

# 1. Geographies of maritime transport

## Gordon Wilmsmeier and Jason Monios

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### 1.1 MARITIME TRANSPORT: A GLOBAL INDUSTRY

Land transport has always been slow, unreliable and dangerous. As maritime transport developed along rivers and coastlines, towns and cities located on water routes could reap the advantages of larger loads that did not need to be moved along the ground. If water transport was also dangerous and relatively slow by today's standards, it had a further reach.

The history of trade was about scarcity, so long-distance trade focused on rare and valuable goods, such as along the famous Silk Road. This was performed using caravans of animal-hauled goods. What is curious is that even that famous trade route involved a common transport mechanism of today, i.e. transshipment, as traders specialised in certain segments of the route. Transshipping sacks between camels may be different to a transshipment port today yet reveals an interesting aspect of global trade that has never been overcome. Nevertheless, distance, friction and profits at each stage were and remain basic aspects of global trade.

The growth of long-distance maritime transport in the 15th to the 19th centuries changed all this, allowing more direct and faster transport between east and west. Throughout the history of maritime transport, operators have had to make decisions on ship size and type, transshipment, storage and price, while ports and states have pursued various policies of handling goods, customs charges and trade policies. Some of the issues raised are endemic to shipping as a transport mode. For example, Sjoström (2004: 107) argues: "Liner shipping has been characterized by collusive agreements, called shipping conferences, since its founding in the mid-nineteenth century."

Shipping is a global business, connecting ports on every coastline in the world via a global network of maritime transport services. These services are provided by companies and assets from across the world, such as ship building (92 per cent in China, Korea and Japan), ownership (32 per cent in Germany, China and Greece), flagging (70 per cent registered in a country different to the country of ownership) and scrapping (94 per cent in

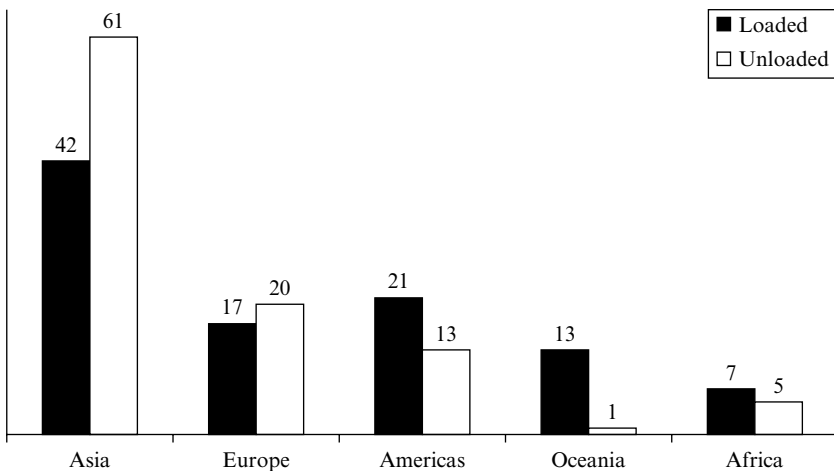
Bangladesh, India, Pakistan and China), with crew drawn from countries such as the Philippines, Indonesia and Ukraine (UNCTAD, 2018). The geographies of each of these aspects have undergone significant changes over the last decades.

The evolution of world trade is reflected in the emergence and disappearance of major trade lanes over time. China owned the world's largest seagoing fleet, the "Treasure Fleet", in the 1400s with up to 3,500 vessels, some having up to a fivefold capacity compared with those built in Europe at that time. This fleet sailed regularly between China and Africa. Interestingly, China banned all oceangoing vessels and decided to destroy its fleet and voyage records as of 1430 in an attempt to control foreign trade. By the beginning of the 1500s the fleet had completely disappeared. Thus, while China had the capacities and technological solutions to circumnavigate the globe centuries ago, the political class decided to withdraw from this endeavour (Edwards, 2017).

