versa) takes place (Schönknecht 2009). In this paper, we focus on the relationship between seaports and landside systems, which we refer to as "seaport-hinterland interfaces".

From an organizational perspective, a variety of stakeholders taking part in the activities at the seaport-hinterland-interface can be identified. Therefore, the institutional structure can be characterized as differentiated and heterogeneous (Herz and Flämig 2014). Talley (2009) distinguishes between port service providers and the users of port services. The former are constituted by port or terminal operators that are engaged in providing and managing infra- and suprastructure for transshipment and storing of cargo within the port system (Talley 2009; Tongzon et al. 2009) and other port related service providers including governmental or administrative bodies such as customs or veterinary offices, stevedoring companies, ship-agents, freight forwarders or third-party logistics providers that carry out activities such as warehousing or value-added services (Talley 2009). Port users encompass all entities that "utilize the port as part of the process in moving cargo […] from a given origin location to a given destination location" (Talley 2009). In this context, not only shippers as the owners of goods being transported can be regarded as users but also transportation operators.[2]

The environmental setup for coordination within the port-hinterland interface is characterized by a significant degree of uncertainty. As an example, we observe deviations from transport schedules as being more the rule, which leads static planning approaches to fail (Olsen and Fagerlie 2011). In this regard, uncertainty in maritime transport and logistics chains arises due to a lack of available (realtime) process information throughout the interorganizational system (Ascencio et al. 2014). The need for coordination between seaports and its hinterland can thus be deduced from the dependencies that exist between the organizations and systems involved. The differentiation between port users and service providers already indicates that activities within the area of interest often appear within a "producer-consumer relationship" (Malone and Crowston 1994) that involve interdependent operational activities.

3 Methodology

3.1 Background on Systematic Literature Reviews

Different to primary research studies, which aim at collecting new data, literature reviews build upon the results of past research. Nevertheless, to be considered as a valid scientific method, a literature review needs to meet the same requirements to

[2] It should be mentioned, that this list of port actors is of generic nature and thus cannot directly be applied to every seaport as each "represents an individual set of involved companies and services" (Herz and Flämig 2014). For a more extensive analysis of port-related stakeholders see Herz and Flämig (2014).

scientific rigor than primary research and thus require effective measures to ensure a high degree of validity (Webster and Watson 2002; Tranfield et al. 2003; Rowley and Slack 2004; Cooper 2010). Traditionally, literature analysis has been carried out "using a process in which multiple studies investigating the same topics were collected and described in a narrative fashion" (Cooper 2010). As the results of those traditional narrative studies lack of comprehensiveness and therefore bear potential for "error and imprecision" (Cooper 2010), systematic techniques have been established as "integrative literature reviews" (Torraco 2005), "research syntheses" (Cooper 2010) or just "systematic reviews" (Tranfield et al. 2003). Although the definitions and concepts slightly differ, the main goal of these review studies is to integrate research results in a systematic, comprehensive and reproducible manner (Fink 2005). Within this paper, we adopt Cooper's methodological perspective and follow his 7-step framework (Cooper 2010) by (1) formulating the problem, (2) searching the literature, (3) gathering information from studies, (4) evaluating the quality of studies, (5) analyzing and integrating the outcomes of studies, (6) interpreting the evidence and (7) presenting the results. Even though this framework suggests a linear process, the steps of data collection and analysis are executed within an iterative process in respect to the recursive nature of empirical work (Randolph 2009).

While the problem formulation (1) has already been described within the first two sections, the procedures used for data collection and analysis ((2)–(5)) will be presented in the following. The interpretation (6) and presentation (7) of the results, including a critical view on limitations, will be carried out in the last section.

3.2 Data Collection and Analysis

Searching the Literature. A few constraints have been established to set a plausible sample frame: For the search process, it was decided to conduct a database search within the "Elsevier Scopus" database, searching for relevant keywords within the title, abstract and associated keywords. Apart from reducing the sample size, this proceeding guarantees a minimum reach and quality of the titles collected. A detailed description of the used keywords is shown in Appendix A. While only contributions written in English have been accepted, no restrictions were made concerning the year of publication. For articles, that were evaluated as being relevant, a forward and backward search using Scopus has been conducted to extend the literature base. The search phase took place in 06/2019.

