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## “Liner shipping”: the evolution of the concept

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### ABSTRACT

The aim of the study was to analyze the scientific views on the definition of liner shipping at various stages of its development. For this, literary sources for more than a hundred years of research on this issue were analyzed. The analysis emphasizes the lack of systemic studies on this issue and the scientific approach to the definition of the concept in question. As a result of the study, the stages of development of liner shipping are presented and the main characteristic features for the concept are given, its boundaries are established. The resulting research also synthesizes the scientific papers in the field of liner shipping, which represents an important supporting tool for future theoretical and applied studies. Taking into account the exceptional role of liner shipping in intermodal delivery systems, the presented analysis is useful for all involved transport modes.

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## 1 Introduction

Liner shipping service, along with tramp shipping, is one of the shipping services, with its own specific features associated, first of all, with the organization of the work of the vessels on the carriage of goods. The key point here is the documentary regulation of relations between the participants of the goods transportation. In a liner shipping service, they are fixed by a liner bill of lading, the reverse side of which is a substitute for the contract of the carriage of cargo by sea. Liner bills of lading contain interpretations of certain concepts related to liner transportation (convenient liner port, liner basis, schedule, etc.), but does not offer any clarification regarding the nature of liner shipping service, and does not define the term itself.

At the same time, inaccurate or vague formulations that have taken root in practice are subsequently transformed into the legislation of some countries or are used in international documents in the transport business. This, in turn, leads to terminological misunderstandings, the resolving of which lies primarily in a clear definition of the initial concept – “liner shipping service” and makes the posed prob-

lem quite actual. A clear understanding of the definition of “liner shipping service” is impossible without considering its elements and the functional relationship between them in the chronological aspect of liner shipping development.

## 2 Beurfahrt: the pre-liner shipping service era

The prototype of liner shipping service as a form of organizing the work of the fleet in the transport of goods is the “Berfart” shipping (Beurt – “Series” from Holland, fahrt – “voyage”), which appeared at the beginning of the 17th century. Often scientific articles contain a mention of this shipping service but do not disclose its essence [17], [20-21]. During the period mentioned, the international trade mostly was not associated with the sea, but with transport by inland waterways, primarily along the Rhine. That period can be considered as the period of the beginning of regular shipping.

In addition to the aforementioned bearings towards inland waterways, the characteristic features of the berfart shipping were:

- simple schemes for the movement of the fleet– the transportation of goods was carried out between two ports;
- inseparability with passenger traffic (the same vessels transported both passengers and cargoes);
- independence of the organization of voyages from the quality of service for shipowners.

Thus, the initial task of berft shipping was to establish regularity not in order to ensure the quality of service for cargo owners but to avoid queues of vessels to be moored in ports.

The first regular line indicated in the literature can be considered the Wesel (Lower Rhine) – Nijmegen (Netherlands) line, which arose in 1559 [2], and a few years later–extended to Amsterdam. The most famous line, which appeared on April 27, 1613, connected Hamburg and Amsterdam [9, 25]. In the same 1613, there was a regular line connecting Amsterdam with Wesel, there were regular voyages from Wesel to Arnhem and Nijmegen, and in 1653 a shipowners' partnership was created on Waal with regular communication with Rotterdam. In 1648 regular voyages were established from Leiden to Wesel, which since 1662 led to voyages in both directions. This medieval form of shipping existed almost unchanged until the era of capitalism and the industrial revolution.

### 3 The modern interpretation of liner shipping service

#### 3.1 Transformation of definition

The industrial revolution that took place in Europe required new resources and regularity of their supply, as well as rapprochement with the New World. At the end of the war of 1812, such a rapprochement became possible. In 1816, the famous Black Ball Line [30], the first line between New York and Liverpool was organized [20]. In a sense, the operation of the line (as well as of the competing lines that appeared later) was similar to the practice of river transportation, which was mentioned above. The line carried out transportation of both goods and passengers between the two ports (departure and destination). However, the opening of a line from Europe to the New World fixed the transition from intra- to intercontinental maritime trade. The opening of regular shipping provided a stable service for trade operations.