The following centuries were influenced by the emergence and dominance of European seafaring. Exploration was quickly followed by exploitation, in which a large volume of resource extraction took place from the "new world" to the "old world". As the American colonies developed, this included the infamous slave triangle transporting slaves from Africa to the Caribbean, sugar, tobacco and other crops to Europe, and manufactured goods from Europe to Africa. This system was maintained and enforced through colonial power and "gunboat diplomacy". One example was the Opium Wars, as well as colonially granted trade monopolies whereby the British East India Company was protected by British naval power. The history of trade is not just about absolute or comparative advantages; it is also about power and control – not only physical power but also the ruling narrative regarding the rights of colonial powers. Later, as the United States rose to eminence, commercial trade linking North America with Europe led to the rise of transatlantic trade.

The emergence and then continued rise of Asia in recent decades has altered this geography of trade. Over the last two decades, from 1998 to 2018, transatlantic containerised trade has doubled from 4 to 8 million TEU, whereas transpacific has gone from 8m to 28m and Europe–Asia via Suez from 6m to 25m TEU (UNCTAD, 2018). Now 48 per cent of all global container trade originates in or is destined for Asia (see Chapter 2). Where once London in the UK, Rotterdam in continental Europe and New York in the US were some of the world's busiest ports due to the importance of transatlantic trade, all the top ten container ports are now in Asia.

Looking specifically at tonnage rather than containers (which indeed represent only 17.9 per cent of global trade), Figure 1.1 shows world seaborne



Source: Authors, based on UNCTAD (2018).

Figure 1.1 Percentage of world seaborne trade by region, 2017 (tonnes)

trade by region in 2017. What the figure does not reveal is that the major trade lanes are all east–west, leaving large populations in the Global South on the periphery of the global liner shipping network, with lower levels of connectivity, frequency of service and competition, resulting in higher transport costs.

South–south and north–south trades have been growing (recently at over 6 per cent per year), and will potentially redraw the global geography of maritime transport (see Chapter 2 for detailed discussion); but the shape and extent of such a new geography of trade depends on many of the factors that currently support our complex globalised trade network (see closing discussion) and are directly linked to the future turn of globalisation.

## 1.2 GEOGRAPHICAL ISSUES IN MARITIME TRANSPORT

Never before has so much depended upon ships and shipping . . . It [my book] recalls a story of cargoes, trade routes, ports, riverways and ship types . . . It is as much a maritime geography as a book on ships and shipping and endeavours to tell the story as much by chart and illustrations as by word. (Hardy, 1941)

Books on maritime geography date back as far as 1815 (Tuckey, 1815).

Earlier publications focused on descriptions of shipping, as well as on the physical geography and political issues (e.g. colonies, commercial treatments, etc.). The four volumes of Tuckey probably give one of the first complete overviews on maritime trade and transport activities (presenting an extensive list of existing related literature in the first section of volume I), however still focusing on the geographical description of territories. Later books on maritime geography (e.g. Hardy, 1941) centred on the description of trade routes, networks (schedules) and trade flows, differentiating cargo types and traffic in key areas around the globe (e.g. Panama Canal, Suez Canal).

More recent books on maritime geography include Couper (1972), who followed the tradition of describing the different shipping markets (dry, liquid bulk, general cargo, etc.). Maritime transport in developing regions was a new topic, focusing on freight rates and the development of national fleets in these countries. The books here are just examples as numerous books on maritime trade and shipping were published across various countries and languages. Over time these publications evolved towards a more maritime economics perspective, Stopford (1997) probably being the most well-known publication.

Some of the early works of transport geography were contributed by geographers working in the port sector. Such early approaches to the geography of port system evolution were predominately taken from a spatial perspective (Bird, 1963; Taaffe et al., 1963; Rimmer, 1967; Hoyle, 1968; Hayuth, 1981; Barke, 1986; Van Klink, 1998). However, by the early 2000s, freight transport geography, and particular maritime geography, had become “a niche concerned with the transport system itself but with few linkages to economic and industrial development” (Pedersen, 2001: 85).

