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Big Data-based analysis report on world's top container shipping routes and ship types

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Overview of top container shipping routes in the world

Distribution of container ship types

There are approximately 5,700 container ships sailing on international routes worldwide. According to the analysis results of the Shipping & Port Big Data Laboratory (SPBD-Lab), Shanghai International Shipping Institute (SISI), container ships of below 4,000 TEUs mainly operate on near-sea shipping routes and Europe-North America ocean routes; the sailing paths of those between 4,000-10,000 TEUs are on trans-ocean routes; while those above 10,000 TEUs primarily concentrate on China-Europe routes with some sailing to the west coast of the America.

Figure 1 is a bubble chart based on the numbers/times of ship calls at ports. It can be seen that the bubbles representing ports in south China are significantly larger than those of other ports, indicating a larger number of ships calling at these China-based ports. Meanwhile, the ports of Malacca and Nordic Europe are also popular ports of calls.

Bubble chart of ports ("number" represents the numbers/times of ship calls at ports)

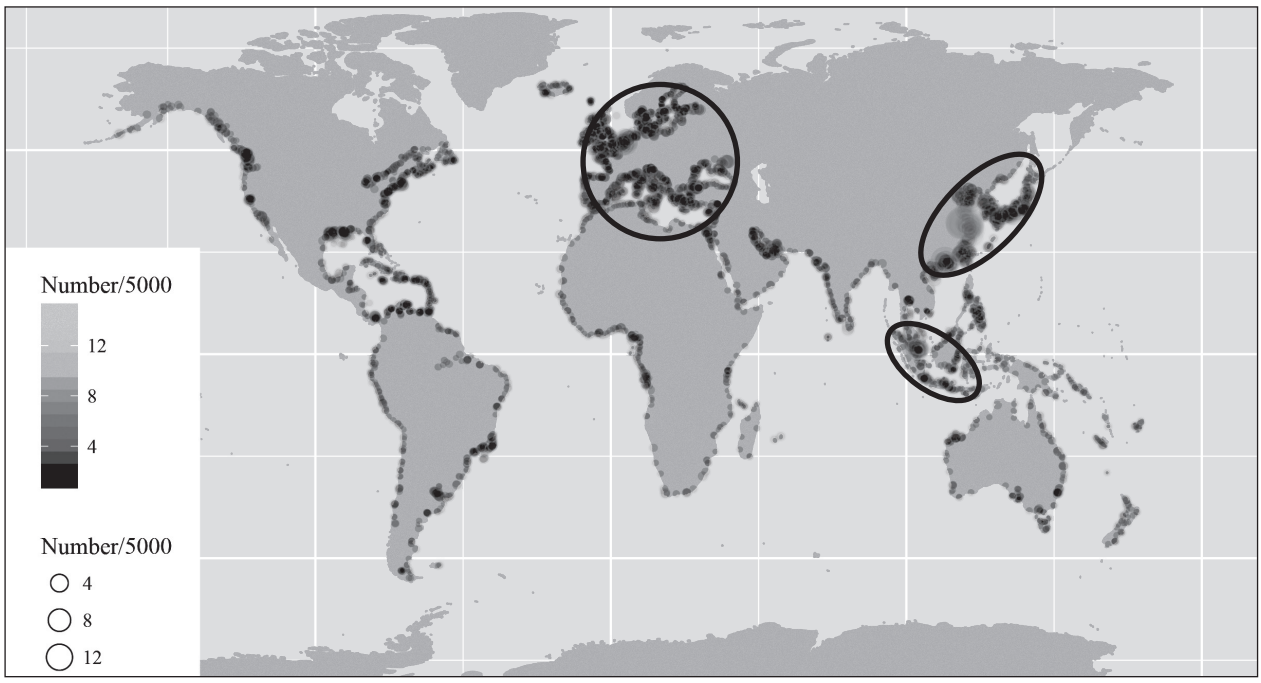
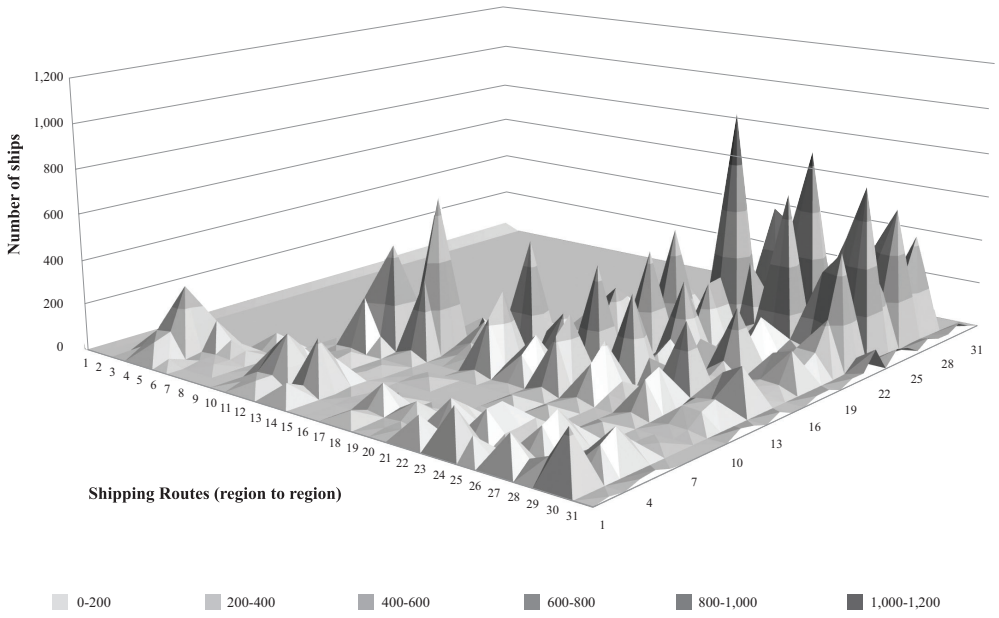


Figure 1 - Source: SPBD-Lab, SISI

Top container shipping routes in the world

In this report, the SPBD-Lab first divides the world into 31 regions, and then analyzes and studies the shipping routes defined by different combinations of ships connecting these regions, excluding those without any shipping capacity. The analysis finally identifies a total of 334 shipping routes in actual use and Graph 1 shows the number of container ships on the 334 shipping routes.

Numbers of ships on global shipping routes (334 in total) in Q3 2017

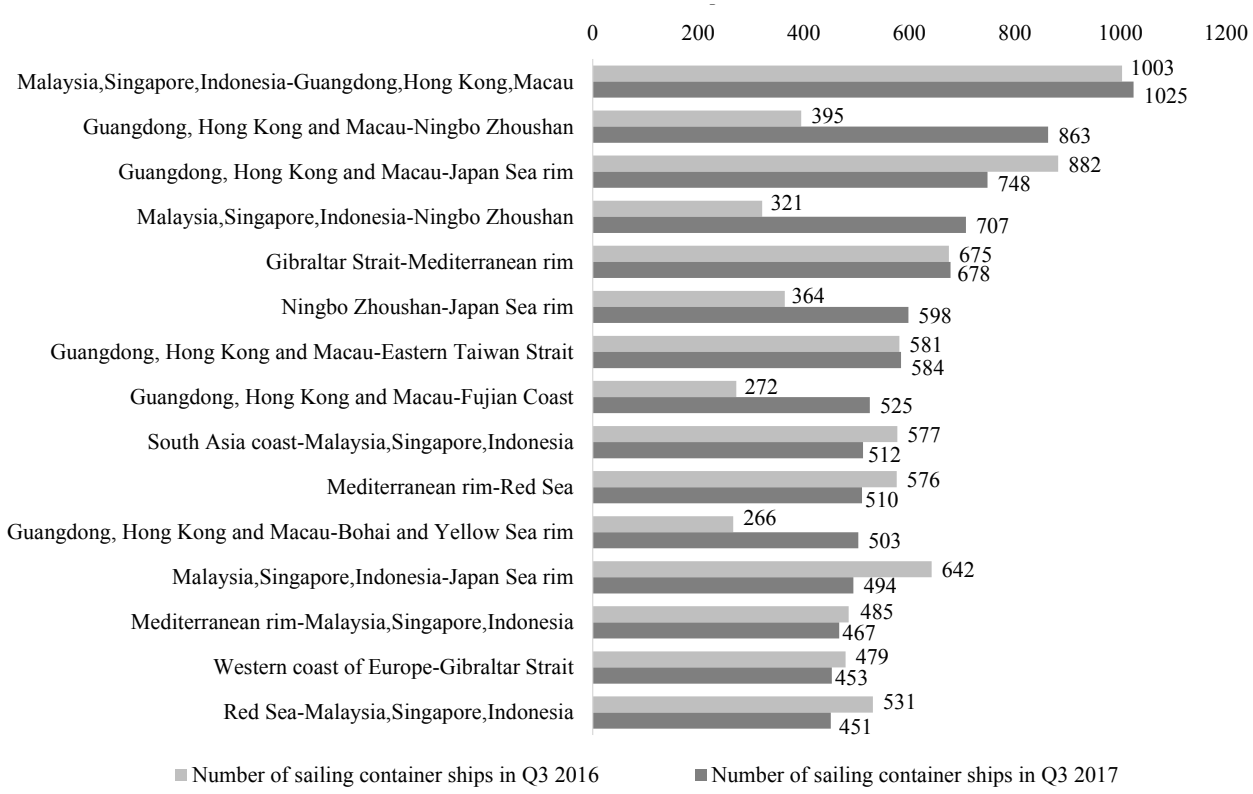


Graph 1 - Source: SPBD-Lab, SISI

In 2017, the global shipping routes with relatively high numbers of container ships were primarily near-sea ones in the Far East and Europe (see Graph 2). Regions with relatively high numbers of container ships include the Guangdong-Hong Kong-Macao region, its neighboring regions such as the Singapore-Malaysia-Indonesia region and Ningbo-Zhoushan, plus the Japan Sea area, eastern region of the Taiwan Strait, the Pearl River Delta, and the rim of the Yellow Sea and the Bohai Sea.

