1 Editor's introduction: the maritime industry means business

Kevin Cullinane

Over the past decade or so, the maritime sector has increasingly been considered a part of a wider international logistics industry that supports, contributes to, and represents an integral element of, global supply chains. This emergent change in perspective certainly reflects what has occurred within industry – both inside and outside the maritime sector – but is also manifest in the academic literature of maritime business. It seems appropriate, therefore, that this work is launched with the initial chapters serving to emphasise this context and to provide a background for this relatively novel and, certainly, more macroscopic perspective. At the same time, however, while acknowledging that the wider supply chain or logistics context does provide an alternative and supplementary perspective on maritime business, it should be recognised that it has not supplanted the more traditional microscopic focus on matters germane to either or both the shipping and port sectors in isolation. As is illustrated by the contents of this work, both these perspectives are well represented in the range of research which is currently being undertaken on maritime business.

As one of the most ardent and vociferous proponents of the adoption of a wider supply chain perspective on the maritime sector, the first substantive chapter of this book is by Ross Robinson (Chapter 2). He presents a scene-setting exposition of the implications of this wider supply chain context by analysing the competitive position of ports and suggesting that they need to alter their perspective if they are to remain competitive. Underpinned by a convincing logic, the author asserts that ports are embedded within complex matrices of supply chains. Precisely because of this, it will be necessary to understand the architecture and dynamics of port-linked supply chains in order to adequately define the functionality of a port. Given that supply-chain architecture is a function of its underlying business model, he argues that it is beholden upon port authorities to understand not only what freight might be concentrated through their port, but also the business model which is determining why and how it is moving at all. By so doing, an understanding will then be gleaned as to the demands on the functionality and value to be delivered by the port. The author illustrates and clarifies these arguments in two detailed case studies of new demand–pull strategies that have impacted upon some of Australia's largest coal export ports and its metropolitan ports handling significant import flows of consumer goods. On the basis of this analysis, Robinson avows that operational efficiency is a necessary, but not sufficient, condition for port growth and that the emergence of new value pools in globalising supply chains requires new thinking about port development strategies. He concludes that the primary objective of ports, therefore, should rest with capturing value by establishing their role within the wider supply chain, rather than adopt the more traditional focus of looking simply at competition within their hinterland.

In Chapter 3 by Thomas Pawlik and Phanthian Zuesongdham, the emphasis is again placed upon fulfilling customer demand and maximising customer satisfaction within a supply chain by ensuring maximum internal operational efficiency and effectiveness. Paying particular attention to the port of Bremerhaven, the authors adopt a conceptual framework based on the value-adding transformation model from operations management and seek to apply it to container terminals. While the authors acknowledge that all transformation processes within a container terminal have to be performed in the most efficient and effective manner, their focus is on the container transfer subsystem which links the activity of loading or discharging a ship to the storage area. They highlight the fact that this particular transformation process must be optimally planned and implemented so that any delay or congestion within the terminal area does not affect other operations.

In analysing this particular subsystem, Pawlik and Zuesongdham advocate the application of a process modelling approach which facilitates the measurement and development of a series of process-based indicators or key performance indicators (KPIs). At the process level, these may be compared to any available industry-comparable benchmarks which then might facilitate their optimisation. However, it is the performance of a container terminal across the full range of subsystems and their processes which ultimately has an influence over the actual competitiveness of a container terminal. Thus, in tandem with external environmental factors over which a container terminal exerts little influence or control, it is ultimately the basket of process-related KPIs (which are functionally dependent upon internal factors) that exerts a strong influence over customer perceptions and, in consequence, the competitive position of container ports and terminals.

Irrespective of the external factors at play, it is clearly important that decision makers within container ports strive to optimise the value of these KPIs across as many processes as possible. The authors conclude that within the basket of all KPIs, those attracting the greatest weight are those related to the 'transfer' subsystem which moves containers to and from the apron to storage. Once the dynamic optimisation of internal processes has been successfully achieved, the authors point to the importance of pushing back the boundaries still further by pursuing research into understanding and influencing the external factors which affect perceived competitiveness.