Gathering Information of Studies. In a first step, all titles found and accessed during the search process were electronically indexed with basic bibliometric data (e.g. title, author, abstract, year, type of publication, keywords) within the reference management software "Citavi". If possible, a first categorization of key concepts or methodological and theoretical approaches was done by reviewing the abstracts.

Evaluating the Quality of Studies. Based on a qualitative evaluation of whether a publication is valuable for answering the research questions introduced in the beginning of this paper, it was decided which studies were considered as part of the sample.

Analyzing and Integrating the Outcomes of Studies. A predefined data collection scheme (see Appendix A) set the frame for in-depth analysis and helped to collect comparable data points for all entities within the sample frame.

4 Results

4.1 Characteristics of Literature Sample

A total of 25 articles that were published between 2004 and 2019 have been identified and analyzed within our review. Thereof, 19 studies originated from the database search while 6 articles have been added during the backward- and forward search process. 16 articles have been published in academic journals and 9 in conference proceedings. The full list of all considered publications is presented in Appendix B.

4.2 Analysis of Central Problems in the Research Area

Research on Coordination Issues Among Seaports and Hinterland Modes. A first set of research questions addresses coordination issues related to the relationship of seaports and specific hinterland modes. In the case of inland waterway transportation, the scheduling of barge arrivals is a well-addressed operational coordination issue. In seaports with a number of different terminals, barge operators suffer from long and unpredictable port stay durations caused by a high number of small terminal calls and loose operational quay planning between sea terminals and barges (Li et al. 2018; van der Horst et al. 2019). Li et al. (2015, 2016, 2017) propose different joint scheduling approaches for coordination among barge operators to solve the barge rotation planning problem. For rail hinterland transportation, coordination problems are reported to appear especially in the context of railway infrastructure allocation (van der Horst and van der Lugt 2014), transport capacity planning in light of uncertainty or interruptions (Elbert and Walter 2014) and the scheduling of rail services in multi-terminal environments (Hu et al. 2019). For road transportation, it is stated that port service providers often struggle to adapt to varying truck volumes. In this regard, research evolves around the coordination between transport operators and terminals by truck appointment or announcement systems. The focus of the identified papers is on the impact on gate congestion levels (Gracia et al. 2017), on environmental influence (Schulte et al. 2015) as well as on yard operations within container terminals (van Asperen et al. 2013; Ramírez-Nafarrate et al. 2017).

Research on the Role of Information Exchange in Coordination. In line with the discussion about appointment and joint scheduling systems for hinterland modes, a number of articles stress the role of information exchange as a means to overcome coordination problems. From the perspective of port terminals, it is claimed that missing information on when containers arrive or leave a port lead to reduced internal capacity utilization and to non-value adding activities (Olesen et al. 2013). In this regard, Pahl and Voß (2017) map insights from production research on maritime transport and emphasize the relationship between cargo lead times and resource

utilization in ports. They argue that lacking information exchange regarding incoming and outgoing containers result in high workloads for port resources and thus to long lead times. For this reason, they propose a maritime collaborative planning system that addresses operational and tactical planning to reduce lead times and smoothen capacity utilization. A positive impact of advance container ETA on capacity utilization in rail transportation has been demonstrated by Elbert and Walter (2014) within a system dynamics based simulation study. On the other half of the information exchange equation, Wiegmans et al. (2018) analyzed the information needs of different hinterland stakeholders of seaports. They conclude that there exists significant demand for information about container status, the moment of container availability and about the crowdedness at the terminal and the terminal status. Heilig and Voß (2014) propose a cloud-based service system that aims at improving coordination in inter-terminal transportation (including transportation to hinterland terminals) by integrating real-time information on port-related operations. In the context of ICT's role in the coordination of seaport-hinterland chains, de Langen and Douma (2010) criticize that "the analysis of coordination problems often focuses on operational issues and neglects the effects of different business models on implementation success" (de Langen and Douma 2010).