In the specialized literature, the definition of the term "liner shipping service" is first encountered in [10], where the key words are "regularity" and "scheduled port". The mention in [27] of "fast transportation ... with a guaranteed high level of safety" certainly expands on the previous interpretation. Ivar Buxell [5], along with the mentioned features, for the first time focuses on the cargo base – indeed, in those time and much later also just general cargo was precisely the cargo base of the lines, which is due to the specifics of trade operations. It is also worth noting the

mention of a distinctive feature of liner shipping service, which is specific for today's time-loading the vessel with the cargo belonging to different cargo owners. The same feature is also mentioned by John S. McGee [19], who rightly positions it as one of the differences from tramp shipping. The same detail can be found in [11], the price aspect was firstly mentioned as well. Indeed, the services of the line for the transportation of goods are paid according to the tariff rate declared by the carrier.

Table 1 shows the definitions of liner shipping service by international authors, which make it possible to trace the transformation of the definition.

Analyzing all the proposed definitions, the following issues can be attributed to the distinctive features of liner shipping service in the modern sense:

1. small consignments of cargo and, as a result, loading the vessel with cargo from different cargo owners;
2. high cost of transported goods and that's why – increased safety requirements;
3. fixed ports and entry/exit times (pre-announced schedule);
4. special commercial terms (conditions for the rates provision, freight payment, terminal charges payment, demurrage, detention etc.).

In a certain sense, the small lot of consignments presented for transportation on the lines can be considered an advantage for the carrier; because does not make it dependent on one cargo owner. On the other hand, the need to search for a significant number of cargo owner led to the specifics of organizing the operation of the line, when it is necessary to have an agency in each region included in the schedule. The presence of many shippers also presupposes the documentary registration of relations with each of them, which, however, is decided by the presence of a corresponding package of documents in each liner shipping company.

From mentioned above items 1-2 are relative as far as a small lot is a consequence of the high cost of transported goods. Today, it is widely practised to transport bulk cargo in a liner form, but this practice is not typical. Economically feasible in a liner shipping service is the transportation of expensive general cargoes, and the transportation of bulk carriers only brings additional income to carriers on unbalanced routes. The variety of transported goods and the independence of the carrier from one cargo owner is explained by the carrier's obligation under the status of "common carrier", thus "a common carrier" was obliged to accept for carriage the goods of all comers or incur liability for damages due to his refusal [7].

Item 3 connects time and geographical features, which are the components of the schedule – an indispensable attribute of liner shipping service and features that fundamentally distinguish it from tramp shipping. It is the schedule, and not the regularity of the voyages performed

**Table 1** Definitions of liner shipping service from 1926 to 2014

Year	Author	Definition
1926	Gregg [10, p. 291]	A ship plying regularly between scheduled foreign ports is called a "liner"...
1931	Stapelfeld [27, p. 66]	The liner shipping company meets this need for fast transportation and advisable handling of goods, with its frequent, regular services, which are geared to actual arrivals and departures, at the same time guarantee the highest level of security (translated from German).
1938	Buxell [5, p. 1]	With regard to the liner, the definition is easy. It is a ship running according to a specific schedule, usually focused on general cargo. Its characteristic feature is that it takes cargoes from various shippers, not paying much attention to either the type of cargo or its origin (translated from Polish).
1938	Wickizer [29, p. 53]	Liner services are provided by vessels operating over definite routes and on regular schedules; there are passenger liners, cargo liners, and cargo-passenger liners, according to their predominating traffic.
1947	Long [18, p. 1]	Strictly speaking, a liner is a ship which sails on a regular schedule between specified ports, and is a common carrier...
1960	McGee [19, p. 205]	... These services are broadly characterized by the scheduled carriage of heterogeneous cargoes that typically are originated by many shippers at several ports and destined for many consignees at several ports. Liner services are sometimes defined by contrasting them with tramp operations.
1980	Panarin [20, p. 26]	Liner shipping, being an independent fleet operation form, has its own distinctive features and features ... values and small consignments of transported goods, lack of dependence on one cargo-owner, fixed ports of call, special commercial and operational conditions (translated from Russian).
2005	Fayle, [8, p. 253]	...liner service implies today a fleet of ships, under common ownership or management, which provide a fixed service, at regular intervals, between named ports, and other themselves as common carriers of any goods or passengers requiring shipment between those ports and ready for transit by their sailing dates.
2007	Haralambides [11, p. 608]	... liner shipping is geared to the provision of regular services between specified ports, according to timetables and prices advertised well in advance. The service is in principle open to everyone with some cargo to ship, and in this sense, it resembles a public transport service, like that of a bus or a tram. The provision of such a service – often of global coverage – requires extensive infrastructure in terms of terminals and/or cargo handling facilities, ships, equipment, and agencies.
2008	Agarwal & Ergun [1, p. 178]	In liner shipping, a carrier decides on a set of voyages, makes the schedule available to shippers and operates on it. Thus, one can identify liner shipping with "a bus service" with definite schedules and a published itinerary.
2008	Plomaritou [22, p. 60-61]	A liner service implies today a fleet of ships under common ownership or management, which provides a fixed service, at regular intervals, between named ports. The liner vessel sails, whether full or not, on the date fixed by the public schedule.
2010	Kirillova [14, p. 86]	Liner shipping is a specific form of providing transport services, where the carrier organizes the regular ship's movement between the established ports according to an announced schedule, transporting small general cargoes shipments from the different owners on the standard agreement (bill of lading) base and with payment at certain costs – tariff rates (translated from Russian).
2014	Branch & Robarts [3, p. 54]	These are vessels (note of the author – liners) that ply on a regular scheduled service between groups of ports. ... should note that it is this function, and not the size or speed, which defines the liner. Liner services offer cargo space to all shippers who require them. They sail on scheduled dates, irrespective of whether they are full or not.