Comparing the capacity variation on global container shipping routes (334 in total), as shown in Graph 3, we can see that most shipping routes with wide increments in shipping capacity start from China's coastal regions. In particular, shipping routes starting from Ningbo-Zhoushan, the Guangdong-Hong Kong-Macao region, the Bohai Sea rim, and the Fujian coast witness significant growth in shipping capacity. The intra-Asia market and the Far East—Europe market also grow rapidly.

Top 15 shipping routes in terms of the number of container ships



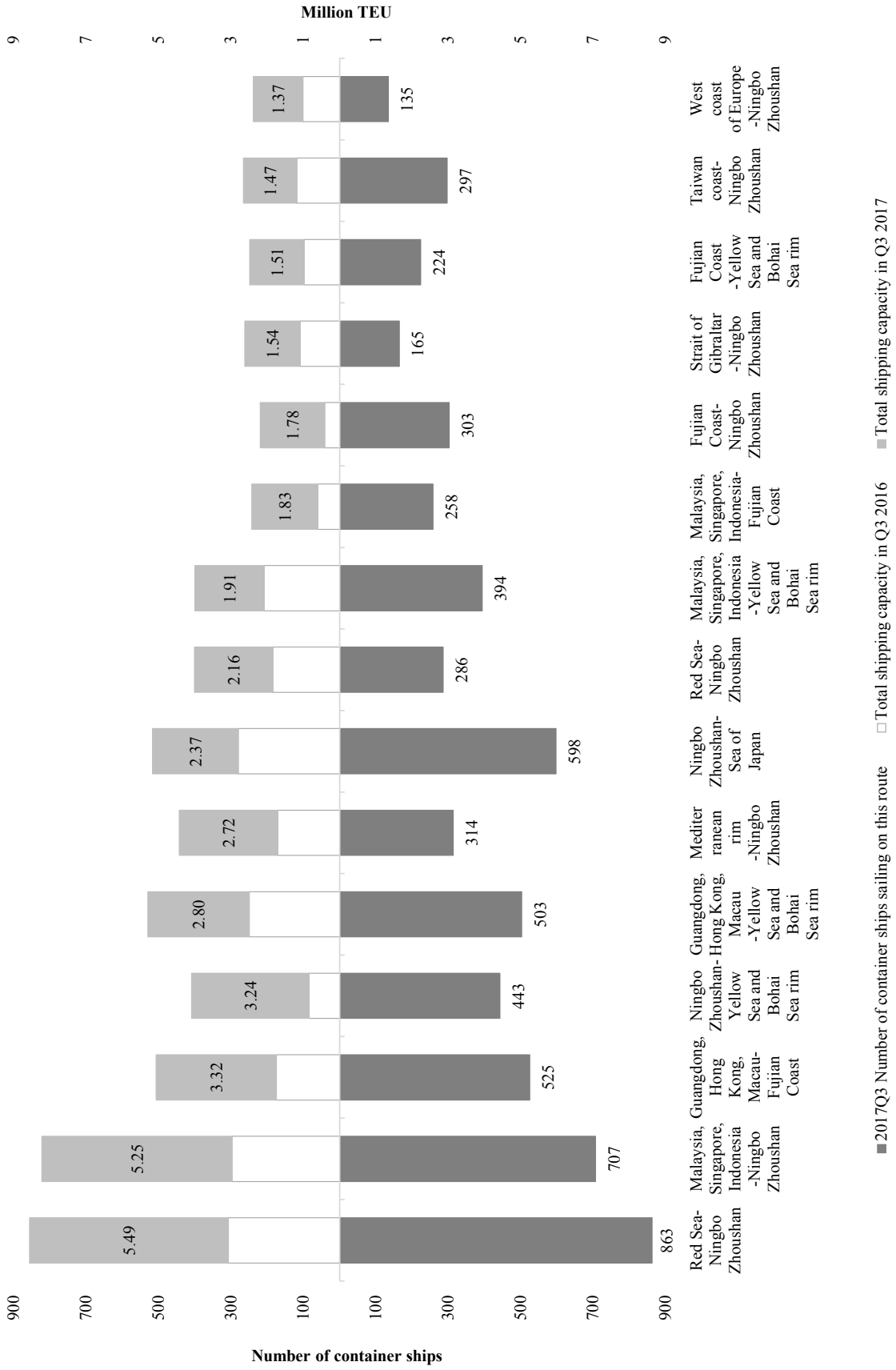
Graph 2 - Source: SPBD-Lab, SISI

Graph 4 shows that shipping routes with higher growth in shipping capacity are primarily near-sea ones connecting the Far East and Africa, the Far East and the Americas as well as those within the Fast East and Europe. Specifically, shipping routes with small numbers of ships are emerging routes, while those with large numbers of ships are popular routes with rapid development.

As shown in Graph 5, among the 334 container shipping routes in the world, the shipping capacity of out-going shipping routes in the Red Sea region and the Japan Sea rim declines significantly. With the help of preceding analysis, we can find that the out-going shipping capacity of the Strait of Gibraltar is shifting from the Mediterranean Sea, the Red Sea, the Japan Sea rim and South Asia to China.

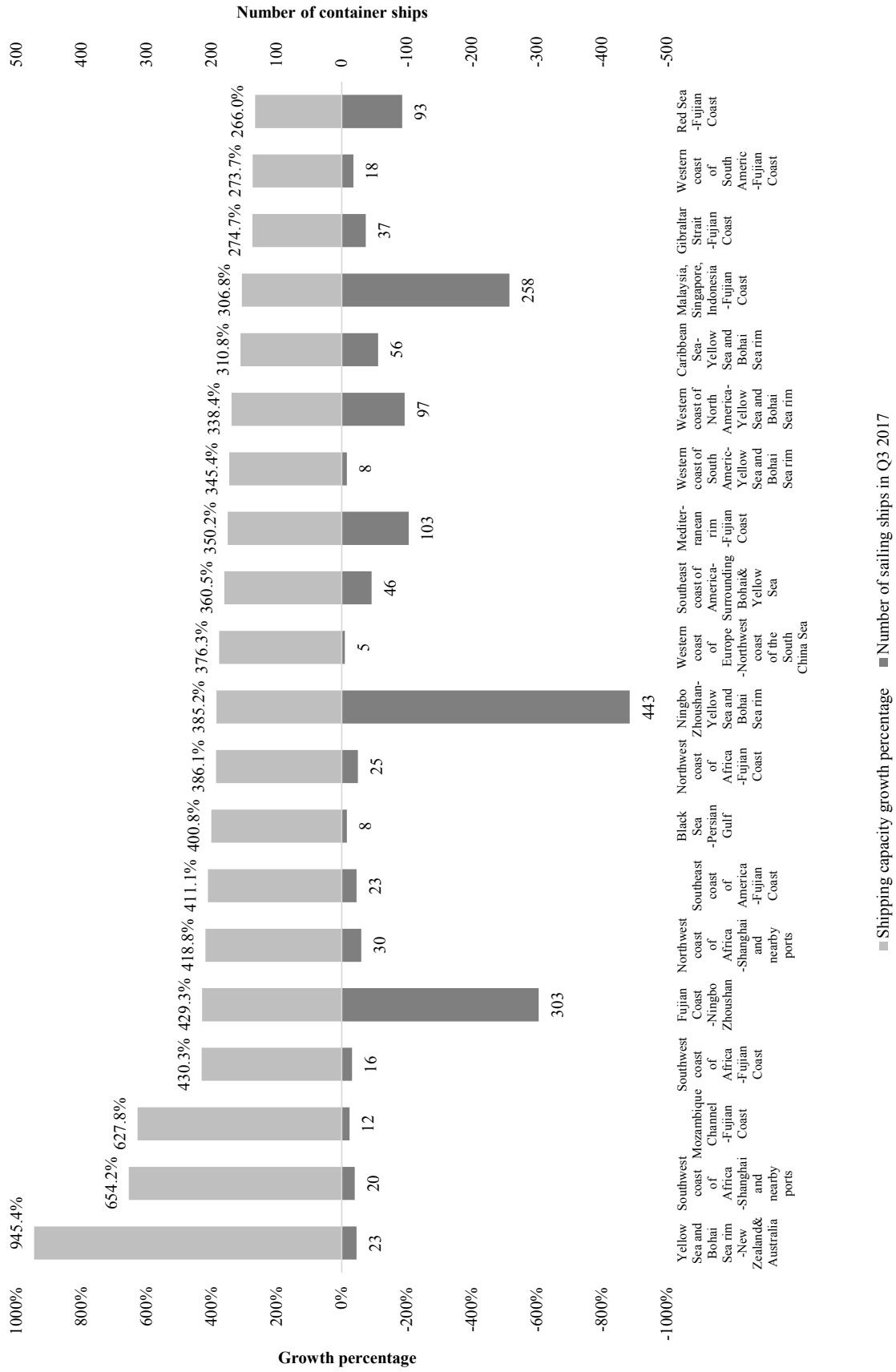
In Graph 6, we can see that shipping routes with the most significant shipping capacity decline are those connecting the southwestern coast of Africa and the Persian Gulf region, as well as those from the western coast of South America to the Far East. In addition, only a small number of ships are still operating on the routes that suffer a wide decline in shipping capacity. Only the route connecting the Arabian Sea and the Bay of Bengal-Sea with the Japan Sea rim retains a higher number of ships. Q3 2017 analysis found that the number of ships on this route has declined by 60, indicating the withering container shipping capacity on the route.

