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THE DRIVERS OF PORT COMPETITIVENESS: A CRITICAL REVIEW

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Abstract

Academic research on port competitiveness has so far focused on the identification of the drivers of port competitiveness and their measurement. This paper argues that the port competitiveness and its drivers are significantly affected by major changes in maritime industry, which scholars have not sufficiently addressed. Therefore, the manuscript explores the multidimensional nature of “port competitiveness” by conducting a systematic literature review of leading peer-review international journals, between the 1983-2014 time frame.

The analysis allows a profound understanding and a categorization of the main drivers of port competitiveness. Main findings present a hierarchy of key drivers and suggest that major industry transformations moderate the influential role of traditional drivers and reshuffle their relative salience. The study also identifies some unexplored research areas for future studies.

Keywords: port competitiveness, drivers, literature review, hierarchy, industry trends.

1. Introduction

In strategic management literature, competitiveness has been studied as a comparative concept concerning the firm capacity to provide a unique value proposition (Prahalad & Hamel 1990; Woodall, 2003) under better conditions than competitors (Porter, 1980; Grant, 1991; Barney, 1991). Maritime industry, which is constituted by dynamic business networks (van der Lugt et al., 2007), considers port competitiveness as a function of the entire community’s ability (Garcia de la Guia, 2010) to grow resources, competencies and capabilities in a co-opetitive perspective (Nalebuff & Brandenbunger, 1996).

Academic research on port competitiveness has focused on two main areas: identification of the drivers of port competitiveness (Pearson, 1980; Tongzon & Heng, 2005; Yeo et al., 2008) and the identification together with the measurement of the drivers of port competitiveness (Tongzon 2001; Teng et al., 2004). With regard to the former, relevant authors concentrated their efforts on the analysis of some operational, organizational and strategic dimensions related to this business, to investigate the effects of various drivers on port competitiveness. Most studies focus on a specific set of drivers to assess the assumptions argued by previous contributions. Main results demonstrate that the key drivers and their relative salience evolved along with specific industry transformations (Rodrigue & Notteboom, 2009; Yeo et al., 2014). However, despite this partial “re-tuning” in the hierarchy of drivers, scholars have failed to provide a convincing interpretative reading of some cutting-edge industry changes having significantly affected port competitiveness and its drivers. The notion of port competitiveness in fact, embraces various research fields and thematic areas. Hence, from a theoretical perspective, the establishment of an overarching conceptual framework is required to explore causal relationships among various dimensions and re-interpret the investigated drivers in the light of major industry trends. Filling this research gap would be particularly relevant, due to the practical implications of the drivers of competitiveness for both private firms and public organisations. This study feeds the debate around the drivers of port competitiveness and discusses the potential effects induced by some key transformations in maritime logistics. In fact, by following a more conscious analytical perspective, we argue that these changes moderate the influential role of traditional drivers and reshuffle their relative salience. In this light, the paper analyses the multidimensional nature of “port competitiveness” by defining a hierarchy of the main drivers of competitiveness through a systematic literature review. The review is carried out selecting papers from leading peer-review international journals within the 1983-2014 time frame.

The remainder of the paper is organized as follows. Section 2 provides the theoretical background of the study whereas Section 3 illustrates the methodology. Section 4 describes the main findings of the literature review issued forth the hierarchy of the key drivers of port competitiveness. Section 5 discusses how major industry changes temper the influential role of traditional drivers of competitiveness, readjusting their relative salience, and finally suggests unexplored research areas.

2. Theoretical background

The notion of competitiveness is far from reaching a univocal conceptualisation even though it has been widely debated in academic literature. Porter (1990) defines competitiveness as the skill or talent resulting from acquired knowledge, able to generate and sustain a superior performance as well as face competitive dynamics. Although the concept of competitiveness is widely used to analyse strategic behaviour of firms, it has also come to refer to competition among nations (Porter, 1990) and business ecosystems (Moore, 1996).

In maritime literature, ports can be considered as dynamic business networks (van der Lugt et al., 2007) where the global value proposition highly depends on the ability of the entire port community (Garcia de la Guia, 2010) to develop resources, competencies and capabilities in a co-opetitive perspective (Nalebuff & Brandenburger, 1996). In this vein, several scholars (Bichou & Gray, 2005; De Langen, 2004; Notteboom & Winkelmanns, 2002; Robinson, 2003) define ports as networks in which the success of each business is tightly connected to the whole system's competitiveness. Maritime business ecosystems, in fact, rest upon the joint effort between Port Authorities and logistics firms to address environmental and competitive challenges (Van der Lugt et al., 2013; Hollen et al., 2014).

In line with extant literature, this study considers port competitiveness as a multidimensional concept. In particular, this multidimensionality builds around the ability of Port Authorities

and business players to perform value added activities (Teng et al., 2004; Yeo & Song, 2006). Due to this multifaceted nature of port competitiveness, most contributions focus on a (limited) number of factors to test the arguments proposed in prior studies. There is a significant number of factors that drive port's competitiveness and they may be both internal and external to Port Authorities' control. Accordingly, Teng (2004) recognises that port competitiveness at international level is profoundly affected by a country's political, legislative and economic background (Teng, 2004). Pallis et al. (2005) analyse the impact that a specific EU policy could exert on Greek ports, with specific regard to the "Port services" Directive initiative, which introduced free market access to port services provision. Research findings suggest that the adoption of a common EU regulatory framework would ultimately exercise a positive impact on the quality of port services. In addition, taking due account of local specificities and environmental background, this initiative could trigger an essential reform of the national port system.

A further research topic, which has been investigated within the studies on the drivers of port competitiveness, relates to port choice criteria (Yeo et al., 2008). In the 1980s, some authors (Willingale, 1981; Collison, 1984; UNCTAD, 1992; Mccalla, 1994) have identified several drivers of port selection including: sailing distance between ports, proximity to hinterland cities, connectivity and port infrastructures, port tariffs, average waiting time, geographic location of ports, hinterland transportation networks, land and container shipping routes, etc. In this regard, Malchow (2004) - focusing on US ports - shows that choice behaviour varies significantly across carriers and commodity types.

Other scholars categorised the drivers of port competitiveness in hard and soft components (De Martino & Morvillo, 2008). Hard components as infrastructures, suprastructures and equipment, geographical location and inland logistics platforms, are crucial to building port competitiveness. However, soft components like supplied services, inter-firm ties, ICT

systems, safety and security, are gaining momentum in the customer evaluation process (Bichou & Gray, 2004).