A geographical discussion of freight transport and maritime transport reappeared around 2005 (e.g. Nuhn and Hesse, 2006; Rodrigue et al, 2006; Knowles, Shaw and Docherty, 2008). Analysis with geographical perspectives turns to address port competition through hinterland accessibility (Notteboom and Rodrigue, 2005; Monios and Wilmsmeier, 2013), the structure of maritime services (Sánchez and Wilmsmeier, 2006; Rodrigue and Notteboom, 2010; Wilmsmeier, 2014), the influence of liner service concentration (Frémont and Soppé, 2007; Lee et al., 2008; Wilmsmeier and Sánchez, 2011; Wang and Ducruet, 2012) and the new spatial patterns of port cities (Ducruet and Lee, 2006). The general trend of maritime and port geography research in recent decades has thus been away from traditional geographical approaches and towards more applied and operational perspectives (Ng et al., 2014). One clear recent subject of maritime transport geography is the explosive growth of cruise shipping (see Chapter 11).

Recent academic work in maritime transport geography continues to

examine the spatial development of port systems. Graph and network analysis (e.g. Ducruet, 2017) is a powerful tool to reveal the growth and change of spatial networks of shipping services connecting major hubs. Analysis of port system evolution has established a spatial principle of an initial trend towards concentration and rationalisation of ports within a range, followed by a deconcentration due to diseconomies of scale (Barke, 1986; Hayuth, 1981; Slack and Wang, 2002; Notteboom, 2005; Frémont and Soppé, 2007; Ducruet et al., 2009; Wilmsmeier and Monios, 2013). In response to this deconcentration, the emergence and location of secondary ports (Slack and Wang, 2002; Wang and Ng, 2011; Wilmsmeier and Monios, 2013; Wilmsmeier et al., 2014; Monios et al., 2019) is an interesting trend. Yet these trends are not driven purely by spatial principles of network formation, but are instead heavily influenced by other factors, such as policy, planning and industrial strategy, understanding of which has led to the need for more qualitative approaches. Such qualitative studies have analysed the geographical trends for port devolution (Brooks et al., 2017) and the rise of global terminal operators (Notteboom and Rodrigue, 2012), resulting in many studies and a growing body of theory on port governance, analysing blends of public and private ownership and operation to produce (particularly container) port services around the globe.

It has been some time since a dedicated volume was published on maritime transport geography, although a number of books discussing this theme appeared in the 1970s and 1980s, representing also some of the key early contributions to transport geography. These books include *Seaports and Seaport Terminals* (Bird, 1971); *The Geography of Sea Transport* (Couper, 1972); *Cityport Industrialization and Regional Development* (Hoyle and Pinder, 1981) and *Seaport Systems and Spatial Change* (Hoyle and Hilling, 1984). Since then, it seems that perhaps maritime geography has been subsumed within the broader sub-discipline of transport geography. Although important papers continue to be published, book-length treatments of transport geography are more general and less specialised in one mode. Relevant books include *Geography of Transportation* (Taaffe and Gauthier, 1973); *Transport and Trade* (Barke, 1986); *Modern Transport Geography* (Hoyle and Knowles, 1992/1998); *Transportation: A Geographical Analysis* (Black, 2003); *The Geography of Transport Systems* (Rodrigue et al., 2006); and *Transport Geographies* (Knowles et al., 2008). Nevertheless, some of these volumes (particularly Rodrigue et al., 2006 and subsequent editions) include a significant focus on maritime transport.

Despite substantial activity in academic journals (bolstered by the establishment of a dedicated *Journal of Transport Geography* in 1993), transport geography remains a somewhat marginal area of human geography. Shaw

and Hesse (2010: 305) characterise the subject as, “despite its vintage, frequently absent from major human geography texts”. Shaw and Sidaway (2010: 504) suggest that this could be because transport geography has been “only marginally associated with key social, political and cultural imperatives”, while other authors are critical that geographers have tended to neglect questions arising from the role of neoliberalism in transport (Wilmsmeier and Monios, 2015; Pyrtherch and Cidell, 2015). One fruitful avenue for exploring these questions is via the mobilities paradigm, which allows a broader focus on the concept of movement, and particularly the social and cultural rather than solely economic aspects underpinning, driving and challenging it. This approach also entails much greater focus on political issues and choices determining the development of the global system of mobility, who has access and who benefits. A recent edited book titled *Maritime Mobilities* explored many of these issues, such as governance, regulation, the role of employees, seafarers and citizens, and especially the local realities of this global system (Monios and Wilmsmeier, 2018). Such approaches are also observed in the increased usage of the term “geographies” rather than the singular “geography”. This change reflects the interdisciplinarity of geography as practised today, the recognition of multiple perspectives rather than a monolithic singular shared view. This interdisciplinarity is reflected in the wide range of backgrounds of scholars contributing to this book. Both “mobilities” and “geographies” approaches highlight also the issue of unequal power relations and seek to give greater space and voice to those benefiting less from the current globalised system. In our view, such critical perspectives are absolutely needed, and scholars should not shy away from making criticisms of the sector even as we point out the great benefits that shipping brings.