Research on Understanding of Coordination Mechanisms and Arrangements. Our review indicates that strategic issues are also represented in the research domain, mainly focusing on understanding and explaining coordination mechanisms. For example, Jaffee (2016) investigates the relationship between port and hinterland stakeholders, namely between container terminal and truck drayage operations. His study points out a weak level of integration that comes with a lack of contractual relationships between the respective companies. The same result has been stated by van der Horst et al. (2019) concerning container barging in seaports. De Langen and Chouly (2004) have analyzed the strategic value of coordination between port service providers and the respective hinterland links. They assume that the quality of hinterland access of seaports is determined by the aggregate behavior of a group of port stakeholders. As this often comes with a "collective action" problem, coordination mechanisms or arrangement are designed as a response to achieve improved conditions.

4.3 Analysis of Theoretical Perspectives and Methodological Approaches

The contributions reviewed within our analysis originate from different research disciplines such as operations research, information systems research, transport geography, transport economics or organizations research. It became apparent that most articles did not establish an explicit definition of coordination. Some publications (van der Horst and van der Lugt 2011, Sholihah et al. 2018) explicitly referred to the definition of coordination as an activity with the purpose to manage interdependence as described in Sect. 2. It is worth noting, that some authors implicitly considered coordination as a determinant of a ports (hinterland) accessibility and establish a link between the degree of coordination and the competitiveness of ports and transport chains (e.g. de Langen and Chouly 2004; van der Horst and de Langen 2008; Franc and van der Horst 2010; Gamassa and Chen 2017).

A dominant methodological approach for describing and explaining coordination problems on a strategic or institutional level is transaction cost theory. The respective studies mainly collected data based on desk research and qualitative expert interviews. For example, van der Horst and de Langen (2008) applied transaction cost theory to gain a better understanding of coordination problems and mechanisms in hinterland transport that have been established to improve the accessibility of the port. Following the opinion that coordination problems arise due to "an imbalance between the costs and benefits of coordination, a lack of willingness to invest, the strategic considerations of the actors involved, and risk-averse behavior" (van der Horst and de Langen 2008), they pointed out general and mode specific coordination problems that appear at the seaport-hinterland interface. Furthermore, they analyzed and classified coordination arrangements that have been in place. Based on this study, van der Horst and van der Lugt (2011) assume complexity of transactions to be a main explaining variable for the choice of a specific type of coordination arrangements. Transaction cost economics has also been applied to mode specific stakeholder groups, e.g. Lendjel and Fischman (2012) in the case of inland waterway transportation, van der Horst and van der Lugt (2014) in regards to rail transportation and Jaffee (2016) in the context of truck drayage.

5 Conclusion, Critical Reflection and Outlook

Regarding our first research question, we identified different categories of research problems in the literature: A first set of contributions focusses on coordination issues and mechanisms that particularly apply for specific hinterland modes. From this, we conclude that each hinterland mode has different challenges and thus requires individual approaches to enable "good" coordination. What seems to hold true for all hinterland modes, is a common understanding of the consequences of lacking coordination. As such, the literature considers congestion and waiting times, underutilization of transport capacity and increasing lead times as the central drivers for port stakeholders' efforts to achieve better coordination. Furthermore, some articles specifically highlighted the role of information exchange between port service providers and port users. In this regard, the development, use and influence of information systems on port-centered supply chain coordination is of special interest within our panel. Another category of contributions is dedicated to achieve better knowledge and understanding about the institutional framework of coordination arrangements in the field.

Our second research question concerning theoretical perspectives and methodological approaches used to analyze supply chain coordination at the seaport-hinterland interface can be answered as follows: The range of research problems that were formulated in the reviewed contributions reveals that the literature is not limited to operational and tactical issues but also considers the strategic or long-term perspective. Regarding research disciplines, we observed that operational and tactical problems are analyzed with methodological approaches of operations research or information

systems research[3], while strategic analyses mainly draw on theories and methods from transport economics, transport geography and organizational research. Still, the analysis reveals the interdisciplinary nature of coordination research in our domain. The lack of explicit definitions makes it difficult to evaluate whether there exists a common conceptual understanding of coordination in the related literature. It is worth noting that almost one third of the collected articles base on case studies rather than investigating the problem solely on theoretical grounds. This indicates that coordination research has relevance for practical applications.