The multidimensional nature of port competitiveness is due not only to the diversity of factors that influence it, but also to the different perceptions across port users (Brooks et al., 2011). By way of illustration, studies on port selection point out that while shipping lines consider “costs at port” as the most important factors, shippers tend to privilege “port location” and “hinterland connections” (Acosta, 2007). Hence, drivers of port competitiveness hold a different salience according to users. It follows that, while port operators should act upon the satisfaction of network’s business players, Port Authorities could undertake the role of community managers, able to strengthen inter-organizational relationships within the ecosystem and ultimately increase port competitiveness (Verhoeven, 2010).

3. Methodology

A systematic review of academic literature is carried out following a three-stage procedure, including planning, execution and reporting (Tranfield et. al., 2003).

In the planning stage we define the object and focus the perimeter of our research’s review. On this purpose, we draw our attention on academic papers selected from leading peer-review international journals reporting a significant number of contributions in the field of transportation and logistics. The papers are identified using Scopus as research engine and carrying out queries with specific keywords. In order to ensure homogeneity and consistency, conference papers, books and PhD dissertations are excluded from the sampling, due to their more limited impact on academic literature. Similarly to Crossan & Apaydin (2003), the second phase of the process, execution, consists of three steps: (i) definition of initial selection criteria, (ii) grouping publications, (iii) analysis and synthesis.

Initial selection criteria

The Scopus database (Elsevier) is scrutinized performing *ad-hoc* queries using string of words consistent with the main theme of the literature review, i.e. the drivers of port competitiveness. Among others, the words “competitiveness”, “selection”, “choice” are searched alone and in combination with the term “port” in the main title, in the abstract and in the keywords of each paper. The analysis focuses on 25 journals (Table 1), chosen on the basis of their impact factor (ISI - Journal Citation Reports), academic reputation and relevance in the domain of transportation and logistics. After these queries a preliminary database of 170 scientific papers is defined, starting with the first seminal contribution in 1983 until 2014, covering a 32-year period (1983-2014).

Insert Table 1 about here

Grouping publications

The initial database is further screened in order to select studies on the basis of two additional factors, first, the real pertinence to the selected topic and secondly, the scientific impact on future research. Following these two criteria, the selection has been carried out in two distinguished phases. In the first selection step, papers which explore port choice criteria employed by shippers, global carriers, cruise, freight forwarders, etc. are included. Similarly, researches analysing the influence that factors like port privatization, port/terminal integration in the supply chain, intra-port competition, governance model, Port Authority’s strategies exert on port competitiveness are also considered. On the contrary, studies not strictly related to port competitiveness but connected to the competitiveness of other actors (e.g. ocean carriers, terminal operators, etc.) or entire economic regions are not included. Other interesting contributions are excluded because focused on the impact of state policy on port

efficiency (Barros 2003), without any explicit relation to competitiveness. In the second selection step, we apply a reference-based criterion to further screen relevant papers (Crossan & Apaydin, 2003) by including papers cited at least 5 times in Scopus. We have selected Scopus as it is a widely used and highly reputed database and it presents wider literature coverage than average database (e.g. Thompson Reuters). Papers published recently (2013-2014), given the short period for being quoted, are selected only if at least one of the (co-) authors have already published highly-cited studies on the topic, more specifically presenting a Scopus h-index greater than 10 (ten)". The final database encompasses 46 papers published in 16 international journals. Each manuscript is categorised according to analytical dimensions as: year of publication, type of paper, research method, geographical context (e.g., Europe, America, Asia, etc.), unit of analysis (i.e., port, national, regional, global), and identified drivers of competitiveness.

Analysis and synthesis

Afterwards, we carefully analyse all the factors discussed in the sample papers and select only those drivers (39) identified as relevant in each study. In order to preserve the original semantic value attributed to the drivers by each author, their names are not merged, except in case of conceptual duplications and redundancies. Subsequently, drivers are further grouped into categories to undertake in-depth investigations on the nature and typology of the factors shaping port competitiveness. Finally, drivers are ranked on the basis of the number of papers where they are identified as relevant, and as residual criteria, total citations and average per paper citations. The total number of citations is used as additional discriminant factor of classification (where appropriate).

4. Findings

4.1. Sample descriptive statistics

First, we analyse the adopted approaches (“type of paper”) in order to understand the most common analytical angles, ranging between theoretical approaches to contributions presenting practical implications. In our framework, research approaches are split into four categories: Research and case study papers have empirical nature while the other two, conceptual and literature review papers present a qualitative approach. Empirical research (80.9%) is far more extensively used than qualitative research (19.6%). With regard to the former, research papers are prevalent (60.9%), followed by empirical case studies (19.6%). Descriptive statistics reported in Table 2 show that only a few literature review studies (2.2%) strictly focus on the academic debate around the drivers of port competitiveness.

Insert Table 2 about here

Scholars avail themselves of diverse analytical methods to address research questions. In this study we classify such options in line with a well-established taxonomy (Mentzer & Kahn, 1995; Sachan & Datta, 2005) (Table 2). Economic modelling, which deals with business practice applying economic theories, and econometrics, OR and simulation techniques accounted for 45.7%. Case study analysis, basic descriptive statistics methods and field research are applied in the 34.8% of papers. Field research includes survey and interview methods, normally used to observe practitioners’ viewpoint. Literature review and content analysis account for 10.9%, while multivariate statistical analysis is implemented quite rarely. In addition, we classify papers according to the different “unit of analysis” and “geographic scope” of the research. The unit of analysis can be classified as international (19.6%), in case of ports located in different countries, national (28.3%) whereas all ports belong to the same country (e.g. the Tanzania port system), regional (30.4%) when adjacent ports are situated in regional proximity within a single country, or as individual ports (4.4%). Some studies (17.4%) address port competitiveness from a purely conceptual perspective and do not present

empirical evidence from any specific geographic context. In terms of geographic scope, research mainly focused on Asian and European ports (50.0%).

We find out that sampling frame progressively shifted from a single- to a multi-country perspective. Studies on ports within the same nation decreased significantly in recent years. From 1983 to 2007 they accounted for 42.9%, while from 2008 to 2014 dropped to 24.0%. Conversely, multiple-country approach became dominant (56.0%) and mainly focused on Asian economies.