While there have been no other recent dedicated books on maritime transport geography, some special issues of academic journals have been published. “Maritime and port economic geography” by Charlier et al. (2004) covered topics such as globalisation, regional and global port governance and integration between shipping and land transport. The editorial for the special issue on “The geography of maritime transportation: space as a perspective in maritime transport research” by Ng and Wilmsmeier (2012) discussed the state of research in maritime geography. They argued for a continued relevance of space in research on maritime transportation across disciplines. At the same time, they also identified “a ‘geographicalization’ in other disciplines . . . such as the emergence of geographical economics”, which on the one hand underlines the relevance of geography, but on the other “dilutes the ‘geographicalness’ of maritime geography research” (Ng and Wilmsmeier, 2012). This becomes obvious in the collection of the papers and interdisciplinarity of the contributors

in their special issue, and in the same manner is reflected in the multitude of disciplines contributing to this book. “Between path dependency and contingency: new challenges for the geography of port system evolution” by Monios and Wilmsmeier (2016) examined the spatial principles of concentration and deconcentration via regional port systems and transhipment hierarchies, liner services, and the governance and life cycles of ports.

These contributions reveal the ongoing relevance of core geographic principles of space, place, scale and networks, while also highlighting the interdependence of geography and economics in terms of network optimisation, market structure and transport costs. While this relationship is necessary and fruitful, the danger is that economic approaches dominate the geographical, focusing only on market rationale and overlooking the social, cultural and political elements influencing the global trade system. The classical economic rational actor does not exist, as evidenced by much behaviour of shipping lines leading to the market cycle of peak and trough.

### 1.3 CHAPTER CONTRIBUTIONS

The chapter contributions to this volume display a wide range of topics, from traditional analyses of trade, commodity flows and shipping networks, to business, ownership and investment strategies, to natural routes and manufactured infrastructure, short and long distance, oceans, rivers and canals, to geopolitics and environmental challenges.

Chapter 2 outlines the historic development of maritime trade and transport to the present day, identifies the main trades and geographical regions and discusses shifts in the structure of sea transport demand and supply from the perspective of transport and trade geography. The chapter also offers some thoughts on the future of globalisation from the perspective of maritime geography.

Chapter 3 explores the link between world economic growth and international trade, and queries the recent demand environment for aspects that could signal a long-term challenge to the “growth-to-trade” conversion rate.

Chapter 4 analyses spatial and complex networks by use of graph theory, revealing that container shipping has experienced tremendous technological and geographic changes in recent decades. The authors produce a new cartography of how the global container shipping network has been geographically distributed over time, thereby highlighting major shifts in terms of port hierarchies and main corridors.

Chapter 5 examines the geography of bulk shipping, which has traditionally been connected to the economic structure of different world

regions with well-defined exporter countries and specific consumption areas. However, recent economic trends as well as the modification of consumption patterns modified historical trade routes and related shipping services. As a result, the introduction of bigger ships and emerging issues related to new energy consumption patterns have significantly affected the traditional shipping network.

Chapter 6 looks at commodities, in which the authors comment that what is often ignored by transport geographers and maritime economists is the way commodity markets themselves function and how the performance of these markets influences the demand for freight and the geography of maritime transport.

Chapter 7 considers the role of the two major canals in global maritime transport, which largely define the structure of the global shipping network: Panama and Suez. They examine the expansion in both canals and observe some differences in price structure.

Chapter 8 turns to geopolitics, describing the changing geography of transport between East Asia and Europe with a special focus on China, in light of the recent “Belt and Road Initiative” (BRI). The author discusses how geopolitical considerations play an increasing role in the design of the new transport infrastructure within the Eurasian continent and its potential effect on the maritime transport lanes between Asia and Europe.