World's top 15 shipping routes in terms of shipping capacity increment (ranked by increment)



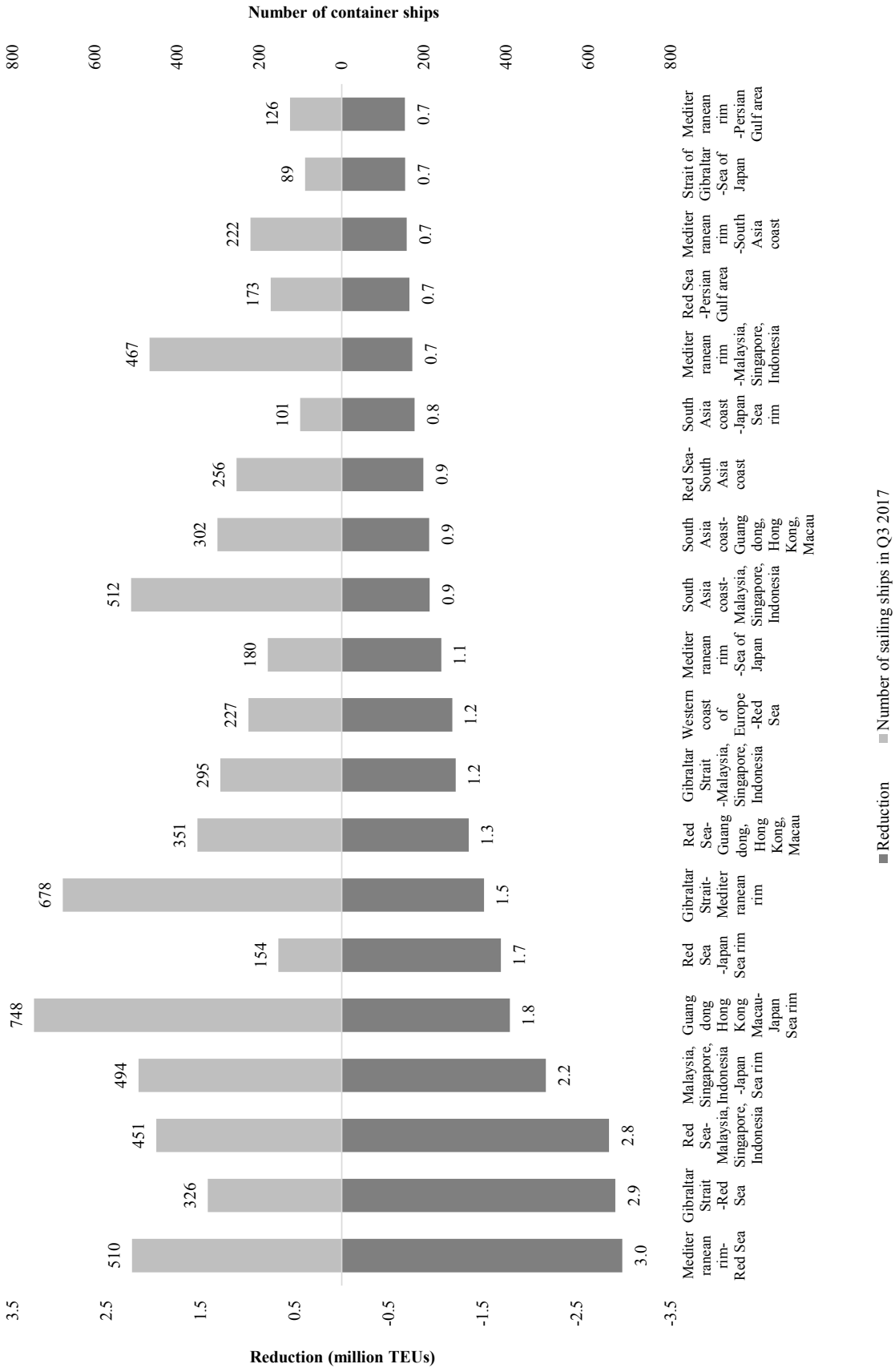
Graph 3 - Source: SPBD-Lab, SISI

World's top 20 shipping routes in terms of shipping capacity growth (ranked by growth percentage)



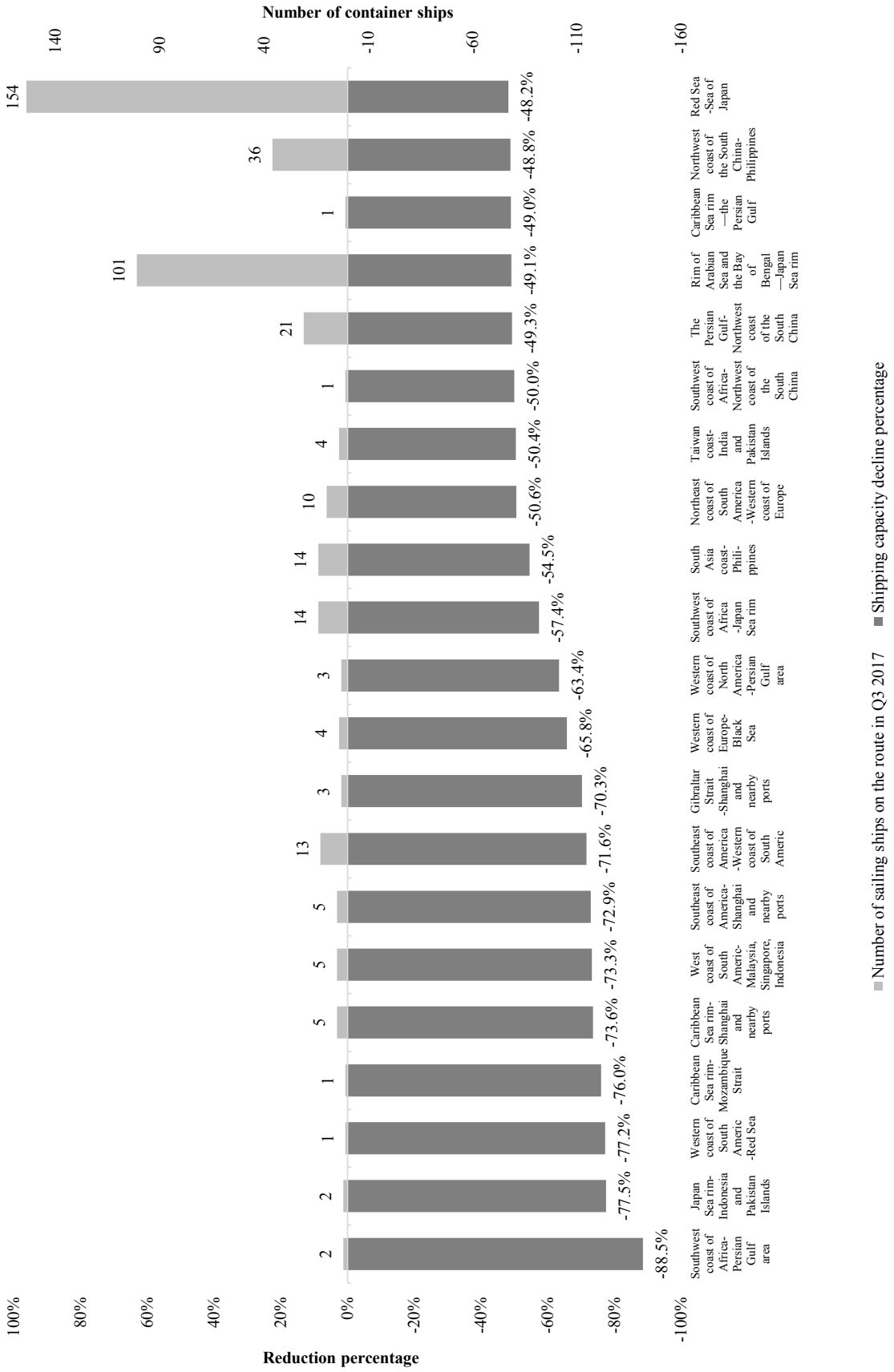
Graph 4 - Source: SPBD-Lab, SISI

World's Top 15 shipping routes in terms of shipping capacity reduction (ranked by amount of reduction)



Graph 5 - Source: SPBD-Lab, SISI

World's top 20 shipping routes in terms of shipping capacity decline (ranked by decline percentage)

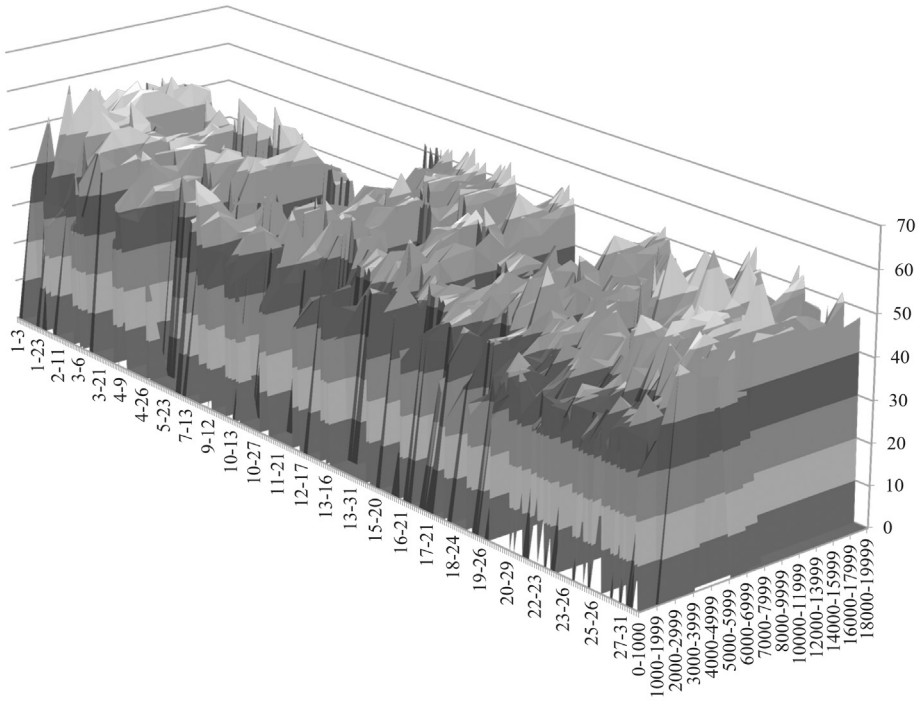


Graph 6 - Source: SPBD-Lab, SISI

Performance of ship types on shipping routes in the world

In this report, the SPBD-Lab figures out a corresponding performance indicator through comprehensive calculation of various data of each ship type sailing on the shipping routes. The indicator takes into account a slew of factors, such as ship busyness, proportion of newly commissioned ships, speed and shipping capacity to measure whether a ship type is popular on a shipping line, which can serve as a reference for shipping companies when they put ships into service.