4.2. Main outcomes

The literature review process scrutinises the drivers pinpointed in each paper as key factors for port competitiveness and defines a hierarchy. For parsimony, Table 3 only reports the top ten (out of 39) drivers in decreasing order of relevance: port costs, hinterland proximity, hinterland connectivity, port geographical location, port infrastructures, operational efficiency, port service quality, maritime connectivity, nautical accessibility, and port site.

Insert Table 3 about here

First, port costs (1) emerge as relevant economic-related drivers of port competitiveness. In most industries the price of goods or services is an important factor that consumers take into account while selecting a range of homogeneous products. *Ceteris paribus*, the lower the cost, the greater the competitiveness. This also typically happens in ports where tariffs (to be paid to the Port Authority) and costs (i.e. port charges paid to the terminal) constitute a significant part of total transportation costs for ocean carriers and shippers. Similarly to most industries, within maritime sector carriers have the possibility to compare competing ports' costs and tariffs, thus selecting the most convenient one. In this regard, Trujillo and Nombela (1999) argue that cargo handling services are particularly important for port users in terms of total charges. These charges are considered highly relevant in affecting port competitiveness (Yuen

et al., 2011).

Besides port costs, hinterland proximity (2) and hinterland connectivity (3) figure among the most influential drivers of competitiveness. This means that inland distance and connectivity to major shippers together with the presence of efficient inland transport networks constitute the prime factor to improve competitiveness of gateway ports. The outcome is in line with the arguments of a number of authors, who recognise the paradigm shift from maritime-related to hinterland-related factors (Lam & Tang, 2009; Ng et al., 2014).

Port geographical location (4) and maritime connectivity (8) are other important drivers especially for those players, involved in cargo routing decisions (e.g., ocean carriers, freight forwarders), which are responsible for the delivery of goods between manufacturing sites and ports. Hence a strategic location is deemed to significantly increase port's competitiveness. More specifically, port location relates to the concept of "diversion distance", i.e. the sailing deviation from main trunk routes, which is necessary to call a certain port. Shipping routes centrality is vital not only for gateway ports but primary for transshipment hubs.

Afterwards, the endowment of port infrastructures (5) and nautical accessibility (9) are indicated as other relevant drivers. It is commonly accepted that nautical accessibility is closely connected with port infrastructures (e.g. berth length, water depth, yard spaces, etc.). To accommodate trade growth and offer economies of scale in a highly competitive market, many shipping companies have invested in mega-vessels, which impose unprecedented operational challenges. In particular, this reflects in deeper channel and terminal water depth as well as in the quest for longer quays and larger terminal areas. These new requirements become a *sine qua non condition* for those ports aiming to keep the pace of market transformations and defend their competitiveness.

Moreover, operational efficiency (6) is a notable factor for those Port Authorities and port operators who are willing to achieve a competitive advantage. On this regard, Tongzon and

Heng (2004) observe that shipping lines, as main customers, mostly pay attention to operational efficiency during the selection of port services. Since carriers consider port turnaround time as an “unproductive” time for vessels, the speed and reliability of container handling play a crucial role to safeguard shipping service schedule and ultimately to keep the port competitive (Parola & Musso, 2007). In addition to this, Baird (2000) argues that port ownership structure has an impact on operational efficiency. The best strategy for maximising efficiency should head for the right balance and compromise between private sector participation and landlord/regulatory functions of the Port Authority.

Finally, other authors recognise the quality of port services (7) (Yeo et al., 2014) and the port site (10) (Wang et al., 2014) as determinants of competitiveness.

To achieve a deeper understanding of the nature and typology of factors shaping port competitiveness, all drivers are grouped into three categories consistent with Notteboom (2008): hinterland-related, maritime-related, and endogenous factors. Hinterland-related factors refer to inland transportation and, broadly speaking, to those attributes affecting the capacity of the port to expand its commercial influence on-shore. Maritime-related factors include dimensions regarding maritime cargo demand and shipping service connectivity. Endogenous factors are constituted by a number of attributes that strictly originate from the port itself, such as infra and suprastructures, operational efficiency, costs, etc. Endogenous factors have been traditionally considered as the main drivers of port competitiveness. Literature review unveils that 50.0% of the drivers identified as relevant in various academic works belong to this category. Hinterland-related factors account for 37.3%. Endogenous drivers are considered relevant in Asian ports where port efficiency and the endowment of infrastructures are capable to influence port success. Asian ports are often located in export-oriented production sites and therefore which means that they do not necessarily need to be connected with faraway hinterlands. Conversely, research on African and European ports

emphasises the eminent role of hinterland-related factors. In point of fact, Gouvernal et al. (2005), argue that the development of effective inland logistics chains has been decisive for the success of ports as Algeciras, Barcelona and Valencia in the last decade. In North America, hinterland and endogenous factors befall to be equally important due to the strong functional integration between port activities and hinterland transportation (Malchow & Kanafani, 2001; 2004). Overall, it can be stated that maritime-related factors, despite their importance, exert a comparatively lower influence in the definition of port competitiveness. The conducted analysis shows that hinterland-related drivers are becoming increasingly relevant, climbing from 31.0% (1983-2007) to 42.0% in recent years (2008-2014). On the other hand, maritime-related factors, have been quite constant across the sample time frame (within the 12.0%-13.0% range).

5. Discussion

In the aim of disentangling its multidimensionality, the notion of port competitiveness has been addressed under various perspectives. As made evident by the literature review, scholars have attempted to capture the multifaceted nature of the port domain and the heterogeneous characteristics of the drivers determining its competitiveness. Despite the results achieved in prior studies, most authors concentrated their efforts on the analysis of some operational, organizational and strategic dimensions, in order to understand their effects as specific drivers on port competitiveness. The outcomes of this literature review reveal that scholars commonly accept the centrality of maritime and inland connectivity, efficiency of port operations and endowment of infra- and supra-structures. In addition, the analysis emphasise a paradigm shift from maritime-related to hinterland-related drivers, in line with the arguments raised by relevant contributions on port management (Bichou & Gray, 2004; Notteboom & Rodrigue, 2005). Most contributions focus on a limited number of drivers,

testing the arguments proposed in previous studies. In principle, their results demonstrate that the key drivers and their relative salience consistently evolve along with some industry transformations. By way of illustration, the growing contestability of port hinterlands accentuates on-shore competitive games and prioritises drivers of competitiveness beyond port boundaries, such as inland connectivity, inland transport infrastructures, etc. (Rodrigue & Notteboom, 2009; Yeo et al., 2014).