Source: Authors

by the ship, the cargo base and the designated ports, that distinguish the liner shipping service from the tramp one.

All of the above describes the specifics of liner shipping service, which is reflected in the special commercial and operating terms of carriage, which are fixed in international liner shipping conventions and, ultimately, in the liner bill of lading. Such international documents are The Hague Rules/Hague-Visby Rules (the provisions

of International Convention for the Unification of Certain Rules of Law relating to Bills of Lading), 1924, York-Antwerp Rules, 1974, United States Carriage of Goods by Sea Act (US COGSA) 1936, United Nations Convention on the Carriage of Goods by Sea (Hamburg Rules), 1978.

Since liner shipping is a form of organizing the movement of the fleet, it is primarily of interest not the cargo base but the technology of the carriages, in other

words – not what is transported, but how it is transported. The cargo itself (its value, physical characteristics, batch sizes, etc.) does not influence the nature of shipping except from a safety point of view.

Since in liner shipping service the loading of a vessel in each individual voyage is made up of numerous consignments of the most diverse cargoes in terms of properties, it is impossible to take into account the individual properties of each of them to develop a unified transport technology. In this context, only the possibility of the same unification of all these individual cargoes in some cargo unit is of interest (called ‘unitization’ by Stopford [28, p. 41] in a form that will make it possible to form a technologically appropriate line (ro-ro, container, etc.).

Thus, the term “organization of carriages” is inextricably linked with cargo flows, while “organization of the movement of vessels” – with the fleet. Obviously, both of these definitions are interrelated, since the movement of the fleet is organized with the sole purpose of transporting cargo. That is, the cargo determines the technology of its transportation (including the specialization of the fleet), and the same type of fleet, in turn, implements transport links between the points of departure and destination of a certain cargo (cars, packages, containers, etc.) in the declared mode – being scheduled.

Considering the above, one can speak of a cargo line only when the same type of cargo flows (containers, packages, wheeled vehicles, etc.) are transported by the same appropriate dimensional ships. If the same cargo traffic is car-

ried by heterogeneous vessels, then we can speak about the existence of several liner services.

From the above, it follows that the ‘hub and spoke line’ encountered in the literature [20] is not quite correct, since the movement of cargo does not coincide with the movement of a homogeneous (same dimensional ships) fleet, and the cargo is transferred to ships, their movement being organized in different ways. Such transport connection consists of several (feeder liner service and mainline service) segments, each of which is an autonomous liner service with its own specific features (departure interval, symmetry of ports of call, etc.). Whereas the feeder liner service operates from the hub port to the final port of unloading (and from the origin port of loading to the hub port), it can be organized by the mainline operator/carrier, who can operate the feeder liner service only for himself or other users) and by the common feeder operator/carrier, which operates a feeder liner service exclusively for other users. The degree of consistency between the mainline service and feeder service schedules depends on above mentioned organization types.