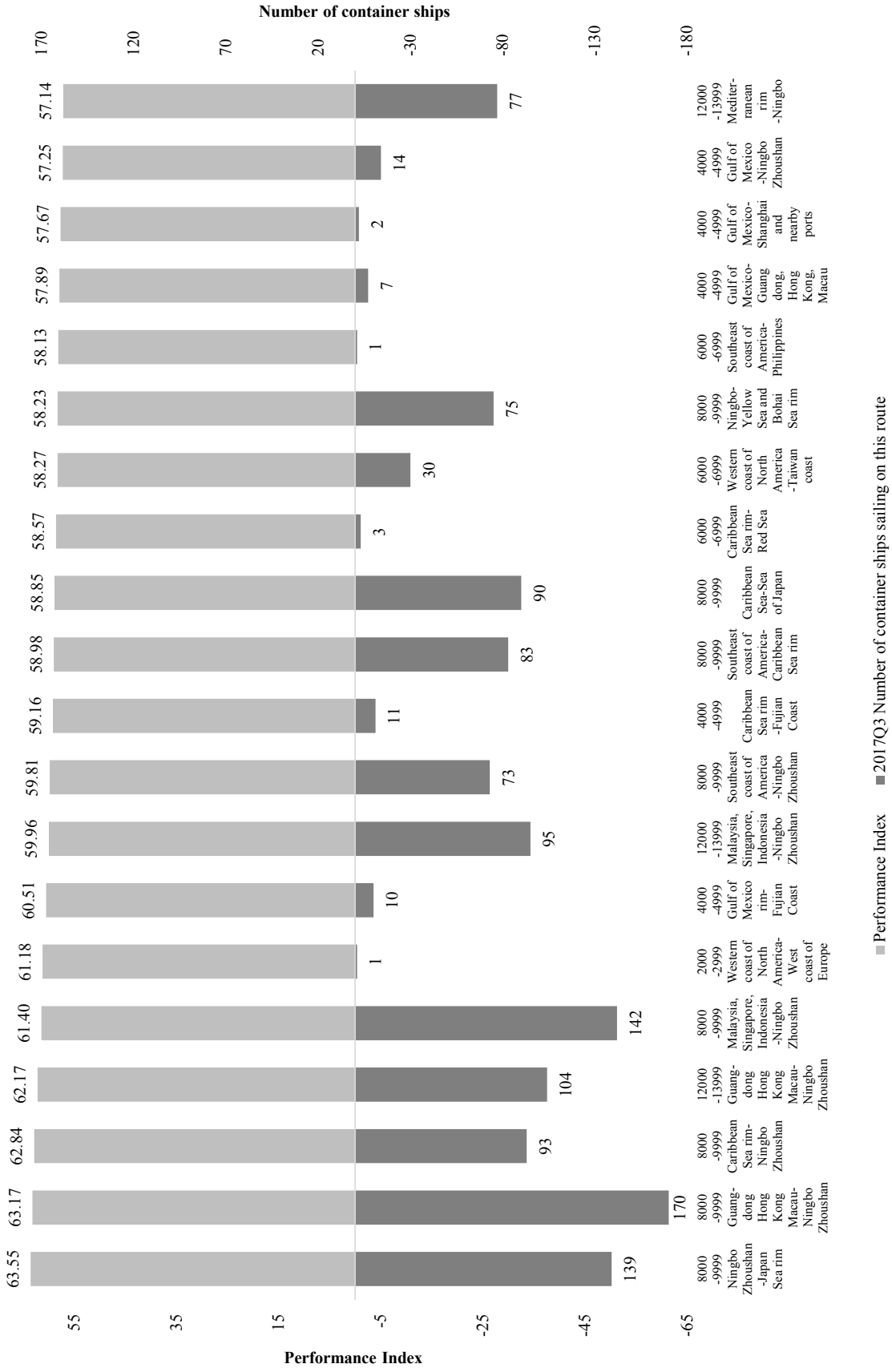
Performance indicators of container ships on all shipping routes



Graph 7 - Source: SPBD-Lab, SISI

By analyzing the performance of different ship types on the 334 shipping routes, we can see from the Top 20 shipping routes in terms of performance indicator that popular ship types are 8,000-9,999 TEU and 12,000-13,999 TEU vessels sailing from the Ningbo-Zhoushan Port to the Japan Sea rim, the Guangdong-Hong Kong-Macao region, the Caribbean Sea rim, the Singapore-Malaysia-Indonesia region, and the Mediterranean rim among others. In addition, performance indicators of 6,000-6,999 TEU and 8,000-9,999 TEU vessels sailing from Caribbean Sea to the southeast coast of the United States, the Japan Sea rim, and the Red Sea region are also high. The performance of smaller sized ships between 4,000-4,999 TEUs is relatively high for ships sailing from south China to the Gulf of Mexico and the Caribbean Sea rim.

World's top 20 shipping routes in terms of performance indicator



Graph 8 - Source: SPBD-Lab, SISI

Ship owners are suggested to arrange appropriate ship types on high-performance shipping routes.

Popular ship types on busy shipping routes

From the shipping route analysis in the previous section, we can find that several fast-developing busy shipping routes starting from China, such as those from the Fujian coast to Ningbo-Zhoushan Port, and from Ningbo-Zhoushan Port to the rim of the Yellow Sea and Bohai Sea, witness fast growth in shipping capacity. As for near-sea shipping routes leading to the Far East, Europe and Americas, those connecting the Singapore-Malaysia-Indonesia region and the Indian-Pakistan islands, those connecting the Caribbean Sea rim and Mediterranean rim, and those from the Gibraltar Strait to the northwestern coast of Africa enjoy fast growth.

Analysis results on popular ship types on busy shipping routes above and the performance indicators of these ship types are shown in Graphs 9 and 10. It can be seen that the performance of shipping routes with a relatively high shipping capacity, such as the Ningbo-Zhoushan—the rim of the Yellow Sea and the Bohai Sea, and Ningbo-Zhoushan—the Fujian Coast shipping routes, was basically proportional to the shipping capacity of ships. In other words, ship types with high performance enjoy a higher presence on the shipping routes in respective market, indicating that the market has entered relatively stable development.

Ships of over 10,000 TEUs deliver obviously higher performance on the other two shipping routes, such as the shipping line from the Singapore-Malaysia-Indonesia region to the Fujian coast shown in Graph 11. However, the number of ships with such a shipping capacity is not big, so ship owners are suggested to put such ships on the shipping routes.

Graph 12 shows the distribution of ship types on the Caribbean—Mediterranean rim shipping line. 8,000-9,999 TEU ships boast the highest performance and the largest shipping capacity in operation. On the contrary, 6,000-6,999 TEU and 5,000-5,999 TEU ships with high performance only register a small quantity in operation. This is another niche that ship owners are suggested to focus on.

Performance indicators of container ships on all shipping routes

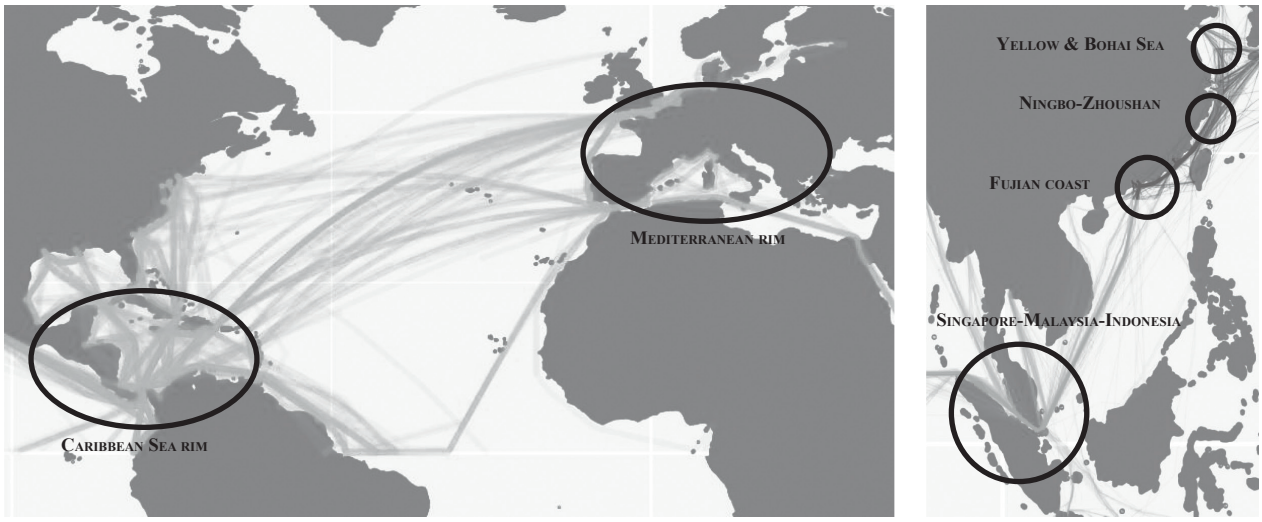
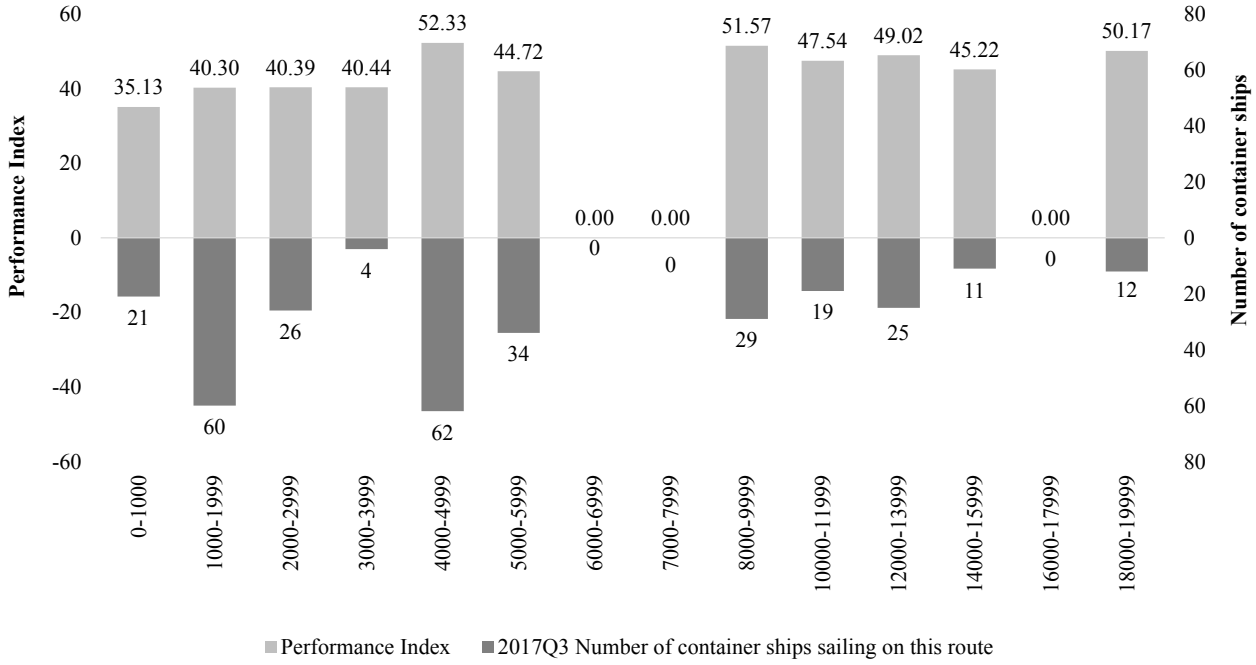