Nonetheless, despite this partial “re-tuning” in the hierarchy of the aforementioned drivers, academic literature has not elaborated a more profound interpretative reading of cutting-edge industry changes able to significantly impact on port competitiveness and its drivers. The notion of port competitiveness is located at the intersection of various research fields and thematic areas. Therefore, it is needed to provide an integrated analytical framework to establish causalities among various dimensions and to re-interpret the investigated drivers in the light of major industry trends.

In recent years, academic literature opened a fruitful debate on a number of emerging research fields, holding relevant practical implications for ports (Ng et al., 2014). In particular, leading scholars concentrated their efforts on the study of some specific trends claimed to model the recent industry development: the growing economies of scale in shipping (Cullinane and Khanna, 2000; Rodrigue and Notteboom, 2009), the institutional turn in port governance (Brooks and Cullinane, 2006; Ng and Pallis, 2010; Jacobs and Notteboom, 2011), the rise of co-opetition among ports in proximity (Song, 2003; Notteboom et al., 2009), the development of inter-firm networks (Soppé et al., 2009; Parola et al., 2014), and the pressure imposed by green and sustainability challenges (Yap and Lam, 2013; Lam and Gu, 2013; Acciaro et al., 2014a). Therefore, we decided to critically discuss the evidence of our literature review by grounding on the industry trends identified by the most acknowledged academic works on maritime logistics. In the definition and naming of the thematic boundaries of the key industry

trends we adopted an inclusive approach by taking into account the variety of theoretical arguments raised by highly-cited contributions. These industry trends provide some innovative analytical angles for feeding the debate around the drivers of port competitiveness and the potential effects provoked by major changes in the port and shipping sectors. In particular, the remainder of this section discusses how such transformations might moderate the influential role of traditional drivers and modify their hierarchical position in terms of relative salience (Figure 1).

Insert Figure 1 about here

Economies of scale in shipping

The significant acceleration of leading shipowners' investments in mega-vessels, represents the first cutting-edge trend observed in the industry. (Cullinane and Khanna, 2000; Martin et al., forthcoming). Notably, during the last twenty years, the quest for economies of scale has driven to cross an important vessel dimensional threshold (above 18.000 TEU ; Martin et al., 2015; OECD, 2015) however, at the same time, has imposed unprecedented operational constraints in ports. As a consequence, ports and terminals have been forced to make large and rapid investments in infrastructures to cope with new vessel sizes and preserve their competitiveness (Imai et al., 2006). With regards to port competitiveness this trend strongly affects the ship-port relationship as operational bottlenecks and port inefficiency inevitably result from an insufficient endowment of infra- and supra-structures. A port unable to accommodate mega-vessels, risks to be marginalised in deep-sea trade patterns and to be served via hub instead of via direct calls. While extant literature commonly accepts the importance of factors such as port costs, operational efficiency and infrastructural endowment, the impact of economies of scale on port competitiveness seems to be not

adequately investigated. Indeed, this trend has generated unprecedented effects on ports. First, it has profoundly reshaped inter-port competitive paradigms within ranges and secondly, it has emphasised the role of intermediate hubs (Rodrigue & Notteboom, 2009). In a growing number of ports, indeed, the aim of safeguarding operational performance stimulated the rise of dedicated terminals for shipping lines, in order to ensure a smoother transfer of cargo from sea to land (Parola & Musso, 2007). The establishment of such facilities also guarantees a stable cargo base and represents an additional driver able to increase port competitiveness in the long-term.

Furthermore, the introduction of mega-vessels imposes new challenges to the synchronization function of ports in terms of landside operations (Rodrigue & Notteboom, 2010). The significant growth of vessel size (and “call size”) have forced gateway ports to achieve higher degree of synchronization with their hinterlands through specialized high-capacity transport corridors serviced by rail or barges, often including dry ports (Roso & Lumsden, 2010). The availability of inland infrastructures and efficient connections (“hinterland connectivity”) tailored to the growing capacity of vessels constitutes a remarkable factor, which might alter competitive dynamics among ports ensuring higher level of competitiveness. In this regard, those Port Authorities capable to stipulate effective public-private partnerships and to implement farsighted hinterland strategies for developing and managing such infrastructures will probably gain in terms of competitive advantage and market positioning (Van Der Horst & De Langen, 2008; Verhoeven, 2010). Therefore, future studies are invited to undertake a more in-depth investigation aimed to disentangle the multifaceted impact of such investments on port competitiveness, seizing the effects on landside operations (Table 4).

Insert Table 4 about here

Governance changes

A second transformation concerns the profound institutional turn, which occurred in the industry over the last 20-30 years, both in developing countries and advanced economies (World Bank, 2007). Notably, the shift from the public to the landlord model in most nations allows the entry of private firms in port operations and incentivises the adoption of managerial practices in reformed Port Authorities (Brooks & Cullinane, 2006; Debrie et al., 2013). Novel governance mechanisms in Port Authorities, including agile and effective board of directors (e.g., small number of executive members, de-politicization of boards, etc.), allow to take fast executive decisions consistent with the needs expressed by private firms and the speed of entrepreneurial action (Van der Lugt et al., 2013). In addition, the establishment of lean institutional chains characterised by a vertical coordination of the decisional power and competencies among various public bodies (e.g., Port Authorities, Municipality, central and local Governments, etc.) is expected to strengthen port competitiveness. In this framework, in fact, the Port Authority is able to proactively invest in inland projects and orchestrate the transport chain more effectively, exploiting “time windows” opportunities (Jacobs & Notteboom, 2011; Parola & Maugeri, 2013).

Proactiveness and scope of Port Authorities’ strategies constitute another dimension that may potentially exert a positive impact on port competitiveness. The presence of a reformed governance setting enables Port Authorities to commit to broader strategic objectives and to embrace functions and activities which sound “innovative” from a public institution perspective, such as marketing & communication, ICT development, and customer relationship management (CSR) (Parola et al., 2013). Leading Port Authorities act as “public” entrepreneurs and are actively engaged in logistics projects beyond port boundaries to ameliorate commodity supply chains and their own competitiveness (Rodrigue & Notteboom, 2009). In this view, the development of projects and investments in foreign countries should strengthen their position in the market and increase revenue streams (Dooms et al., 2013).