Again emphasising the role of maritime players within the context of the wider supply chain and international logistics, Chapter 4 by Eon-Seong Lee and Dong-Wook Song, revolves around maritime logistics value; a concept which refers to the extent to which shipping and port operators meet logistical demand, for example through the efficient and effective flow of physical goods, service and information. The authors suggest that if maritime players satisfy customers in seeking to achieve their logistical goals, the value of maritime logistics within any supply chain becomes greater. They also point out that the delivery of maritime logistics value is predicated on operational efficiency and service effectiveness.

The authors go on to advocate the implementation of a knowledge management system as a viable strategic option for shipping and port operators to provide enhanced maritime logistics value. Particularly when exploring the competitiveness of a firm in a highly uncertain environment (such as the case in international logistics), this form of knowledge-based approach has received wide acceptance in the strategic management discipline, where it is recognised that knowledge-based benefits accrue in the areas of innovation, uniqueness, productivity and service quality and so on. It is suggested that knowledge acquisition and application will, more specifically, enable maritime transport operators to play a crucial role in the whole logistics system by reducing lead times and costs and improving service flexibility and reliability. On the basis of an exploratory case study, the authors conclude that maritime transport operators acquire their most valuable knowledge through being embedded in cooperative/coopetitive networks and that by effectively applying this acquired knowledge, they can efficiently improve the maritime logistics value which they offer.

Chapters 5 and 6 provide practical case studies that reveal how the more holistic thinking in respect of the position of the maritime sector within international supply chains has been applied in practice. Both case studies share the important characteristics of relating to high-value perishable products that are time-sensitive and situations where shipping competes with air transport for the 'pole position' of preferred mode of transport.

In Chapter 5, Jasmine Lam presents a case study of a cold chain; a specific form of supply chain, dealing mainly with the handling of temperature-sensitive products, such as perishable food, confectionery and pharmaceuticals. Sea and air are the major competitor modes of transportation for handling the long-haul physical movement of such products. The author provides an empirical analysis of how to enhance the synchronisation of cold chains and, thereby, maximise the competitiveness of the sea mode as opposed to air. The case-study material she presents is for a container shipping supply chain, which she then relates to a model she proposes for achieving excellence in container shipping supply chains. This is achieved through the appropriate synchronisation of the cold chain in the areas of customer service, inventory, transportation and order processing at the operational, tactical and strategic levels. In so doing, the use of the model is clearly demonstrated and its applicability to practical examples is validated. In common with the ultimate goal of any supply chain, the author concludes that seaborne cold chain partners should work hand in hand to maximise the value and profit generated out of the end consumer by the chain. If achieved, this has obvious practical implications for maritime industry players as it is possible not only to enlarge the pie available to the shipping industry, but also to capture business opportunities away from the air cold chain.

In Chapter 6, Anthony Beresford and Chang Zheng present a case study of the transport of live plants from Taiwan to Guangdong Province on the Chinese mainland. The route from origin to destination is not very long in the context of international trade movements, thus the supply chains involved for goods following this route are relatively short. Nonetheless, there are a range of choices concerning routeing, modal choice and method of carriage which allow the logistical decision-making processes to be fruitfully explored. At the time at which the analysis was done, regulations governing transport between Taiwan and the Chinese mainland meant that Taiwanese ships could not sail directly into Chinese mainland ports. Thus, transhipment via a third-party location was necessary. Due to its location in respect of this particular trade, Hong Kong constituted a natural selection as the point of transhipment. However, the handling charges at Hong Kong are high and the route itself via Hong Kong also generates high transportation costs. Multimodal transport solutions for this route which aim to lower the total cost would, therefore, be very meaningful in commercial terms.

Traditional modal choice models are used as a research framework, with more sophisticated analysis then undertaken in order to explore the trade-offs in more detail, and to clarify the decision making in this semi-constrained commercial environment. Both the existing route and potential alternative routes are analysed. Comparisons are drawn to illustrate the selection criteria for the routes utilising the Beresford cost model for multimodal transport. Through the use of the cost model, it is shown that a number of alternative routes using a combination of sea, waterway and road transport from Hong Kong could achieve more economic routeings. Three of the routes analysed generate the same transit time as the original route but at lower cost. Moreover, it is shown that an efficient system can not only substitute for a unimodal route in both cost and time efficiency, but it can also offer the customer service flexibility which meets a range of requirements, especially in terms of risk minimisation.