Concerning the limitations of our research, it needs to be mentioned, that the choice of the database and keywords have a significant impact on the composition of the panel. Therefore, further studies could extend the literature search to other data sources and keywords. Even though the documentation of the data collection and analysis procedures should enable to comprehend and replicate our research process, we point out that qualitative assessments still have a subjective component, as other researchers might for instance include or reject other contributions. This is especially true, as the share of papers that were rejected from the database search was relatively high. While this study offers first insights into port-hinterland related coordination research, further studies could extend the scope to other parts of maritime transport chains, e.g. the interface of seaports and the ocean transportation system. Even though the focus of this paper has been the content of the sample, it became apparent, that a significant amount of the publications originates from a coherent cluster of researchers. Considering this, a bibliographic meta-analysis could provide additional knowledge on the academic discussion in regards to coordination research in maritime logistics.

Appendix A – Search and Evaluation Process

Selection Criteria

Content	Publication must be related to supply chain coordination in the seaport-hinterland environment
Language	Must be written in English
Publication	Academic journal or conference papers
Identification	Publication must be found in database-search or by back-and onward-search of database titles

Keyword-Search

Scopus: TITLE-ABS-KEY ((port OR seaport) AND (hinterland OR landside) AND (coordin* OR dependenc*)) AND (LIMIT-TO (LANGUAGE, "English"))

[3] This observation fits the results of van der Horst and van der Lugt (2011) who showed that operational coordination problems are mainly approached by ICT arrangements in practice.

Data Collection Scheme

#	Description
Author(s)	Self-explanatory
Year	Self-explanatory
Type of publication	Self-explanatory
Central problem	Central problem that is addressed within the publication
Research/problem level	Strategic: Problem involves long-term decision Tactical: Problem involves monthly-/weekly decisions Operational: Problem involves daily decisions
Definition of coordination	How is "coordination" defined? Which concepts are assigned to it?
Aspect of coordination	Classification of coordination aspects that are considered within publication. e.g. role and explanation of coordination, coordination mechanisms, coordination problems, role of coordination, benefits of coordination
Considered hinterland mode	Transport modes specifically considered within the study
Methodological approach	Methodologies used within study
Theoretical approach	What is the theoretical approach for explaining and examining the topic observations or methodologies
Main results of study	Self-explanatory

Appendix B – References for Systematic Literature Review

de Langen, P., Chouly, A.: Hinterland access regimes in seaports. European Journal of Transport and Infrastructure Research **4**(4), 361–380 (2004)

de Langen, P., Douma, A.: Challenges for using ICT to improve coordination in hinterland chains; An overview. International Journal of Transport Economics **37**(3), 261–279 (2010)

Elbert, R., Walter, F.: Information flow along the maritime transport chain - A simulation based approach to determine impacts of estimated time of arrival messages on the capacity utilization. In: Buckley, M., Miller, J. (eds) Proceedings of the 2014 Winter Simulation Conference, Savanah, GA, USA, pp. 1795–1806 (2014)

Franc, P., van der Horst, M.: Understanding hinterland service integration by shipping lines and terminal operators: A theoretical and empirical analysis. Journal of Transport Geography **18**(4), 557–566 (2010)

Gamassa, P., Chen, Y.: Challenges and Strategies of Abidjan Port-Hinterland Connectivity. 6th International Conference on Transportation and Traffic Engineering (ICTTE 2017) **124**, 1–7 (2017)

Gracia, M., González-Ramírez, R., Mar-Ortiz, J.: The impact of lanes segmentation and booking levels on a container terminal gate congestion. Flexible Services and Manufacturing Journal **29**(3-4), 403–432 (2017)

Heilig, L., Voß, S.: A cloud-based SOA for enhancing information exchange and decision support in ITT operations. In: González-Ramírez, R. (ed) Proceedings of the 5th International Conference on Computational Logistics, Valparaíso, Chile, pp. 112–131. Springer International Publishing, Cham, CH (2014)

Hu, Q., Wiegmans, B., Corman, F., Lodewijks, G.: Integration of inter-terminal transport and hinterland rail transport. Flexible Services and Manufacturing Journal **107**(31), 1–25 (2019)

Jaffee, D.: Kink in the intermodal supply chain: interorganizational relations in the port economy. Transportation Planning and Technology **39**(7), 730–746 (2016)

Lendjel, E., Fischman, M.: Maritime ports and inland interconnections: A transactional analysis of container barge transport in France. International Research Conference on Short Sea Shipping, 2012, Lisbon, Portugal, 1–20 (2012)