Finally, the reform of port governance opens the doors to private investments and to private operating firms inclined to commercial risk. In this regard, the presence of a competitive market environment enables Port Authority managers to select highly reputed and effective players that, in turn, reinforce the competitiveness of the port as a whole. Despite the numerous contributions on market openness and the selection of private firms through awarding procedures (Notteboom et al., 2012; Siemonsma et al., 2012), academic literature has so far neglected to explicitly investigate the impact of such dimensions on port competitiveness. Indeed, extant research efforts have been focused on the reasons underlying port governance reforms and on the related institutional, organizational and strategic changes occurring during the process. Surprisingly, except for a few attempts (Brooks & Pallis, 2008; Vieira et al. 2014; De Langen & Heij, 2014), a “normative” approach has been prevalent in the studies of the port governance reform, while an (empirical) assessment of its implications on port competitiveness has been neglected so far.

Co-opetition among ports in proximity

A third wave of change is constituted by the growing interdependencies among ports situated in geographic proximity. The increased rate of interdependency originated a mixed combination of competitive and co-operative strategies, known as “co-opetition” (Heaver et al., 2001; Song, 2003). First, the emergence of the “port regionalization” paradigm (Notteboom & Rodrigue, 2005) marks a new stage in port development characterised by the combination of wider and more discontinuous hinterlands with intense inland inter – port competition. Port Authorities embrace and foster the regionalisation process as a way to cope with port-related key challenges, e.g., congestion, growing costs, limited handling capacity, and at the same time to be able to meet the requirements of freight distribution patterns (Notteboom & Rodrigue, 2005). Ports have realised that competitiveness is being fought out

beyond their physical boundaries, as a more efficient access to the hinterland has become a critical success factor for growth and survival.

Although adjacent ports are typically strong competitors in attracting customers and (foreign) investors, their relationship has also evolved in the sense that Port Authority managers and private firm executives are seeking opportunities for cooperation and coordination in various thematic areas (Notteboom et al., 2009). The reasons behind Port Authorities' efforts to coordinate with neighboring ports are several: rationalisation of port spaces and available transport infrastructures, building of new infrastructures pooling financial resources, creation of a 'lobby' for getting State funds, port promotion through joint-marketing and communication activities, realisation of market studies and common projects on environmental protection, ICT services, research and development (R&D) and safety/security issues. Ultimately, cooperation among ports in proximity represents a prime way for enhancing competitiveness, as it is able to moderate (unfair) competition among neighbouring ports and deal with the intensification of international competition (Notteboom et al., 2009; Wang et al., 2012). The cooperation and integration among ports can lead to the creation of a shared "brand name" (e.g., North Adriatic Port Association, Ligurian Ports, etc.), of an *ad-hoc* body in charge of specific and limited functions (e.g., Flemish Port Commission, BremenPorts, etc.) or even to the merge of prior port entities (e.g., Copenhagen/Malmoe, New York/New Jersey, Fraser Ports, etc.) (Caballini et al., 2009).

As a result, strategic inter – port cooperation call for a profound re-conceptualisation of the idea of competitiveness, specifically in case of multi-port gateway regions (Notteboom, 2010). As individual ports belong to wider port complexes / regions, the drivers of port competitiveness should be reframed according to the level of competitiveness of the whole region in which they are inserted. In this regard, academic literature addresses dyads or groups of (competing) ports from a seemingly misleading perspective. In particular scholars

seem to be reluctant to investigate in depth how inter-port cooperation and coordination strategies affect the competitiveness of the single port at an international scale (Ng et al., 2014).

Lastly, the profound functional interdependencies and co-opetitive dynamics among ports in proximity provide an ideal site for advancing contemporary research on port competitiveness and its drivers, suggesting novel research avenues and interpretative readings.

Inter-firm networks

A fourth cutting-edge transformation of the industry is represented by the rise of inter-firm networks in shipping and ports. In principle, the strengthening of cooperative ties among private firms has conducted to paradigm shift of the bargaining power from public to private. First, the development of consortia and global alliances in shipping has imposed an unprecedented pressure on ports (Midoro & Pitto, 2000; Heaver et al., 2001). For Port Authorities it becomes critical to deal with large constellations of shipowners sharing vessel capacity and investments and thus showing growing operational needs (e.g., port costs, port infrastructures, port service quality, operational efficiency, etc.). For instance, customer fidelization can imply the awarding of dedicated port spaces or services to such groups of shipowners (Vanelslander, 2008). The loss of a big customer and its partners may generate large traffic diversion to competing ports and, as a consequence, a significant decrease of port competitiveness in the long term. In this regard, academic literature should further investigate the influence that inter-firm agreements among ocean carriers exert on Port Authority strategies (e.g., dedicated terminals to consortia, *ad-hoc* services to alliances, etc.) and ultimately on port competitiveness.

The collaborative ties also have proliferated among port terminal operating firms (Song, 2003; Soppé et al., 2009; Parola et al., 2014). Over the last decades, in fact, structural changes

in port operations and ownership have witnessed the rise of container port multinational enterprises (MNEs) which outgrew their home countries managing wide portfolios of facilities under a corporate logic (Olivier & Slack, 2006). The progressive maturity of the port business stimulates port MNEs to massively have recourse to cooperative agreements to expand their geographic scope and share the investment risk (Heaver et al., 2001; Parola et al., 2014). The establishment of a complex architecture of voluntary ties in the port industry has led to the birth of inter-organisational networks among firms, which heavily impacted on port management and planning. Nevertheless, scholars seem to not pay the due attention to these effects, which still appear under-investigated in academic literature. As argued by Olivier and Slack (2006), in fact, the emergence of the port MNEs imposes an essential epistemological shift in re-conceptualising the port from a single fixed spatial entity to a network of terminals operating under a portfolio logic. In this perspective, port MNEs are expected to profoundly affect the behaviour of Port Authorities regarding planning and the destination use of port areas. Corporate headquarters shapes the strategies of local terminal operating subsidiaries and may impose a strong pressure on Port Authorities due to their bargaining power. The potential delocalisation of port strategic decisions in the headquarters of global firms might weaken the executive role of Port Authority and generate conflicts because of the misalignment between local public interests and private strategic objectives (Parola & Maugeri, 2013). In addition, the delocalisation of the executive power might produce concerns in the dialectic between the interests of local entrepreneurs and global firms which, instead, should coexist and find a mediation in the port sphere (Parola & Maugeri, 2013). Finally, the numerous inter-firm collaborative agreements among port MNEs emphasise the aforementioned issues since these private ties implicitly anchor the development of each port to the strategy implemented in other “virtually connected” locations (Olivier & Slack, 2006). Academic literature should therefore undertake further effort in order

to investigate how the development of port MNEs and inter-firm ties at international level can reshape the hierarchy of drivers affecting port competitiveness.