By way of implicit recognition of the outcomes from the analysis contained in the previous chapter, an important trend within the container shipping industry over recent years has been to extend and diversify service offerings into landside logistics. This involves adding new functions that reach beyond the traditional expertise of maritime shipping companies. Previous research in relation to this phenomenon has tended to focus on shippers' selection of carriers and the performance of service providers based on attributes such as time, reliability and so on. In Chapter 7, however, Ki-Soon Hwang, Richard Gray and Kevin Cullinane provide a survey-based analysis of shipper perceptions of what is important for liner shipping companies to provide in their service offerings.

Factor analysis is applied to responses from a sample of international shippers in the UK and South Korea to reveal what functions are perceived to form part of a liner shipping company's logistics service provision. In terms of the range and quality of services that are actually supplied, hypothesis tests show that UK shippers are generally more satisfied with the logistics service provision of liner shipping companies than their South Korean counterparts and point to the logistics service functions of shipping lines where improvements are necessary.

As one of a range of strategic responses implemented by liner shipping companies to meet the demand for logistics service functions, in Chapter 8 Hercules Haralambides and Michele Acciaro analyse the services offered within the context of the product bundling concept. The authors point out that there are over 20 'components' in an international door-to-door supply chain, ranging from warehousing and distribution, to forwarding, documentation, ocean transportation, customs clearance, and more. Over time, as liner shipping tariffs have tended to converge due to the effects of competition and service homogenisation, in an effort to differentiate their 'product' and command a premium all-in price, carriers have sought to integrate supply chain components under their own control. In doing so, they have invested heavily in logistics, rather than ships that can relatively easily be chartered-in from private investors.

With the use of game theory, the profitability of bundling strategies for liner shipping companies is investigated. The authors argue that a carrier's profitability as the result of engaging in the provision of integrated solutions depends on the relative efficiency in assembling the bundle not only with respect to other carriers, but also with respect to shippers. The model that is developed also shows that the effects of bundling on consumer surplus and social welfare are negligible. These findings bring into question the veracity of the typical current strategy of buying ever-larger ships in pursuit of economies of scale. The authors conclude that better capacity utilisation, as well as greater profitability, can be achieved through improved alliance cooperation, as well as through the pricing of all-in services that is leveraged around carriers maintaining a comparative advantage in terms of the ocean transportation leg of the supply chain.

Offering a seemingly contradictory, but essentially still complementary view, of liner shipping strategy in Chapter 9, Antoine Frémont questions the accepted wisdom that because liner shipping companies are unable to create a comparative advantage at sea, they attempt to differentiate themselves and secure enhanced market shares on the back of the added value they can provide through the provision of inland logistics services. Instead, he hypothesises that the maritime leg remains the core activity of even diversified shipping lines and that their differentiated maritime networks and network coverage impact directly upon their competitiveness. Applying a methodology for studying the networks of shipping lines based on the capacity supplied by individual companies on alternative service routes, he proposes an explanation of the historical development dynamics in the market over the past 30 years which revolves around the unequal power of maritime networks.

The results of this study reveal significant differences between maritime networks which, Frémont contends, imply not only a significant degree of service differentiation, but also that they have been developed dynamically as outcomes from deliberate collective or individual strategies adopted by the shipping lines to increase their competitiveness in a highly competitive market.

Although it is quite clear that contemporary maritime networks are now integrated within larger transport chains which extend inland, the author concludes that they remain an essential source of competitiveness for shipping lines. This explains why liner shipping companies have constantly striven to strengthen their maritime networks through either internal or external growth or through an involvement in alliances. It is the resulting differentiation of maritime networks which, he suggests, explains the dominance in the 1980s of the Asian shipping lines, whose maritime networks were based on the external trade flows of their respective national economies. More recent carrier strategies, based on the creation of innovative maritime networks, provide an explanation for contemporary developments in market domination; an early adoption of hubs in order to increase the density of their networks in the case of Mærsk and the targeting of secondary markets initially and the later deployment of global networks in the case of the Mediterranean Shipping Company (MSC) and the Compagnie Maritime d'Affrètement (CMA).