Chapter 9 discusses short-distance maritime geographies, focusing on shipping goods domestically or within an economic region, often referred to as Short Sea Shipping (SSS). The chapter provides an overview of the main SSS segments, and particularly elaborates on the two most important: roll-on/roll-off shipping and container feeder shipping.

Chapter 10 turns to the geography of waterborne transport on rivers. Via an analysis of the changing institutional and legal processes, the chapter explores how the story of regional cooperation around rivers may echo, at a smaller scale, the story of globalisation, with its opportunities, limits and potential adjustments.

Chapter 11 describes another specific trend in maritime transport geography, that of cruise shipping, detailing how cruise shipping has witnessed an uninterrupted growth over the last three decades, supported by operators seeking economies of scale and advanced segmentation, in order to offer innovation and schedule new types of itineraries, a key influence on which is the strategies of cruise ports to host more cruise activities. The chapter also discusses the social, economic and environmental questions accompanying cruise growth and globalisation.

Chapter 12 analyses the evolution of the container shipping sector and considers whether the market can now be considered mature, and, if so, what comes next, drawing on traditional theoretical concepts relating to



market cycles and economies of scale. The industry life cycle theory is applied to the container shipping sector, demonstrating that the sector is at the stage of maturity; but whether it will decline or be reinvigorated is open to question. Finally, the chapter considers whether the current challenges to the sector will lead to a new phase or a decline.

Chapter 13 assesses the role of state-owned enterprises (SOEs) in ports and shipping, identifying a large use of SOEs in international container terminal operations and port development. This raises important additional research questions, most importantly regarding the strategic rationale of SOE internationalisation and the role of geopolitical considerations in international activities.

Chapter 14 considers the role of financial operators in port infrastructure. These operators have been increasingly seeking new clients and additional investment opportunities. Initially, they emerged as key players orchestrating financial deals in the sector, but later they also became active investors in ports and related infrastructures. The chapter identifies and discusses the intrinsic characteristics, objectives and global strategies of various types of financial operators, including investment banks, private equity funds, sovereign wealth funds and SOEs, pension funds and insurance companies, and investment holding companies, as well as multilateral financial institutions and development banks.

Chapter 15 explores maritime clusters, according to the authors a key subject in regional studies over the past two decades, given that maritime clusters are centres of industry and economic development. The authors reveal the mechanisms driving maritime cluster evolution, originating from diverse modes of regional economic development. More importantly, development models and policies which are suitable for each mode of maritime cluster development are proposed, namely the maritime production cluster, maritime service cluster and all-in-one maritime cluster.

Chapter 16 investigates the relationship between port cities and world cities, measuring both the attractiveness of cities/regions with a seaport towards the location of the largest global third-party logistics (3PL) and the correlation between the logistics connectivity of port cities and the physical distance between these port cities and the nearby world cities. Their econometric analysis finds that, in the case of port cities located very far from world cities, they can concentrate advanced logistics functions thanks to the impact of variable specialised knowledge centres. On the contrary, if there is a nearby world city, this one tends to suck up the advanced logistics functions.

Chapter 17 looks at the inland perspective of maritime transport, analysing the strategic governance of inland ports located within urban areas. The authors develop a matrix incorporating the logistical dedication

and the geographic reach of economic activities that take place within a specific inland port and relate the findings to urban freight policy.

Chapter 18 discusses international shipping and climate change. Notwithstanding the comparatively low greenhouse gas emissions per unit of a tonne of seaborne freight, international shipping is responsible for a significant share of global emissions. The chapter reviews the main issues associated with decarbonising the shipping sector, highlighting the complexity of devising effective climate change policies and emphasising the need for a holistic approach to maritime decarbonisation.

Chapter 19 examines the impact of environmental challenges on the shipping network, discussing the implementation of Environmental Controlled Areas, the adoption of new ship standards (e.g. LNG) and the introduction of international regulations (e.g. Ballast Water Convention). The chapter also investigates recent technological, regulatory and strategic trends emerging within the shipping network, as well as recent developments (e.g. slow steaming and Arctic shipping).

Chapter 20 discusses the new geography of Arctic shipping. The chapter argues that enabling the potential of trade in the region must be differentiated by the sector and type of traffic and according to changing market environments. A significant challenge is to deliver shipping services in the most environmentally sound manner and in adaptation to the extreme physical conditions.