Green and sustainability challenges

The emergence of green and sustainability challenges represents a cutting-edge wave of change in the port and logistics industry (Acciaro et al., 2014a; Lam & Notteboom, 2014). Although port environmental strategies might appear just as an additional benefit to efficiency pursuit or compliance need, it increasingly becomes a fundamental pillar in the whole strategic framework given the fragile balance existing among efficiency, growth, sustainable transportation and logistics. Indeed, environmental sustainability represents a growing concern for Port Authorities, policy makers, port users and local communities. In this regard, technical and process innovations can provide solutions to the main environmental issues, preserve quality standards and ultimately boost efficiency and competitiveness. A port, which is on the frontier of green technology, thanks to its solutions in marine and inland operations, can improve its image on the market and attract firms that share the green orientation. However, we have to admit that innovation often meets resistance. In the case of ports, environmental sustainability requires advanced conceptual frameworks for innovation. More specifically, a closer interaction between public and private actors it is required for its introduction and success (Acciaro et al., 2014). As a result, academic literature is called to investigate the implication on the drivers of port competitiveness not only addressing the role of green innovation but also enlightening the nature and quality of the relationships among the players jointly committed to deliver new green solutions.

Another relevant green dimension affecting port competitiveness relates to the capacity of Port Authorities to conceive sustainable strategy and planning (Yap & Lam, 2013). Port and territory are two elements presenting a symbiotic relationship (they attract each other because

they need each other), however their coexistence might become a source of deep conflicts (Parola & Maugeri, 2013). Long-term planning strategies heavily weigh upon the conflicting relationships between seaport and territory as they impact on the capacity of the port to deal with water, air, acoustic and visual pollution, as well as traffic congestion (Bergqvist & Egels-Zandén, 2012). In addition, concerning new projects, Port Authorities begin to include green clauses into the bidding process, thus compelling concessionaires to respect emissions thresholds and/or modal split requirements (De Langen et al., 2012; Lam & Gu, 2013). Suitable green strategies may contribute to the building of a serene city-port relationship characterised by social stability and consensus (i.e. effective local governance). A low level of conflict propensity within the surrounding territory can ultimately enhance port competitiveness. The port needs to be in harmony with its environment and with the entire logistics chain to pursue a coherent development by investing in new projects and performing an efficient day-to-day management of operations.

Finally, despite the compulsory nature of many green regulations, environmental strategies might provide a strong support in preserving port image and building a solid reputation (Lam & Notteboom, 2014). Green solutions, besides their undoubtful economic impact, can also contribute to moderate potential sources of conflicts with the territory, and to disseminate a “differentiating” message on sustainable issues towards transport players in comparison with other ports.

Overall, the conceptual nexus between the outcomes of green strategies and port competitiveness has not been sufficiently discussed in literature. Therefore future research is expected to disentangle this multifaceted relationship modeled by resistance to innovation, port reputation, as well as social and political tensions.

6. Conclusion

Despite prior studies have pinpointed a number of relevant factors influencing port competitiveness, scholars have neglected to provide an in-depth interpretative reading of some cutting-edge industry changes which heavily impacted port competitiveness and its drivers.

Therefore, this paper analyses the multidimensional nature of “port competitiveness”, in order to categorize the main drivers of competitiveness through a systematic literature review. From a theoretical perspective, the study develops an original conceptual framework for re-interpreting the investigated drivers in the light of mainstream industry trends.

Main findings provide a hierarchy of key drivers and suggest that economies of scales in shipping, port governance changes, co-opetition among ports in proximity, inter-firm networks, and green and sustainability challenges, moderate the influential role of traditional drivers and reshuffle their relative salience. The study also identifies some unexplored research areas for further studies.

In particular, we consider that the measurement of the impact of port governance changes on port competitiveness should be further investigated in the future, given the potential contribution of Port Authority reform to reshuffle the hierarchy of the drivers of competitiveness. Secondly, future research should deepen conceptual nexuses between green strategies and port competitiveness, emphasising the role of factors such as resistance to innovation, port reputation, and social and political tensions which may bring new insights on the hierarchy of the drivers.

Despite the valuable contribution provided, this work presents some inherent limitations that should be addressed in further research. First, in the systematic literature review the sampling procedure was limited to 25 peer-reviewed journals. Therefore, the coverage should be enlarged adding not only other journals, but also relevant conference papers and book

chapters. Second, the selection process of papers could contain some bias due to sampling criteria (e.g. keywords, pertinence issue, number of citations, etc.). Future studies should develop more sophisticated criteria for weighing and providing a hierarchy of the different drivers. Third, the sample papers are lopsidedly focused on mostly large-scale container operations, limiting the whole analysis to leading ports worldwide. Fourth, in the critical discussion some conceptual bias might originate from the potential “correlation” between the drivers, as well as from reverse causality problems arising between port competitiveness and some drivers. Finally, further contributions could corroborate literature review undertaking a field research based on qualitative analytical methods - focus group and/or in-depth interviews to maritime and logistics experts - for validating the main drivers identified from prior academic studies as well as discussing the dimensions of port competitiveness impacted by major industry changes.

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Tables and Figures

Table 1. The breakdown of the preliminary database of journal papers.

