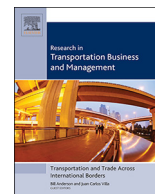




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## Port cooperation in the North Adriatic ports

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### ABSTRACT

Recent trends in port development show that ports are making increasing efforts to forge mutually beneficial cooperation strategies, particularly ports sharing a common hinterland. In this paper, we analyse the North Adriatic ports (Koper, Rijeka, Trieste and Venice) with a focus on two related themes. First, the complementarity of the North Adriatic (NA) ports in the container market is analysed based on port vessel service patterns and shipping line interviews. We operationalize the analysis of complementarity with an analysis of the effects of multiple port calls on the revenue required to make a call in a specific NA port economically feasible. We conclude that the inclusion of another NA port reduces the minimum required revenue for a call in an additional NA port.

Second, we assess the scope and depth of cooperation between ports. We map current and potential future cooperation using a 'cooperation matrix' with two dimensions: the involvement of stakeholders (limited vs. broad), and the depth of cooperation (pre-competitive vs. commercial). We use in-depth interviews with port authorities, terminal operators, rail operators, major shipping lines and forwarders in the NA region to position the NA ports in the matrix. We conclude by discussing prospects of future NAPA ports cooperation.

### 1. Introduction

The North Adriatic ports traditionally encompass four ports in three EU member countries, Trieste and Venice in Italy, Koper in Slovenia and Rijeka in Croatia. All four ports are members of the North Adriatic Port Association (and will henceforth be termed the "NAPA" ports). Ravenna, another Italian port, was also a member until 2012. Their exit from the association was attributed to the fact that Ravenna mainly serves the market of Italian region Emilia-Romagna and, unlike the previously mentioned ports, did not strive to serve the middle European hinterland. Ravenna re-joined the NAPA at the end of 2017. In the container segment, the focus of this paper, the NAPA ports jointly handled over 2 million TEU in 2016, up from slightly over 1 million TEU in 2007. This means the throughput has doubled in less than a decade. The growth is mainly achieved through attracting cargo that was previously shipped via ports in the Hamburg-Le Havre range (Notteboom, 2010). The NAPA region has attracted considerable attention from industry players in recent years, with e.g. a Drewry (2016) report concluding that the fastest route from the Far East to Munich is via Koper, with the MSC shipping line recently entering a joint venture with Trieste's container terminal (Trieste Marine Terminal-TMT), and finally, the sizeable amount of infrastructure development projects co-funded by the European Union in all four ports, mostly pertaining to

enlarging and expanding container terminals and upgrading rail and intermodal links with Central and Eastern Europe. From the academic perspective, the NAPA region has been attracting greater research attention (see Acciaro et al., 2017; Twrddy and Batista, 2013, 2014, 2016). The NAPA's cooperation approach is to cooperate internationally and compete locally. However, as our analysis will reveal, the NAPA ports exhibit a low level of cooperation, especially on a strategic level.

Developments in the last decade have severely intensified the competitive landscape among ports. This has been caused by the concentration and consolidation among shipping lines and the increase in intermodality, which has enabled greater inter-range competition, as well as more recent initiatives such as 'Belt and Road Initiative' (BRI), which is reviving the land trade route by rail between Asia and Europe (Casarini, 2016). These trends foster cooperation between ports, particularly those in adjacent areas. A number of authors have mentioned cooperation as a trend in the maritime industry (e.g. Hwang and Chiang, 2010; Li and Oh, 2010; Notteboom, 1997; Wang, 1998). The authors acknowledge that the type and format of cooperation are context-specific; nevertheless, most studies either categorize the types of possible cooperation (de Langen and Nijdam, 2009) or provide a context-specific analysis of port cooperation (Hoshino, 2010; Song, 2002; Yap and Lam, 2006). There have also been attempts to provide a universal framework for assessing the extent of cooperation between

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port authorities (Mclaughlin and Fearon, 2013).

In this paper, we argue that *complementarity* among ports is a necessary condition for effective port cooperation among adjacent ports. This paper builds on the findings in the literature and contributes in two ways: first by enlarging the scope of analysed stakeholders. Previous research has focused mostly on port authorities and the benefits of their cooperation. However, cooperation is only effective in the long run, if it generates commercial advantages. Assessing the benefits of cooperation from a commercial perspective requires an analysis of the involvement of all firms in a port cluster in the cooperative initiatives. Thus, unlike previous studies, we consider not only cooperation between port authorities and explore several potential value-creating strategies among commercial operators in port clusters. The second contribution of this paper is the conceptual clarity we provide for analysing complementarity between ports.

In the next section, we review the main literature on port cooperation and in the section thereafter, we set up a theoretical research framework by developing a matrix to classify cases of cooperation between ports. We also present our research design to assess the level of cooperation in NAPA within this matrix. In the next section, we provide a brief description of the NAPA ports and assess their current level of cooperation, based on the results obtained from detailed interviews with the stakeholders. In the following section, we first establish the case for the complementarity of the NAPA ports and then discuss the future prospects of NAPA port cooperation. In the final section, we summarize the results and suggest additional research on this topic.