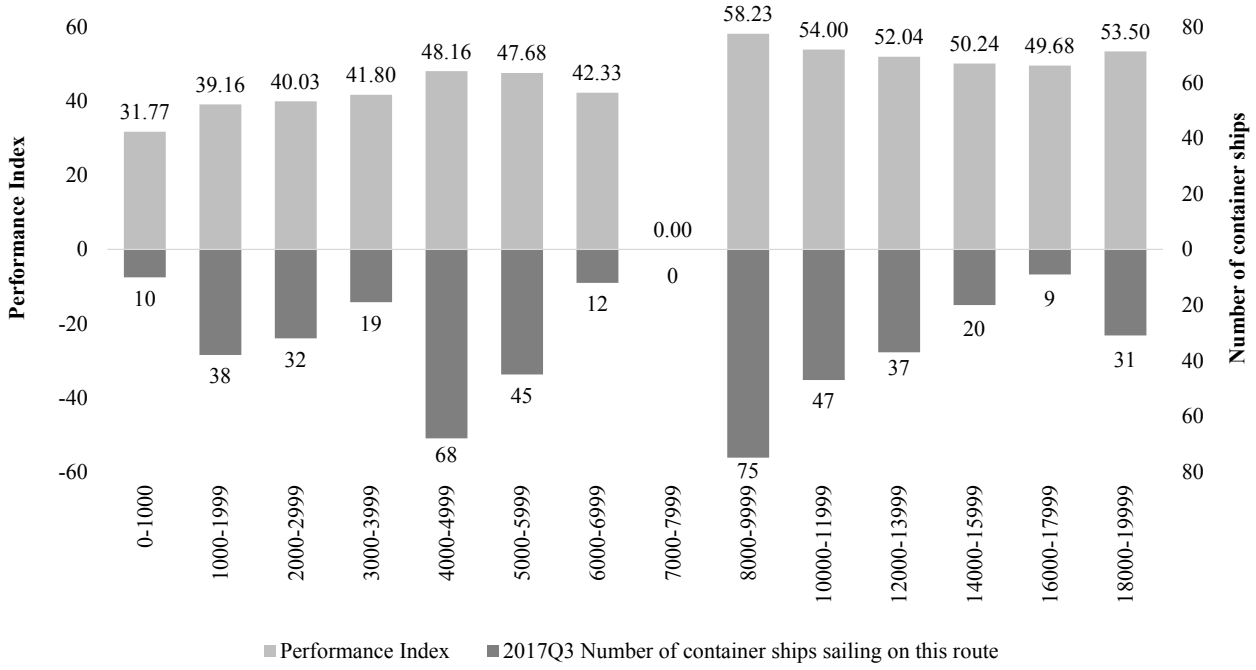
Figure 2 - Source: SPBD-Lab, SISI

Distribution of popular ship types on Fujian coast—Ningbo-Zhoushan shipping route



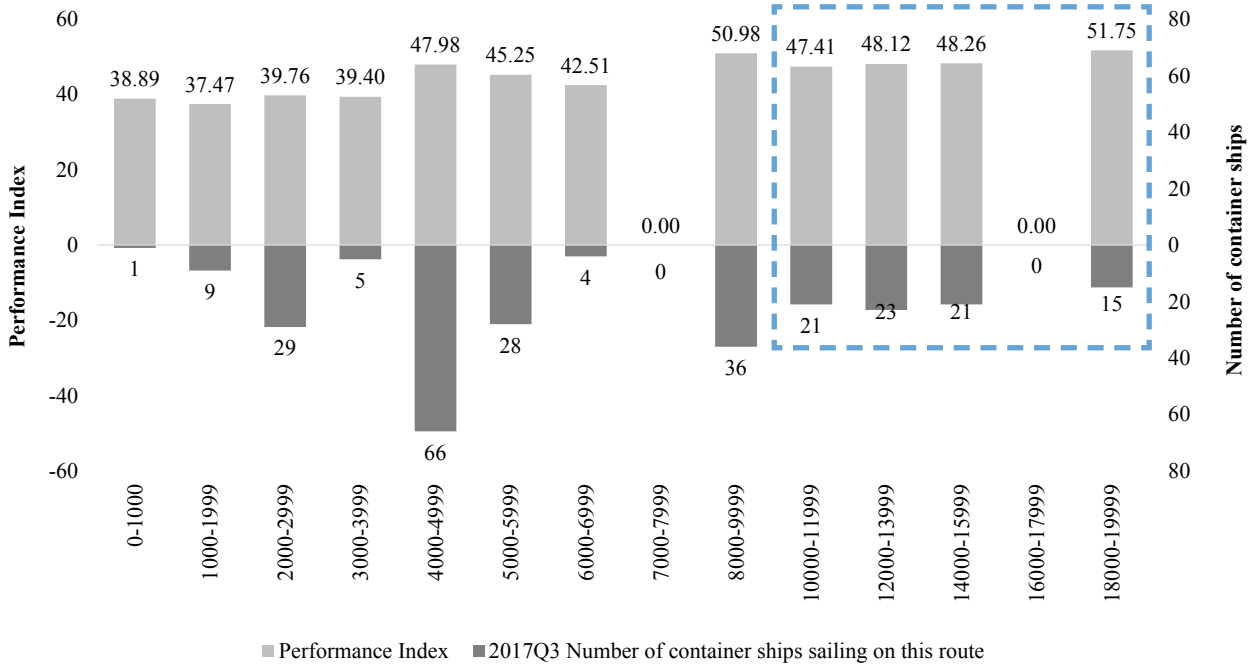
Graph 9 - Source: Shipping & Port Big Data Laboratory

Distribution of popular ship types on Ningbo-Zhoushan-rim of the Yellow&Bohai Sea shipping route



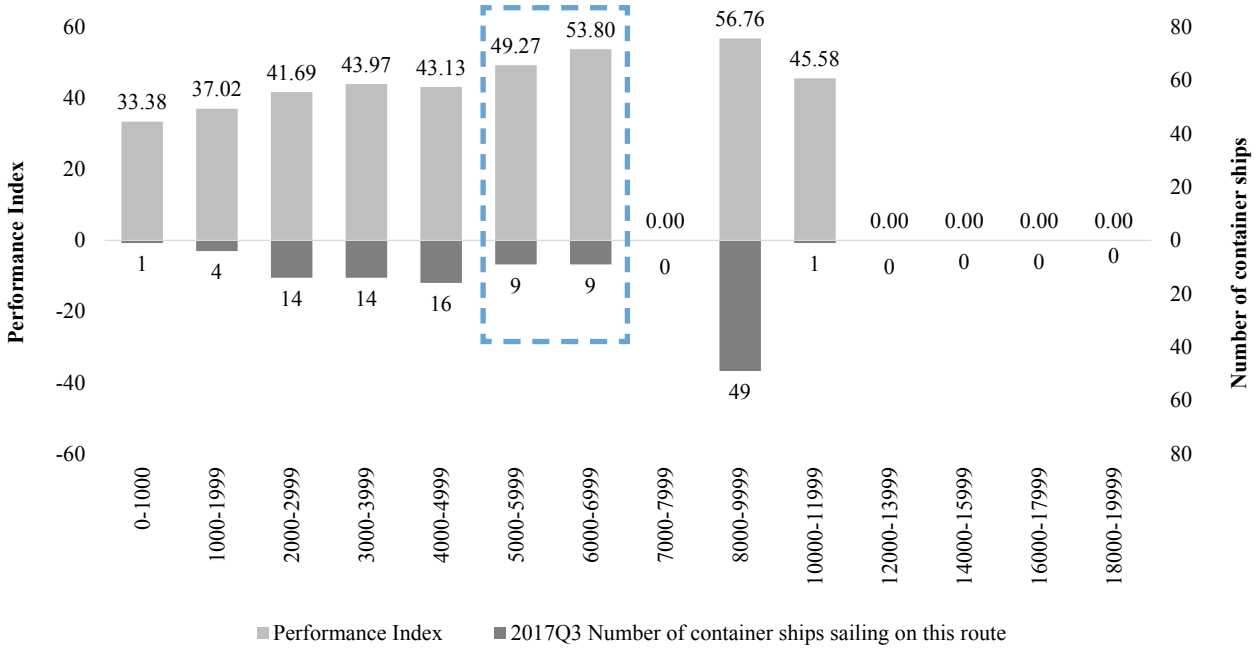
Graph 10 - Source: SPBD-Lab, SISI

Distribution of popular ship types on shipping routes connecting the Singapore-Malaysia-Indonesia region and Fujian coast



Graph 11 - Source: SPBD-Lab, SISI

Distribution of popular ship types on the Caribbean—Mediterranean rim shipping route