### 3.2 The most significant components of the term “liner shipping service”

The above definitions of liner shipping for 1926-2014 ultimately make it possible to divide all the components related to the term into 3 large groups: “time”, “geography”, and signs related to the “common” feature of a (add an ar-

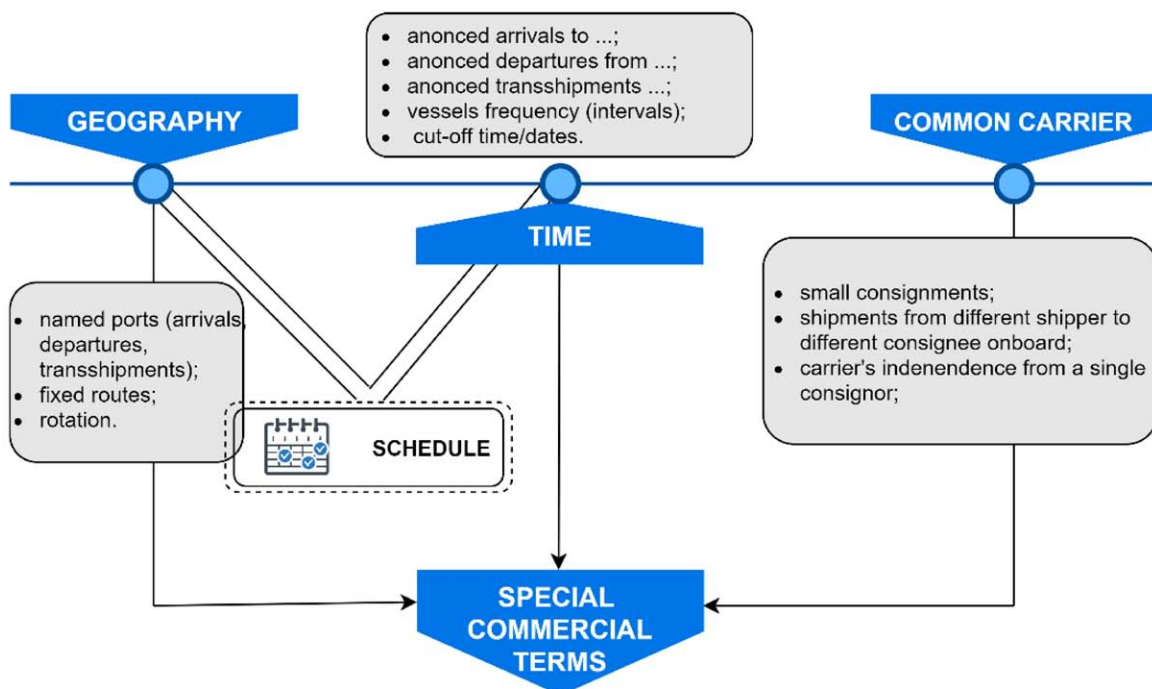


Figure 1 The main groups of features of liner shipping service

title) carrier. If the temporal and geographical features describe the timetable, the main feature of liner shipping service, then the third one refers to the availability of the carrier for all cargo owners interested in the proper transportation of cargo.

A shipping company can act as a public carrier, assuming transportation obligations for a wide range of cargo owners for a fee. Such carriers have the right to limit the categories of cargo that they are ready to transport, a specific vessel, and the route. This status imposes certain obligations on the carrier, in particular, restrictions on the level of proposed transportation rates. The main groups of features of liner shipping service are presented with Fig. 1.

#### 4 Development stage

Table 2 shows the development stages of the liner shipping service presented by various authors.

Reasonably liner shipping service, taking into account the research of the above authors, can be divided into three periods, the first refers to the stage of the birth of liner shipping in the modern sense (1810-1870), the second is the stage of development (1870-1956), and the third period refers to the phase of sustainable growth. The last of these is undoubtedly associated with the development of a specialized fleet and the beginning of containerization, which began in the second half of the