## 1.4 THE FUTURE OF MARITIME TRANSPORT GEOGRAPHY

What is striking is not so much what has changed in the last two centuries of shipping but what has not. Some of the key issues of 150 years ago are still recurrent in contemporary discussions, such as concentration, overcapacity and market cycles. Major changes in the spatial flows of maritime transport have been a transition from earlier eras of colonisation and resource extraction from the new world to Europe, to the transatlantic trade between Europe and North America, and then in the last two decades the rise of Asia. Future changes to this dominant east–west trade will be an increase in regional, south–south and north–south trade, and the potential of Arctic shipping. While environmental impacts of shipping have been clearly identified, one must keep in mind that industry lobbying against environmental regulations, clearly needed safety practices, or corporate social responsibility remains as old as the industry itself.

Maritime transport in all its facets and complexity can facilitate the mobility of goods and people, and has been responding to the increasing

demands of circulation of both over the last decades. Thus, maritime transport has been central to the exchange and exploitation mechanisms of globalisation. Yet, maritime geographies are of much higher complexity than the physical movement of goods and people, and as much as maritime services can improve accessibility and centrality of countries, regions and ports, their absence, distortion or limitation will drive peripherality of the same (cf. Wilmsmeier and Sánchez, 2010; Rodrigue et al., 1997), as evidenced in hub-and-spoke and hierarchical liner shipping networks.

Looking to the future, there are several trends that will influence the geography of global trade in the decades to come (discussed in Chapters 2 and 3). In terms of production and consumption, trends include continued change in the weight/volume relationship of cargo, miniaturisation, re-shoring of industrial activities, 3-D printing, changing trade policies (including a partial reversal of free trade) and ageing societies. Technological changes to maintain competitiveness of the sector include increased automation of ships and terminals, larger vessels and larger containers. Other potential system shocks include market instability, political uncertainty, tariff wars, looming recession, debt crisis and hacking. These challenges are more difficult to forecast, but they are already happening now and will challenge our current globally extended supply chains. The major concern for the future, as for the present, is of course the environment. Climate change effects are already occurring, and previous forecasts for effects more than 100 years in the future are being radically brought forward. Rising sea levels and major storms will threaten our globally integrated supply chains in the coming decades. These are major disruptors that are already happening, and scientific predictions are becoming worse all the time. Current predictions are in the region of several metres of sea level rise by 2100 and storms that would be considered catastrophic today to arrive regularly (Hansen, 2007). These changes will affect ports directly but also the wider economy as a result of massive migrations of coastal populations, crop failures, regional conflicts and countries spending billions on adaptation, all of which will influence demand for shipping and ports in profound and unpredictable ways (see Chapter 2). Yet these issues have been sorely under-addressed in the literature. While many scholars (not just geographers) consider small incremental changes and improvements to current practices, there is a lack of serious consideration of major climate disruptions that will radically alter not just operational practices but global patterns of production and consumption, and hence the geography of maritime transport. Addressing these topics will be the task of scholars in the coming decades, and it is one to which the particular skills of maritime transport geographers are well suited.

This book is a collection of well-considered, empirically rich interdisci-

plinary contributions demonstrating the key role of maritime transport in the 21st century's globalised economy. The publication thus complements the recent books *Maritime Mobilities* (Monios and Wilmsmeier, 2018) and *Cargo Mobilities* (Birtchnell et al., 2015) by adding contemporary and critical perspectives on the state of the maritime industry.

Despite the breadth of the collection of research topics presented in this volume, the book captures only a section of the richness of the maritime geographies field. There is scope to further “understand the social and cultural aspects of transportation [and] dissatisfaction with the existing and largely quantitative approaches” (Pyrtherch and Cidell, 2015: 26) and to question the effects of the continued economisation of maritime transport during a period demanding sustainable paradigm shifts. Adaptation will be the key characteristic determining the future of maritime transport geographies. As pointed out by Megginson (1963: 4): “It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself.” It will be interesting to observe how future maritime geographies research will build on the perspectives presented in this book, and how new philosophical and methodological approaches will emerge.

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