Graph 12 - Source: SPBD-Lab, SISI

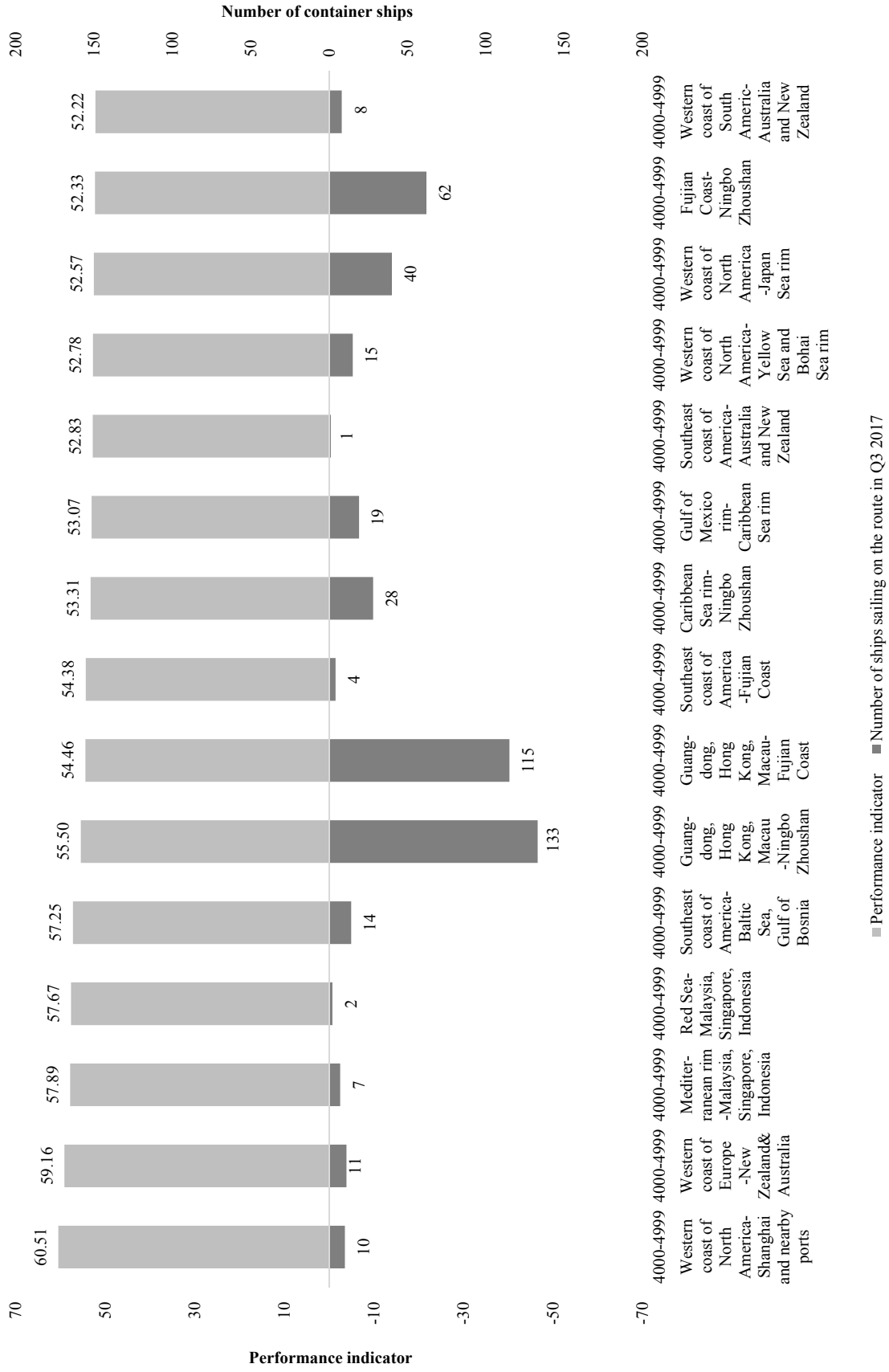
Popular ship types ranked by performance indicator

As shown in the performance indicator ranking of container ships, 2,000-2,999 TEU, 4,000-4,999 TEU, 6,000-6,999 TEU, 8,000-9,999 TEU, and 12,000-13,999 TEU ships deliver high performance. The following is the analysis on the three medium-sized ship types respectively – 4,000-4,999 TEU, 8,000-9,999 TEU and 12,000-13,999 TEU.

(1) 4,000-4,999 TEU container ships

Among 4,000-4,999 TEU container ships, those with remarkable performance are on the shipping routes from the Mexico Sea rim to some regions in China, including the coastal areas of Fujian, the Guangdong-Hong Kong-Macao region, Shanghai neighboring regions and Ningbo-Zhoushan Port. These shipping routes have limited numbers of container ships in operation, thus they are the "New Continent" yet to be explored. By comparison, shipping routes from the Guangdong-Hong Kong-Macao region to Ningbo-Zhoushan and the Fujian coast have sufficient shipping capacity in operation while maintaining high performance, ensuring a stable demand for 4,000-4,999 TEU container ships (Graph 13).

World's top 15 shipping routes in terms of performance indicator for 4,000-4999 TEU container ships



Graph 13 - Source: SPBD-Lab, SISI

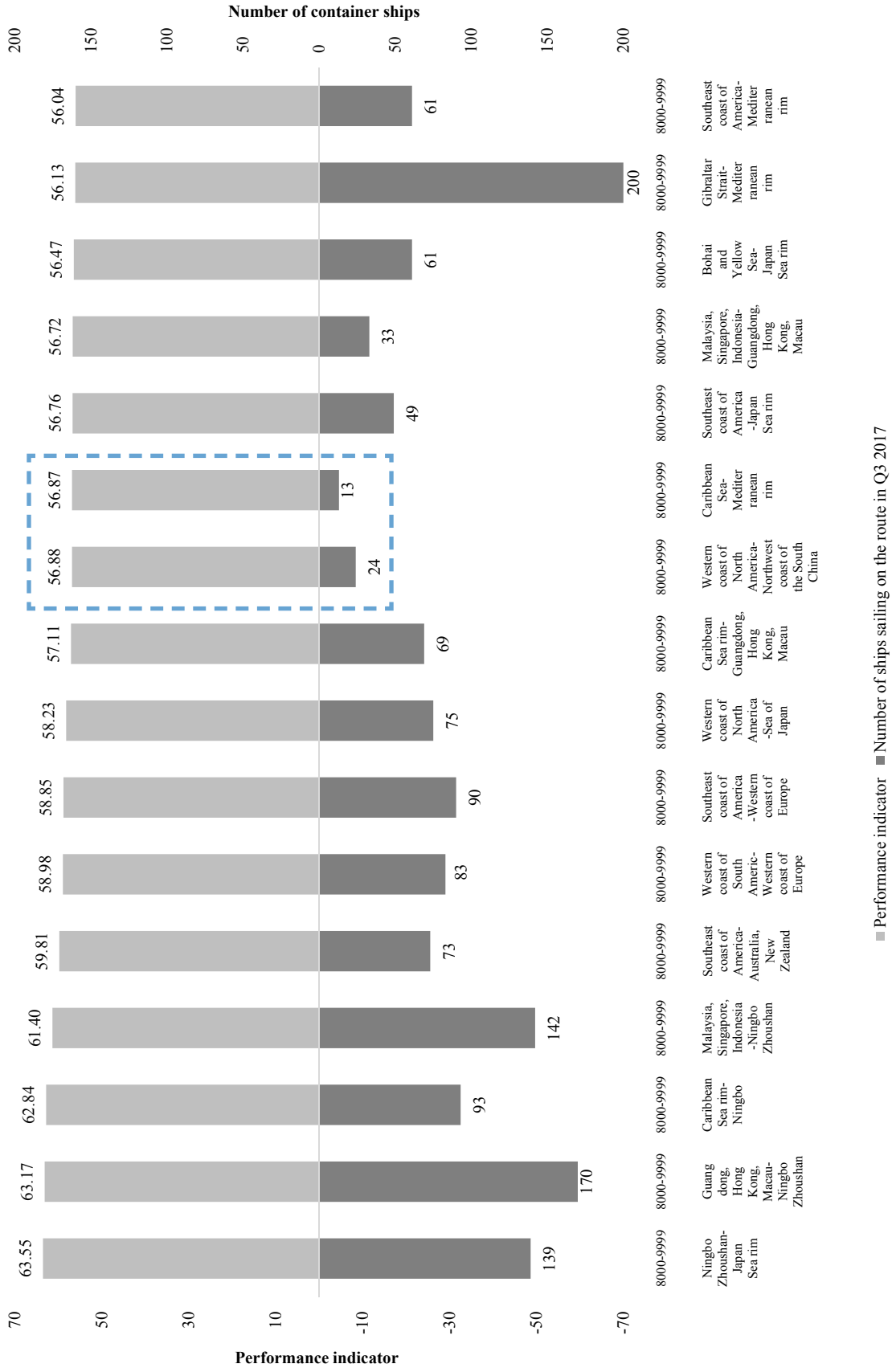
(2) 8,000-9,999 TEU container ships

8,000-9,999 TEU container ships record outstanding performance in the ship type performance ranking on all the shipping routes. In particular, the performance of the route originating from Ningbo Zhoushan area is leading, liner companies can give priority to placing such vessels on these routes. At the same time, shipping routes from the west coast of North America to the southeast coast of the US and the northwest coast of the South China Sea, and from the Caribbean Sea rim to the rim of the Yellow Sea and the Bohai Sea demonstrate high performance, but they have limited in-service shipping capacity. For this reason, 8,000-9,999 TEU container ships can be put into operation on these shipping routes (Graph 14).