Academic Journals	Impact factor (2013)	1983-1999	2000-2009	2010-2014	Number of papers
Applied Economics	0.250		1		1
Asia Pacific Viewpoint	0.525	1			1
Asian Journal of Shipping and Logistics	n.a.			8	8
International Journal of Logistics Systems and Management	n.a.			3	3
International Journal of Shipping and Transport Logistics	1.34			7	7
International Journal of Transport Economics	0.517		6	6	12
Journal of Marine Science and Technology	0.72		3	2	5
Journal of Maritime Research	n.a.		1	2	3
Journal of Transport Geography	2.214		6	6	12
Marine Policy	2.621		1		1
Maritime Economics and Logistics	1.045		17	6	23
Maritime Policy and Management	1.447	5	23	20	48
Networks and Spatial Economics	1.80			1	1
Ocean and Coastal Management	1.769	2			2
Regional Studies	2.017	1			1
Research in Transportation Business and Management	n.a.			4	4
Research in Transportation Economics	n.a.		4	3	7
Tourism Management	2.377			1	1
Transport	0.529			1	1
Transport Policy	1.718		2	5	7
Transportation Journal	n.a.		1	3	4
Transportation Planning and Technology	0.255			1	1
Transportation Research Part A: Policy and Practice	2.525		3	3	6
Transportation Research Part E: Logistics and Transportation Review	2.193				
		1	4	5	10
Transportation Research Record	0.44		1		1
Grand total		10	73	87	170

Note:

n.a. = not applicable.

Table 2. The final sample of academic papers: Breakdown by type and method.

Type of paper	%	Method	%
Research paper	60.9%	Econometrics	23.9%
Case study	19.6%	Case study analysis	21.7%
Conceptual paper	17.4%	Modeling, simulation and OR	19.6%
Literature review	2.2%	Basic descriptive statistics	10.9%
-	-	Multivariate statistical analysis	8.7%
-	-	Content analysis	6.5%
-	-	Literature review	4.3%
-	-	Field research	4.3%
Total	100.0%	Total	100.0%

Source: authors' own elaborations.

Table 3. Literature review: The key drivers of port competitiveness.

Rank	Key drivers	Definition	Number of papers	Citations		References
				Total	Average per paper	
1	Port costs	The costs bearded by port's customers is a function of direct port costs such as port charges, storage and stevedoring, as well as indirect costs incurred during lengthy port stops	13	537	41.3	<i>Strandenés and Marlow (2000); Song and Yeo (2004); Lirn et al.(2004); Cullinane et al. (2005); Guy and Urli (2006); Tongzon and Sawant (2007); Chang et al (2008); Wiegmans et al. (2008); Anderson et al. (2009); Low et al. (2009); Yuen et al. (2012); Wang et al. (2014); Yeo et al. (2014).</i>
2	Hinterland proximity	Hinterland proximity refers to the geographical proximity of the main hinterland markets served by a port (both local/captive markets and others, more distant and contestable)	12	446	34.3	<i>Yeo et al. (2014); Malchow and Kanafani (2001); Tiwari et al. (2003); Malchow and Kanafani (2004); Guy and Alix (2007); Lin and Tseng (2007); Chang et al. (2008); Wiegmans et al. (2008); Garcia-Alonso and Sanchez-Soriano (2009); Low et al. (2009); Van Asperen and Dekker (2013); Kim (2014).</i>
3	Hinterland connectivity	Hinterland connectivity refers to the efficiency of inland transport networks (e.g. rail and road transport)	12	455	37.9	<i>Slack (1985); Wood (2004); Guy and Urli (2006); Acosta et al. (2007) ; Guy and Alix (2007); De Martino and Morvillo (2008); Yeo et al. (2008); Wiegmans et al (2008); Low et al. (2009); Iannone (2012); Yeo et al. (2014); Kim (2014).</i>
4	Port geographical location	Geographical location has an inclusive meaning and refers to the spatial positioning of the port respect to shipping networks, inland market areas, inland transport infrastructures, logistics centres, consuming markets, urban areas, etc.	9	483	53.7	<i>Malchow and Kanafani (2001); Tiwari et al. (2003); Song and Yeo (2004); Malchow and Kanafani (2004); Chang et al. (2008); Tongzon (2009); Garcia-Alonso and Sanchez-Soriano (2009); Anderson et al. (2009); Yuen et al. (2012).</i>
5	Port infrastructures	Port infrastructures are evaluated on the basis of the number and quality of available infrastructures (e.g. breakwater, quay wall, yard surface, etc.), as well as in relation to their appropriateness respect to customer's needs and environmental concerns.	6	367	61.2	<i>Lirn et al. (2004); Ugboma et al. (2006); Lin and Tseng (2007); De Martino and Morvillo (2008) Tongzon (2009); Onut et al. (2011).</i>

6	Operational efficiency	Capacity of a port to employ all its resources efficiently to deliver high operational performance (e.g., ship turnaround time, ship waiting times due to congestion, cargo handling productivity, etc.)	6	366	61.0	<i>Tongzon and Heng (2005); Ugboma et al. (2006); Low et al. (2009); Tongzon (2009); Onut et al. (2011); Tang et al. (2011).</i>
7	Port service quality	Port service quality refers to the quality of (all) port facilities, and to the capacity of differentiating the services supplied from competitors.	6	190	31.7	<i>Song and Yeo (2004); Cullinane et al. (2005); Guy and Urli (2006); Tongzon and Sawant (2007); Yeo et al. (2014); Kim (2014).</i>
8	Maritime connectivity	Maritime connectivity refers to the efficiency of shipping transport networks (e.g. number and variety of served destinations, logistics cost, etc.).	5	273	54.6	<i>Slack (1985); Ugboma et al. (2006); Acosta et al. (2007); Tongzon (2009); Low et al. (2009).</i>
9	Nautical accessibility	Nautical accessibility refers to the capacity of a port to accommodate large vessels at anytime, regardless of tide and weather conditions. It is affected by natural factors (e.g, depth of inland rivers, tide range, etc.) and the endowment of physical infrastructures (e.g., locks, breakwaters, etc.)	3	165	55.0	<i>Lin and Tseng (2007); Wang and Cullinane (2008); Low et al. (2009).</i>
10	Port site	Port site refers to the extension of the entire port area, the quality of terminal layouts and common spaces, as well as its appropriateness respect to the needs of port users.	3	112	37.3	<i>Marti (1990); Cullinane et al. (2005); Wang et al. (2014).</i>

Other drivers (*in decreasing order of relevance*):

(11) inter-port cooperation, inter-organizational relationships, port suprastructures, extended gateway systems, inland investments in logistics, maritime cargo volume, inland transportation costs, logistics cluster, port congestion, (20) feeder connectivity, degree of privatization, freight rates, efficiency of customs procedure, ICT services, inland logistics centres, inland transport infrastructures, institutional environment, intra-port competition, matching demand expectations, (30) Port Authority strategies, port expansion, supply chain integration, environmental issues, collective action regimes, local governance, scale economies, port reliability, bunker price and quality, (39) road pricing.