Li, S., Negenborn, R., Lodewijks, G.: A two phase approach for inter-terminal transport of inland vessels using preference-based and utility-based coordination rules. In: Corman, F., Voß, S., Negenborn, R. (eds) Proceedings of the 6th International Conference on Computational Logistics, pp. 281–297. Springer International Publishing, Cham, CH (2015)

Li, S., Negenborn, R., Lodewijks, G.: A logic-based benders decomposition approach to improve coordination of inland vessels for inter-terminal transport. In: Paias, A., Ruthmair, M., Voß, S. (eds) Proceedings of the 7th International Conference on Computational Logistics, Lisbon, Portugal, pp. 96–115. Springer International Publishing, Cham, CH (2016)

Li, S., Negenborn, R., Lodewijks, G.: Planning inland vessel operations in large seaports using a two-phase approach. Computers and Industrial Engineering **106**, 41–57 (2017)

Li, S., Negenborn, R., Liu, J.: Stimulating inland waterway transport between seaports and the hinterland from a coordination perspective. In: Cerulli, R., Raiconi, A., Voß, S. (eds) Proceedings of the 9th International Conference on Computational Logistics 2018, Vietri sul Mare, Italy, pp. 67–85. Springer International Publishing, Cham, CH (2018)

Olesen, P., Dukovska-Popovska, I., Hvolby, H.: Improving Port Terminal Operations through Information Sharing. In: Emmanouilidis, C., Taisch, M., Kiritsis, D. (eds) IFIP International Conference on Advances in Production Management Systems, Rhodes, Greece, Revised Selected Papers, pp. 662–669. Springer, Berlin/Heidelberg (2013)

Pahl, J., Voß, S.: Maritime load dependent lead times - An analysis. In: Bektas, T., Coniglio, S., Martínez-Sykora, A., Voß, S. (eds) Proceedings of the 8th International Conference on Computational Logistics, Southampton, UK, pp. 300–305. Springer International Publishing, Cham, CH (2017)

Ramírez-Nafarrate, A., González-Ramírez, R., Smith, N., Guerra-Olivares, R., Voß, S.: Impact on yard efficiency of a truck appointment system for a port terminal. Annals of Operations Research **258**(2), 195–216 (2017)

Schulte, F., González, R., Voß, S.: Reducing port-related truck emissions: Coordinated truck appointments to reduce empty truck trips. In: Corman, F., Voß, S., Negenborn, R. (eds) Proceedings of the 6th International Conference on Computational Logistics, pp. 495–509. Springer International Publishing, Cham, CH (2015)

Sholihah, S., Samadhi, A., Cakravastia, A., Nur Bahagia, S.: Coordination model in hinterland chain of hub-and-spoke export trade logistics. Journal of Industrial Engineering and Management **11**(4), 776–793 (2018)

van Asperen, E., Borgman, B., Dekker, R.: Evaluating impact of truck announcements on container stacking efficiency. Flexible Services and Manufacturing Journal **25**(4), 543–556 (2013)

van der Horst, M., de Langen, P.: Coordination in hinterland transport chains: A major challenge for the seaport community. Maritime Economics and Logistics **10**(1-2), 108–129 (2008)

van der Horst, M., van der Lugt, L.: Coordination mechanisms in improving hinterland accessibility: Empirical analysis in the port of Rotterdam. Maritime Policy and Management **38**(4), 415–435 (2011)

van der Horst, M., van der Lugt, L.: An Institutional Analysis of Coordination in Liberalized Port-related Railway Chains: An Application to the Port of Rotterdam. Transport Reviews **34**(1), 68–85 (2014)

van der Horst, M., Kort, M., Kuipers, B., Geerlings, H.: Coordination problems in container barging in the port of Rotterdam: an institutional analysis. Transportation Planning and Technology **42**(2), 187–199 (2019)

Wiegmans, B., Menger, I., Behdani, B., van Arem, B.: Communication between deep sea container terminals and hinterland stakeholders: information needs and the relevance of information exchange. Maritime Economics and Logistics **20**(4), 531–548 (2018)