Moving on to the consideration of how ports might respond to the new context for the provision of their services, Cimen Karatas Cetin and Güldem Cerit analyse how organisational effectiveness in meeting the requirements of shipping lines and other port users can best be satisfied. They propose a systems approach to analysing the effectiveness of port organisations. Their justification for this approach lies with the fact that ports are not only places for loading and discharging operations, but are also value-added organisations that are operated as intermodal terminals. In applying the systems approach, a port-oriented transport system can include all of the processes from the origin of the cargo to its destination; all the transport modes involved, the points of interface between these modes, the transport infrastructure and the network itself. The ports themselves comprise the focal point and encompass the most value-creating functions of this system. The interdependence between the functions contributes to the realisation of the objectives of the system, which are generally related to time and cost concerns.

Very clearly, ports play a significant role in this system by facilitating the effective functioning of the whole system and creating value to players in the supply chain. Most importantly, therefore, the expectations and requirements of port users also play an important part in the system and should be embedded within it. As such, it is essential that any port-oriented system is analysed from the perspective of the players in the supply chain. In this respect and given the dynamic changes that continue to occur in the operating environment of ports, the authors point out that a significant level of interaction between the port organisation and port users is needed for the effective operation of the value chain system. The authors conclude that to attain a truly effective port-oriented transport system, ports need to maintain flexibility in the light of constantly changing conditions, engage in intensive communication with all parties in the supply chain and ensure the quality and efficiency of port operations, as well as the integrity of the whole system.

The ability of a port to enhance its effectiveness will obviously impact upon the level of competitiveness of that port *vis-à-vis* other ports that serve an overlapping hinterland. In Chapter 11, Wei Yim Yap and Theo Notteboom contend that the supply of container shipping services at a port provides a measure of port connectivity which not only facilitates the handling of containerised cargo, but also positively correlates to the level of beneficial spin-offs for the local, as well as hinterland, economies. On the basis of this premise, the Annualised Slot Capacity (ASC) of a port is utilised as a measure of port connectivity (that is, the extent to which ports are served by a network) that is deemed to proxy the degree of success achieved in terms of port competitiveness.

In consequence, therefore, the authors' analysis examines the calling patterns of container shipping services and establishes the trade routes and markets where either competition or complementarity exist between ports within a common or overlapping hinterland. The main empirical evidence is obtained for ports within South-East Asia (Singapore, Port Klang and Tanjung Pelepas), the Pearl River Delta (Hong Kong and Shenzhen) and North-West Europe (Rotterdam, Hamburg, Antwerp and Bremerhaven). As well as identifying the specific nature of relationships between ports within a common hinterland, the authors also suggest that, whatever the level of container shipping supply and associated benefits, these extend to other ports where complementarity exists between the services provided by different container ports within the same hinterland.

The issue of container terminal concessions has attracted only minimal academic attention, with insights from established economic theory only rarely applied to this context. This is despite their critical importance as a determinant of the nature and level of internal competition within an individual port which, according to many analysts, makes a direct contribution to a container port's efficiency and effectiveness and ultimately, therefore, to its competitiveness. In Chapter 12, however, Christophe Theys, Theo Notteboom, Thanos Pallis and Peter De Langen address this surprising gap in the literature by considering pivotal aspects of the concessioning process: how container handling services are concessioned in practice – including the development of a classification scheme for awarding procedures and a detailed overview of the different phases of the terminal awarding process; the allocation mechanisms used for granting those concessions; the determination of the concession term and fees; the nature and content of any special clauses aimed at ensuring the terminal operator acts in the best interests of the port authority and the wider community; and the likely outcome of the different alternative approaches. To illustrate the arguments presented, the authors refer to voluminous industry examples and case-study material. As implied by the title of their chapter and as is inevitably the case with much research, the authors conclude that their analysis has raised many more questions than answers. Following an extensive discussion of the economic issues that require further investigation, they point in particular to determining what kind of awarding procedure is best suited to each type of terminal concession to be granted.

Given the capital intensity of the maritime sector, a pivotal issue in research has always been the available sources of finance and matters related to investment. The ensuing four chapters reflect the importance attached to such matters by addressing some of the more currently topical areas of research in the field.