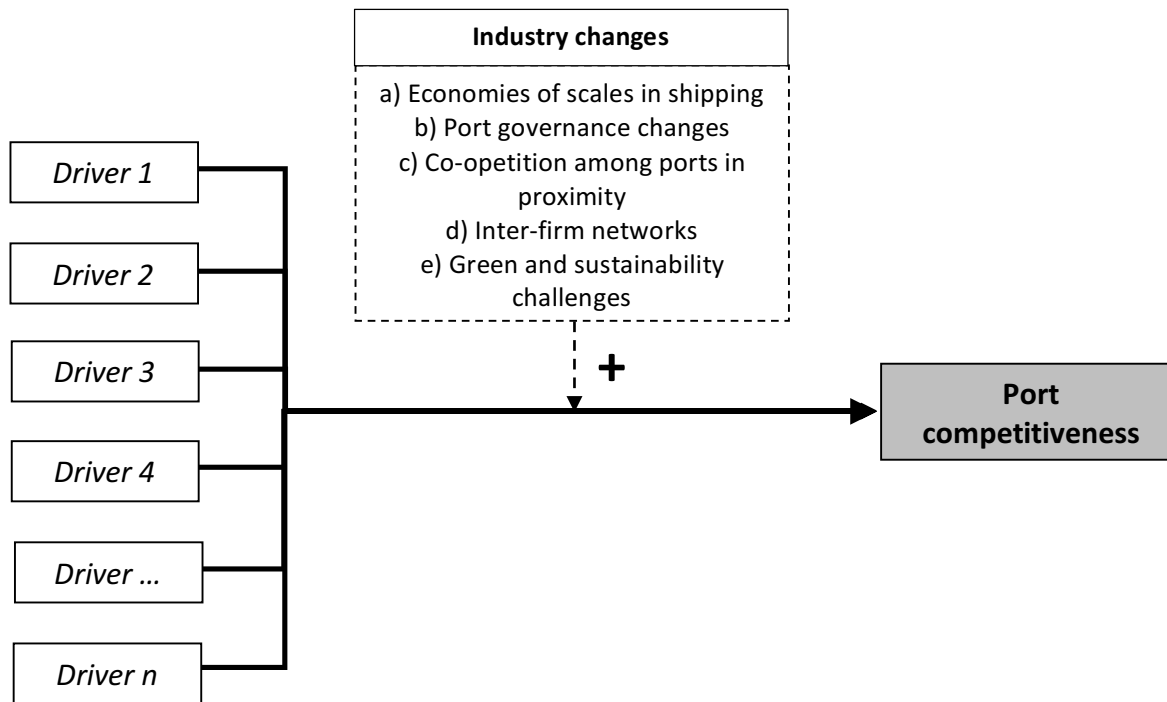
Source: authors' own elaborations.

Table 4. The main drivers of port competitiveness moderated by cutting-edge industry changes.

Cutting-edge industry changes			Main moderated (+) drivers of competitiveness
Trends	Critical success factors	References	
a) Economies of scale in shipping	i) synchronization of sea-land operations, ii) presence of dedicated terminals ensuring a stable cargo base, iii) tailored landside infrastructures and inland connections/dry ports, iv) proactive hinterland strategies by Port Authorities.	<i>Cullinane and Khanna (2000); Imai et al. (2006); Parola and Musso (2007); Van Der Horst and De Langen (2008). Rodrigue and Notteboom (2009); Roso and Lumsden (2010); Martin et al. (forthcoming).</i>	Port costs, hinterland connectivity, operational efficiency, nautical accessibility, port infrastructures, port expansion, maritime cargo volumes (dedicated terminals), etc.
b) Governance changes	i) governance framework and managerialization of the Port Authority, ii) agile and coherent institutional chain, iii) proactiveness and scope of Port Authority strategies, iv) market openness and selection of competitive private investors.	<i>Brooks and Cullinane (2006); World Bank (2007); Brooks and Pallis (2008); Ng and Pallis (2010); Jacobs and Notteboom (2011); Van der Berg and De Langen (2011); Notteboom et al. (2012); Siemonsma et al. (2012); Debrie et al. (2013); Dooms et al. (2013); Parola et al. (2013); De Langen and Heij (2014); Vieira et al. (2014).</i>	Port Authority strategies, inter-organizational relationships, port infrastructures, hinterland connectivity, local governance, institutional environment, degree of privatization, intra-port competition, etc.
c) Co-opetition among ports in proximity	i) (degree of) competition for attracting customers and investors, ii) development of joint-projects on R&D, green issues, safety and security, inland infrastructures, iii) joint marketing and communication activities, iv) lobbying activity towards governmental institutions.	<i>Heaver et al. (2001); Song (2003); Notteboom and Rodrigue (2005); Caballini et al. (2009); Notteboom et al. (2009); Notteboom (2010); Wang et al. (2012); Ng et al. (2014).</i>	Inter-port cooperation, local governance, institutional environment, scale economies, hinterland connectivity, inland investments in logistics, ICT services, Port Authority strategies, etc.
d) Inter-firm networks	i) bargaining power of customers and users, ii) influence of port multinationals on long-term port development and strategic decisions, iii) relations between local and international stakeholders and intensity of conflicts.	<i>Midoro and Pitto (2000); Heaver et al. (2001); Song (2003); Olivier and Slack (2006); Vanelslander (2008); Soppé et al. (2009); Parola and Maugeri (2013); Parola et al. (2014).</i>	Port costs, port infrastructures, port service quality, operational efficiency, Port Authority strategies, inter-organizational relationships, degree of privatization, port site, etc.
e) Green and sustainability challenges	i) respect of international green regulations, ii) green innovations in processes and facilities, iii) sustainable port planning, iv) smooth city-port relationship and social stability and consensus, v) preservation of port image and reputation.	<i>Bergqvist and Egels-Zandén (2012); De Langen et al. (2012); Parola and Maugeri (2013); Yap and Lam (2013); Lam and Gu (2013); Acciaro et al. (2014a); Acciaro et al. (2014b); Lam and Notteboom (2014).</i>	Environmental issues, port infrastructures, port site, Port Authority strategies, local governance, etc.

Source: authors' own elaborations.

Figure 1. The moderating effect of cutting-edge industry changes on the drivers of port competitiveness.



Source: authors' own elaborations.