**Table 2** Phases of liner shipping service development

Author, year	1 <sup>st</sup> phase	2 <sup>nd</sup> phase	3 <sup>rd</sup> phase	4 <sup>th</sup> phase	5 <sup>th</sup> phase	6 <sup>th</sup> phase
Ch. van Schirach-Szmigiel, 1979 [23]	1820 – 1870	1870 – mid 1960’s;	since the mid 1960’s	–	–	–
P. Panarin 1980 [20]	beg. 17 – beg. 19 cent.	beg. 19 <sup>th</sup> cent. 1870 <sup>th</sup>	1875 – beg. 20 <sup>th</sup> cent.	1950 <sup>th</sup> – until today	–	–
A. Lapkin, I. Lapkina 1995 [16]	17 – 18 cent.	19 – 40’s 20 cent.	1950’s – until today	–	–	–
E. Kirillova 2010 [14]	beg. 17 – beg. 19 cent.	beg. 19 – mid 19 <sup>th</sup> cent.	mid 19 <sup>th</sup> cent. – beg. 20 <sup>th</sup> cent.	beg. 1920’s– mid 1920’s	beg. 1950’s – end 1960’s	beg. 1970’s – until today
G. Harlaftis 2019 [13]	Before 1830’s	1830’s – 1870’s	1880’s – 1930’s	1940’s – 1980’s	–	–

Source: Authors

**Table 3** Liner shipping service foundation, expansion and diversification stages

Stage	Date	Characteristics	Cases
foundation	1810-1870	The emergence of the first transocean scheduled liner services	<ul style="list-style-type: none"> <li>• 1816 The first trans-ocean line was probably that of the Black Ball Lines between Liverpool and New York;</li> <li>• 1834 British Post Office had transferred the right to transport mail from warships to private General Steam Navigation Co;</li> <li>• 1838 The first Atlantic steamship The rapidly increasing the number of liner shipping companies;</li> <li>• the creation of the first associations of shipowners and cargo owners (SS ‘Great Western’ and SS ‘Sirius’) of the British American Steam Navigation Co.were introduced.</li> </ul>
expansion	1870-1956	The rapidly increasing the number of liner shipping companies; the creation of the first associations of shipowners and cargo owners	<ul style="list-style-type: none"> <li>• 1872 The first ferry route Fredericia – Strib was opened on the Baltic Sea to link the Danish railway infrastructure;</li> <li>• 1875 The first freight conference for cargo-shipping was established on the Great Britain – Calcutta route;</li> <li>• 1881 The tea growers created the first shippers’ associations (The Indian Tea Association/The Calcutta Tea Traders Association);</li> <li>• 1935 Gothenburg – Fredrikshavn liner car-ferry service was established.</li> </ul>
diversification	1956-...	The specialized liner ships arising	<ul style="list-style-type: none"> <li>• 1956 The ‘Ideal X’ carried first 58 containers, that launched the container era;</li> <li>• 1956 The first roll-on/roll-off vessel ‘Searoad of Hyannis’ was purpose-built to transport loaded semi-trucks, began her operation;</li> <li>• 1960 The American President Lines opened the first transocean container line between the US West Coast and the Far East;</li> <li>• 1963 AB Wallenius introduced the world’s first ro-ro vessel MS ‘Aniara’ with the capacity to carry 240 cars;</li> <li>• 1966 The first transocean ro-ro technology car-carrier MS ‘Dyvi Atlantic’ with a capacity of 1400 cars.</li> </ul>

Source: Authors

late 1950s. The analysis of the initial stages gives an idea of the processes that led to the modern economic and organizational structure of up to date liner shipping.

## 5 Discussion and conclusions

It is obvious that liner shipping service as a form of organizing the fleet operation is in continuous development. This is facilitated by both the emergence of fundamentally new technologies for the transportation of goods, and the improvement of existing, individual means, methods, algorithms.

Considering the above, the following conclusions can be drawn:

- the appearance of the first lines is associated with river navigation and was caused by the need to streamline the positioning of ships in the port and not with the quality of service for cargo owners;
- a regular fleet schedule is the only sufficient indication of liner shipping service; other features are components of the schedule, or those that are the result not of the form of organization of the movement of the fleet, but of commercial, legal, and other issues (Fig. 1);
- the movement of cargo traffic on the line coincides with the movement of tonnage, but if the cargo is served by several vessels (with transshipments), then such a sea communication is organized using several autonomous liner services. Thus, the main-feeder traffic can only be spoken of in the context of the carriage of goods by several services, and not as a joint "main-feeder line". Such connection can be organized by several independent shipping companies on the terms of joint (mutual or unilateral) use of the fleet (vessels or share of cargo capacity) with the coordination of separate independent schedules of all carriers participating in.

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