(3) 12,000-13,999 TEU container ships

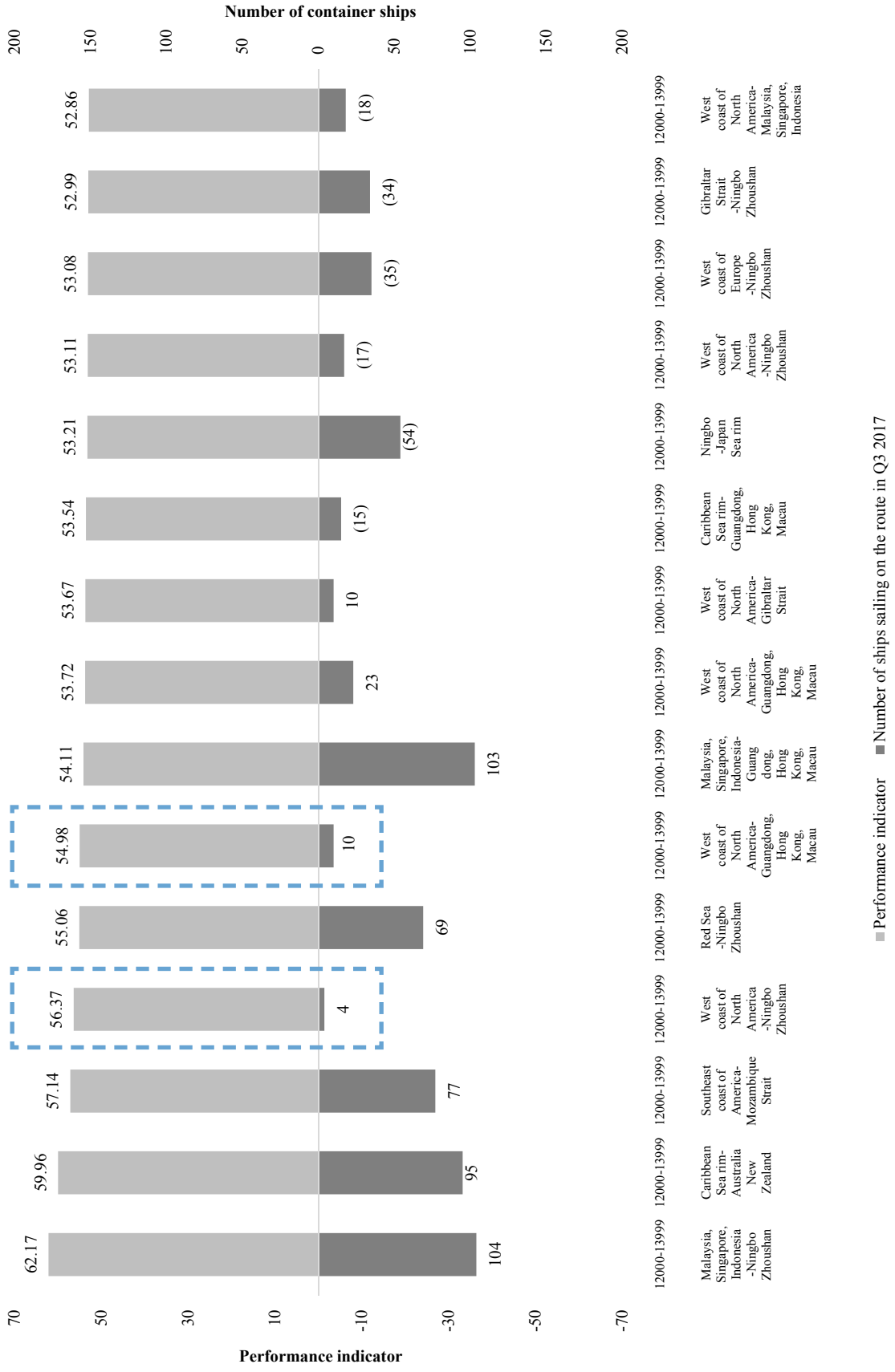
The navigation path map of global container shipping routes shows that ships of over 10,000 TEUs primarily sail on China-Europe routes, among which the shipping routes from Ningbo-Zhoushan to the Guangdong-Hong Kong-Macao region, the Singapore-Malaysia-Indonesia region, the Mediterranean rim and the Red Sea region are the highest performing ones. Specifically, ship owners are suggested to pay attention to shipping routes of Caribbean Sea rim—the Singapore-Malaysia-Indonesia region and the west coast of North America—the west coast of Europe, because this ship type is able to deliver high performance on shipping routes but with limited capacity in operation, a niche worth investment (Graph 15).

World's top 15 shipping routes in terms of performance indicator for 8,000-9,999 TEU container ships



Graph 14 - Source: SPBD-Lab, SISI

World's top 15 shipping routes in terms of performance for 12,000-13,999 TEU container ships

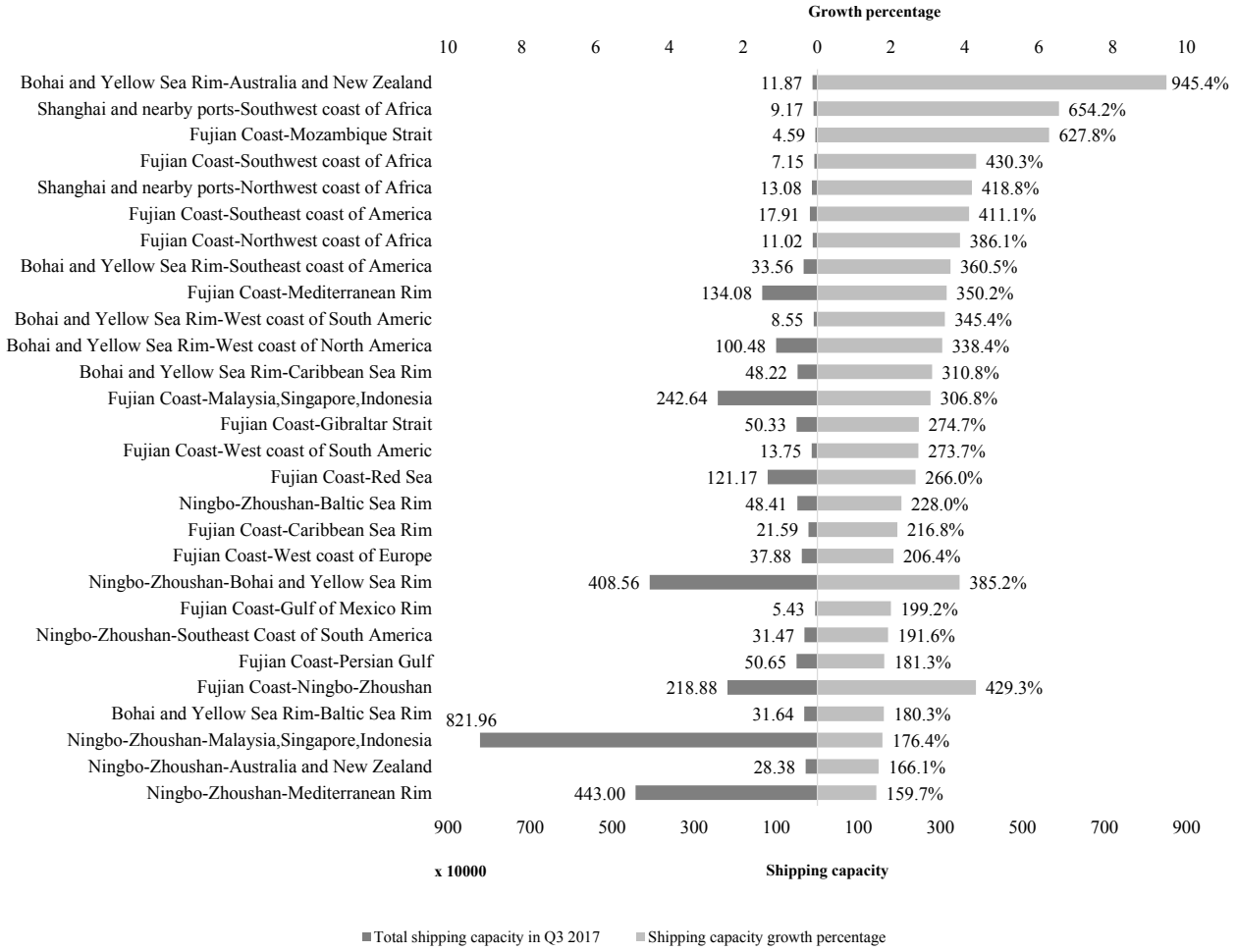


Graph 15 - Source: SPBD-Lab, SISI

Popular ship types on China's international shipping routes

Comparing the margins of growth of shipping capacity on China-related shipping routes (Graph 4), we can see that shipping routes from the Fujian coast to Ningbo-Zhoushan Port, the Mediterranean Sea rim to Ningbo-Zhoushan Port, and Fujian coast to the rim of the Yellow Sea and the Bohai Sea demonstrate evident potential for growth. Among China's out-going shipping routes, container shipping routes to Australia, New Zealand and Africa witness the fastest growth in shipping capacity, a proof of the achievements of the 21st Century Maritime Silk Road.

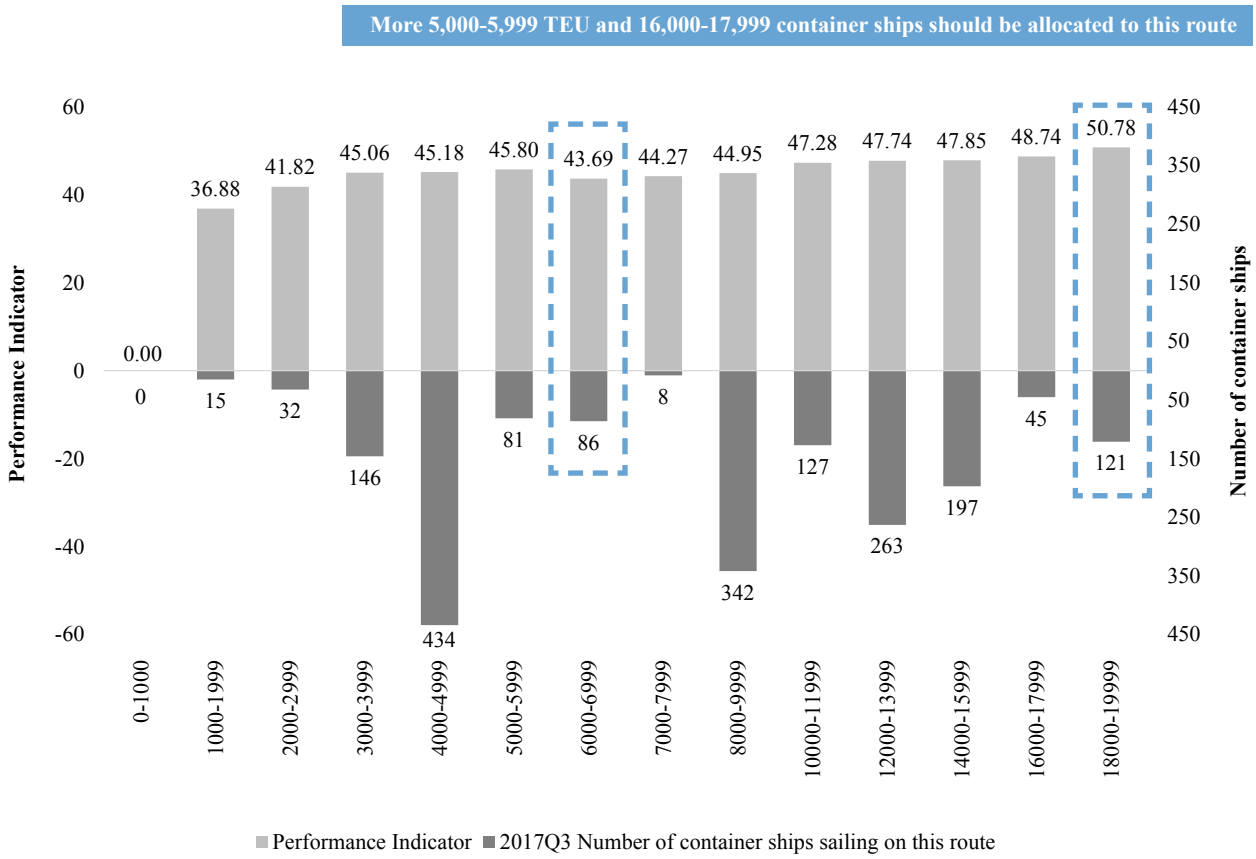
China's top 26 international shipping routes in terms of shipping capacity growth