References

Ascencio, L.M., González-Ramírez, R.G., Bearzotti, L.A., Smith, N.R., Camacho-Vallejo, J.F.: A collaborative supply chain management system for a maritime port logistics chain. J. Appl. Res. Technol. **12**(3), 444–458 (2014)

Carbone, V., Martino, M.D.: The changing role of ports in supply-chain management: an empirical analysis. Mar. Policy Manag. **30**(4), 305–320 (2003)

Chan, H.K., Chan, F.T.S.: A review of coordination studies in the context of supply chain dynamics. Int. J. Prod. Res. **48**(10), 2793–2819 (2010)

Cooper, H.: Research Synthesis and Meta-Analysis: A Step-by-Step Approach, 4th edn. SAGE, Los Angeles (2010)

Fink, A.: Conducting Research Literature Reviews: From the Internet to Paper, 2nd edn. SAGE, Thousand Oaks (2005)

Heaver, T.: The evolution of maritime economics. In: Talley, W.K. (ed.) The Blackwell Companion to Maritime Economics, pp. 16–33. Wiley-Blackwell, Malden (2012)

Herz, N., Flämig, H.: Understanding supply chain management concepts in the context of port logistics: an explanatory framework. Transport **29**(4), 376–385 (2014)

Iivari, J., Hirschheim, R., Klein, H.: Towards a distinctive body of knowledge for Information Systems experts: coding ISD process knowledge in two IS journals. Inf. Syst. J. **14**(4), 313–342 (2004)

Kaur, A., Kanda, A., Deshmukh, S.G.: Supply chain coordination: Perspectives, empirical studies and research directions. Int. J. Prod. Econ. **115**(2), 316–335 (2008)

Kotzab, H., Darkow, I.-L., Bäumler, I., Georgi, C., Luttermann, S.: Mapping research on logistics and supply chain coordination, cooperation and collaboration. In: Freitag, M., Kotzab, H., Pannek, J. (eds) Dynamics in Logistics: Proceedings of the 6th International Conference LDIC 2018, Bremen, Germany, pp. 10–20. Springer, Cham (2018)

Lam, J.: Patterns of maritime supply chains: slot capacity analysis. J. Transp. Geogr. **19**(2), 366–374 (2011)

Lawrence, P.R., Lorsch, J.W.: Differentiation and integration in complex organizations. Adm. Sci. Q. **12**(1), 1–47 (1967)

Malone, T., Crowston, K.: The interdisciplinary study of coordination. ACM Comput. Surv. **26**(1), 87–119 (1994)

Olsen, K., Fagerlie, E.: Adaptive systems - a case for calculating estimated time of arrival. IEEE Potentials **30**(2), 15–19 (2011)

Rowley, J., Slack, F.: Conducting a literature review. Manag. Res. News **27**(6), 31–39 (2004)

Schönknecht, A.: Maritime Containerlogistik: Leistungsvergleich von Containerschiffen in intermodalen Transportketten. Springer, Berlin/Heidelberg (2009)

Stefansson, G., Russel, D.: Supply chain interfaces: defining attributes and attribute values for collaborative logistics management. J. Bus. Logist. **29**(1), 347–359 (2008)

Talley, W.K.: Maritime transport chains: carrier, port and shipper choice effects. Int. J. Prod. Econ. **151**, 174–179 (2014)

Talley, W.K.: Port Economics. Routledge, London/New York (2009)

Tongzon, J., Chang, Y.-T., Lee, S.-Y.: How supply chain oriented is the port sector? Int. J. Prod. Econ. **122**(1), 21–34 (2009)

Torraco, R.J.: Writing integrative literature reviews: guidelines and examples. Hum. Resour. Dev. Rev. **4**(3), 356–367 (2005)

Tranfield, D., Denyer, D., Palminder, S.: Towards a methodology for developing evidence-informed management knowledge by means of systematic review. Br. J. Manag. **14**(3), 207–222 (2003)

Webster, J., Watson, R.: Analyzing the past to prepare for the future: writing a literature review. MIS Q. **26**(2), XIII–XXIII (2002)

Winkler, H., Pichler, S.: Performance-enhancing design of interfaces in international supply chains. In: Kersten, W., Blecker, T., Jahn, C. (eds.) International Supply Chain Management and Collaboration Practices, vol. 4, pp. 213–236. Eul Verlag, Lohmar (2011)