## 2. Literature review

Many scholars recognize that ports can no longer rely on serving captive hinterlands. Containerization has enabled greater intermodality, the expansion of international trade, the concentration of the shipping industry and the liberalization of transport markets, all of which has increased the intensity of port competition in shared hinterlands (Fageda, 2005; Notteboom and Winkelmanns, 2001; Seo and Ha, 2010). In light of the maturation of container traffic, which is closely linked to the maturation of the global economy (Rodrigue et al., 2013), but also, in the light of recent trends in port growth and competition, there is an increasing need for ports, particularly those sharing common hinterland, to forge mutually beneficial cooperation strategies. Already in the late 90s, Notteboom (1997) predicted that due to the concentration tendency among shipping lines, the pressure on port authorities in terms of efficiencies and costs would grow and suggested that the only way to counterbalance that pressure is for ports and terminals to cooperate and form strategic alliances. The term *co-opetition* was originally coined by Noorda (1993), meaning a mixture of competition and cooperation, thus having a strategic implication that those engaged in the same or similar markets should consider a win-win strategy. Song (2002) introduced the term *co-opetition* to the maritime industry. He explained that ports should compete through cooperation, effectively achieving win-win situations by proposing joint ventures and cross-shareholdership as the way forward. This is a sensible conclusion for ports that have complementary commercial interests. Jacobs (2007) observes that cooperation between Long Beach and Los Angeles ports seems prudent, since both ports depend on the same congested hinterland transport systems and face competition from other ports on the Pacific coast. De Langen and Nijdam (2009) identify three categories of cooperation among ports in proximity and show for the case of the Copenhagen-Malmö port that even cross-national port authority joint venture can be successful and mutually beneficial. Hoshino (2010) suggests that Japanese ports *need* to collaborate with one another to survive the harsh competition from the Chinese ports. In the absence of anti-trust regulation, Wang et al. (2012) wonder why ports choose to compete at all, since potential gains are larger when ports cooperate instead. Furthermore, government agencies often encourage cooperation among ports. Consolidation in the maritime industry has gone

hand-in-hand with greater efficiencies through the introduction of ever-larger vessels. Notteboom (2010) finds that compared to 1998, a weekly call in 2010 generated around three times more containers (around 300,000 TEU per year), due to the increasing ship size and associated increasing call size. The use of larger container ships provides an additional motive for cooperation, as ports that join forces may be better positioned to attract shipping lines. Moreover, ports in the wider regions become potential substitutes, thereby intensifying competition. Wang et al. (2012) argue that cross-shareholding or full mergers, if feasible, are the most optimal way to coordinate pricing and operational strategies in adjacent ports. Mclaughlin and Fearon (2013) agree that some form cooperation among adjacent ports is both favourable and appropriate, and note that mergers are more likely when they are part of a national economic agenda (e.g. China) or when the existence of ports is endangered by future prospects (e.g. Copenhagen-Malmö). Collaboration as a form of cooperation is feasible even when institutional inertia prevents mergers, joint ventures or cross-shareholding. Collaboration may be beneficial, while maintaining the identity and autonomy of the ports.

De Langen and Nijdam (2009) distinguish three levels of cooperation, namely: port authorities that have developed strategic cooperation with other port authorities in their vicinity in the form of joint holdings, investments and acquisitions; port authorities that have some form of cooperation, but not on a strategic level, and port authorities that do not have any form of cooperation with ports in their vicinity, despite being members of port associations (e.g. ESPO) or networks (e.g. Ecoports). Fremont and Lavaud-Letilleul (2009) distinguish between ports linked within a strait or an island, ports with different profiles and ports with similar profiles and argue the type of cooperation depends on the port profile. Fremont and Lavaud-Letilleul (2009) also argue that ports may change their profiles in cases when adjacent ports would consider building complementary relationships. For example, when one port has better nautical accessibility, while another has better terrestrial accessibility, ports could coordinate resources in a way to complement each other in their respective hindrances, thereby reducing the necessary investments. Mclaughlin and Fearon (2013) provide a framework for assessing the extent of cooperation among ports in the form of a cooperation-competition matrix, which distinguishes the intensity of cooperation on one axis and the degree of competition on another axis. This framework allows them to assess whether and how intensive forms of cooperation can reduce competition.

## 3. Research framework and research design

### 3.1. Port complementarity

The core concept to assess the potential for commercial cooperation is complementarity. The term *complementarity* gained increased attention in microeconomics thanks largely to Milgrom and Roberts (see e.g. Milgrom and Roberts, 1990; Roberts, 2007). They define complementarity as a relationship between two or more elements so that each element enhances the value of the other. Notteboom's (2009) paper defines ports as complements and substitutes based on vessel calling patterns. If a container vessel in a specific loop calls at both ports (or at none of them), they are considered complements, if a container vessel calls at only one of the port pair in question, then they are considered substitutes. Notteboom finds that smaller ports typically act as complements to larger load centers, such as the case of Antwerp and Zeebrugge. However, Notteboom's operationalization of complementarity is not fully in line with the mainstream definition from Milgrom and Roberts (see above). A call pattern where a call at one port goes hand-in-hand with a call in another port may be because 'one element enhances the value of the other', but may also be because these ports are independent of each other. In addition, double call patterns at ports that are substitutes are possible. For instance, two nearby ports may have large volumes of captive cargo that justify a call in both ports,

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