Over the past decade or so, the maritime industry has witnessed the quite rapid industrial concentration of both the supply of container shipping and container handling services ashore. A significant contributor to this phenomenon has been the rampant merger and acquisition (M&A) activity that has characterised both these markets. In respect of the shipping industry, in Chapter 13, Osvaldo Rodrigues de Araujo Rios and Heather Leggate McLaughlin investigate the impact of M&A activity on corporate value. Their study is prompted not only by the recent proliferation of M&A activity within the sector, but also by the dearth of analysis which has accompanied it. This is despite the fact that the effect of mergers on corporate value represents one of the most researched topics in the general finance literature, where it is well recognised that mergers can lead to the earning of abnormal returns in the stock markets, particularly in the short term. The continuation of intense M&A activity within the shipping industry, as well as an increasing predilection towards equity finance, should ensure that this type of analysis becomes a productive stream of future research.

Focusing on the share price reactions of both the target and bidding companies, the adopted methodology involves establishing a benchmark against which abnormal returns can be estimated within a given window of time around the announcement date of the merger. In general accord with previous similar studies of other industries, the results suggest that shipping merger announcements also lead to abnormal positive returns in the short run. Specific to the shipping industry, however, the authors find that, on average, liner companies achieve higher levels of abnormal returns than those involved in the tanker sector and that these begin to accrue prior to the merger announcement date and continue for a number of days afterwards. In contrast, abnormal returns in the tanker sector are largely concentrated in or around the announcement date itself. For both sectors, target companies reap the greater proportion of the benefits, with bidders also having to wait longer for their smaller share of benefits to become manifest.

Over the past decade or so, there have been some 22 separate acquisitions completed by private equity funds (PEFs) and involving 11 ferry companies in Europe. In total, these transactions amounted to a combined value of €7.7 billion worth of investment. With a focus on the European ferry sector, Alfred Baird (Chapter 14) provides an analysis of the increasingly prevalent involvement of PEFs in the maritime sector. His chapter presents an explanation of the development and workings of PEFs, including a review of the pros and cons of this type of investment model/funding vehicle. In an effort to deliver a better understanding of the nature of these sorts of transactions and how they have evolved over time, a series of case studies relating to the acquisition of individual ferry operators by PEFs are set out. A comparative analysis of the circumstances of each case study illustrates specific characteristics of individual ferry operators that PEFs find attractive. Not least among these characteristics are: the existence of barriers to entry on ferry routes served; a long-established business track record; consistently stable cash flows; and large market shares. At least from an investor perspective, PEFs consider ferry services as displaying characteristics quite similar to other essential transport infrastructure investments such as roads and railways and, hence, the attraction of investing in individual ferry operations will also greatly depend upon whether its services or assets are considered essential infrastructure within their operational ambit. Based on his in-depth analysis of numerous case studies, the author concludes that PEFs appear to find the ferry market a relatively safe and attractive investment opportunity. As such, he points out that the sellers of ferry services, in addition to the regulators of ferry markets (especially in the case of 'lifeline' services), need to be conscious of the potential opportunities, as well as the possible disadvantages, of PEF investment and ownership. This becomes increasingly relevant and important if there is to be a continuation of the trend towards greater private sector involvement in maritime areas that have traditionally been perceived as the responsibility and preserve of monopoly public sector or quasi-public sector operators.

Continuing this theme of the public sector divesting itself of operational and financial responsibility in respect of the maritime industry, contributed by Sophia Everett and Rae Weston, Chapter 15 addresses the prospects for attracting equity finance into the Australian port sector. This issue of the availability of equity finance for the funding of ports has emerged as a key concern in an increasingly deregulated global operational environment where, in recent years, government policy on ports has typically been driven by the desire to enhance the efficiency of the port sector for reasons of national economic welfare, while simultaneously limiting the liability of the public purse to a burgeoning requirement for port investment. Despite the seemingly global proliferation of such policies, it is interesting to note, as the authors have done, that the evidence does not provide unequivocal support for their success.

Somewhat unusually and, it has to be said, to some extent refreshingly, Everett and Weston's analysis eschews the more common focus on container ports in favour of a focus on dry bulk ports in Australia, particularly coal and iron ore exporting facilities. It adopts the integrated chain model, where port performance is evaluated in terms of the level of integration of a port within its supporting chain structure.

Although it is clearly imperative to protect consumer welfare during any process that incentivises private sector involvement in ports, the outcome of Everett and Weston's evaluation suggests that performance of the integrated chain may, to a large extent, be determined more by regulatory and policy constraints, than by the particular financial model which is instigated. While recognising the benefits that Australia's policies on competition and deregulation have brought in terms of increased efficiency and productivity levels, the authors' analysis brings into question the wisdom of implementing a carte blanche approach across all industries and of seeking to achieve an optimum solution in terms of regulation and legal interpretation alone and in isolation of the potential impact on real-world supply chain efficiency. The authors conclude that the integrated chain model provides a viable basis for the evaluation of port performance in its widest connotation; not only in terms of operational efficiency and effectiveness, but also by attaching importance to the integration of business processes. While the global financial crisis will inevitably curtail the availability of finance to expand port facilities in the short term, in the absence of an appropriately feather-light touch, the authors warn that the actions of Australia's regulators may constitute a much more serious barrier to private sector funding in the medium to longer term. Although not enunciated explicitly, this remains a salutary message and object lesson to be learned by many of the world's port administrators and regulatory authorities.

Another important theme in the shipping finance literature has always been that of risk management. The significant volatility of freight rates in bulk shipping impact directly upon the cash flows of both shipowners (operators) and charterers. This lack of predictability is particularly prevalent in the Capesize sector, where the mitigation of market risk is even more critical to business success or failure.

In Chapter 16, Manolis Kavussanos and Ilias Visvikis focus on the calculation of the optimal number of forward freight agreements (FFAs) for hedging a given level of exposure. Any potential investor faces a choice of alternative strategies when deciding upon the optimal number of FFA contracts needed to hedge any given level of exposure to freight rate risk in the underlying physical market. Taking into account the specific properties of both spot and FFA prices in the Capesize sector, the authors assess potential alternative strategies by analysing a variety of models that are used to empirically estimate optimal hedges and comparing: (i) the hedging effectiveness of dynamic (time-varying) and constant hedge ratios; and (ii) whether in-sample or out-of-sample hedging horizons are relevant and appropriate for investors who wish to manage their freight rate risk in the Capesize sector through participation in the derivatives markets.

The authors conclude that both shipowners and charterers can make good use of FFA contracts to effectively reduce their freight rate risk. The in-sample results reveal the better performance of time-varying hedge ratios, while out-of-sample results suggest that naive hedge ratios may produce better hedging outcomes. The major benefit of these results is that players in the Capesize market may more easily develop more appropriate hedge ratios and, thereby, manage freight rate risk more efficiently and effectively.

Having delved into the vagaries of providing capital for the sector, the final chapter of this book returns to another much-researched area of critical concern to maritime business – the issue of labour. Experiments with the training and deployment of dual-purpose (polyvalent) officers who are capable of dispensing both deck and engine responsibilities began in the 1960s. Over the past decade interest in this concept has resurged, both at national (Denmark and Singapore) and corporate level (A.P. Møller-Mærsk). From the various perspectives of the resource-based view of the firm, labour economics, and transaction cost economics, Ioannis Theotokas and Maria Anne Wagtmann (Chapter 17) consider the economic and operational advantages and disadvantages to a shipowner of developing and deploying dual-purpose officers within the world's merchant marine.

The authors identify two potential routes to increasing revenue – improved ship utilisation due to efficiency gains and increased demand due to the potential association with corporate social responsibility (CSR) if customer opinion on the policy is positive. These benefits accrue irrespective of whether the deployment of dual-purpose officers requires the reorganisation of shipboard responsibilities or whether this simply involves slotting them into traditional roles. Cost reduction is identified, however, as the main source of medium-term human resource value creation; an advantage that is most closely associated with a shipboard reorganisation of roles and responsibilities that facilitates a policy of deploying dual-purpose officers. This, however, needs to be balanced with the investment costs of both instigating such a reorganisation and, initially, of training dual-purpose officers. Recognising the cost differential of the latter between high- and low-wage countries, the authors suggest that the advantages to be reaped may be insufficient to cover the required investment costs in countries with higher wages. Because of this difficulty in achieving a true competitive advantage in high-wage nations, they conclude that the deployment of dual-purpose officers will probably not gain universal acceptance and take-up. They go on to suggest that some possibility of success exists, however, in specific market segments as long as cost-cutting or revenue creation opportunities exist.