Graph 16 - Source: SPBD-Lab, SISI

Analysis on popular ship types on China-Africa shipping routes shows that larger tonnage ships on this shipping line deliver higher performance. However, despite the high performance of 5,000-5,999 TEU and 16,000-17,999 TEU container ships, their capacity is limited. It is suggested that more such ships can be allocated to China-Africa routes.

Popular ship types on China-Africa shipping routes

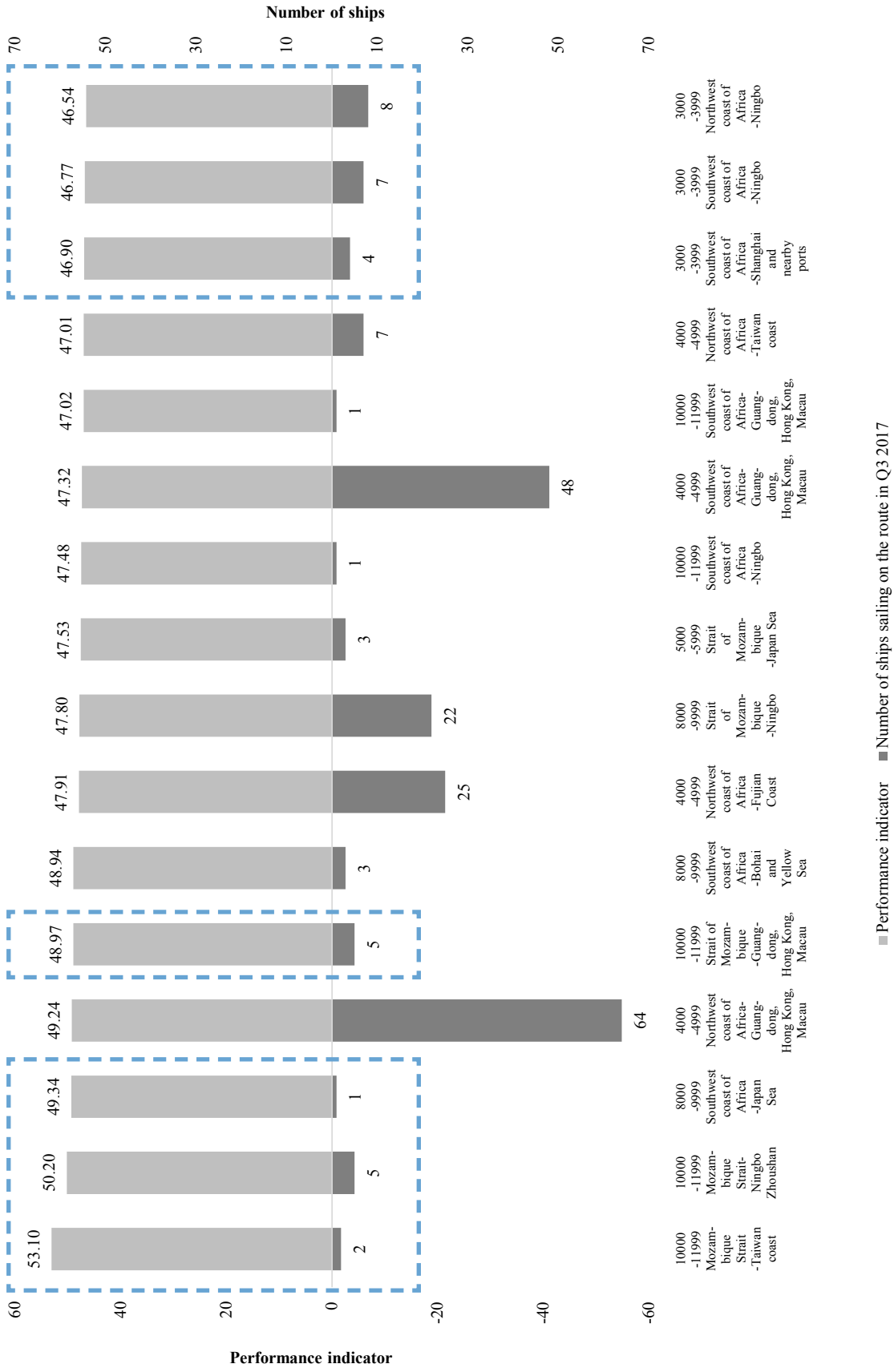


Graph 17 - Source: SPBD-Lab, SISI

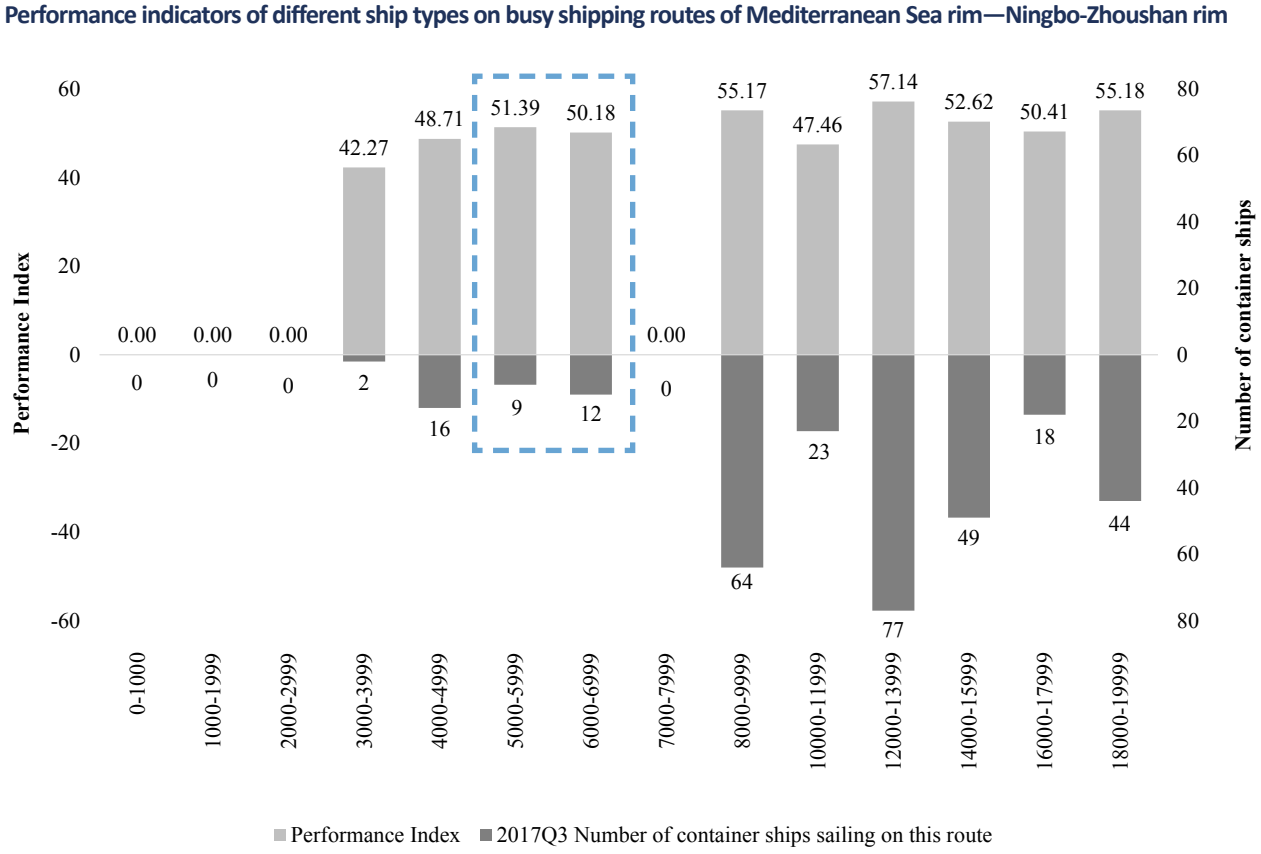
Shipping line-specific, we can find that the performance of ships on some shipping routes is not proportional to the available number of such ships. This points a direction worth ship owners' attention. More 18,000-19,999 TEU and 5,000-5,999 TEU ships can be allocated to shipping routes from Strait of Mozambique on the southeast coast of Africa and the Southwest coast of Africa to South China Ports, like Ningbo Zhoushan, Fujian Coastal Ports.

Graph 16 shows that the shipping capacity on the Ningbo-Zhoushan—Mediterranean Sea rim and Malaysia, Singapore, Indonesia shipping routes grew rapidly in recent years. The Malacca Strait is a must-access route from China to the Mediterranean Sea route, It can be considered that Ningbo-Zhoushan—Mediterranean Sea rim contributes a large part of shipping capacity of Ningbo Zhoushan- Malaysia, Singapore, Indonesia shipping routes. From the distribution of ship types on this route, we can see that 5,000-5,999 TEU and 6,000-6,999 TEU ships, though in small numbers, deliver sound performance, and hence ship owners are suggested to allocate more such ships to the shipping routes.

Performance indicators of different ship types on busy China-Africa shipping routes



Graph 18 - Source: SPBD-Lab, SISI



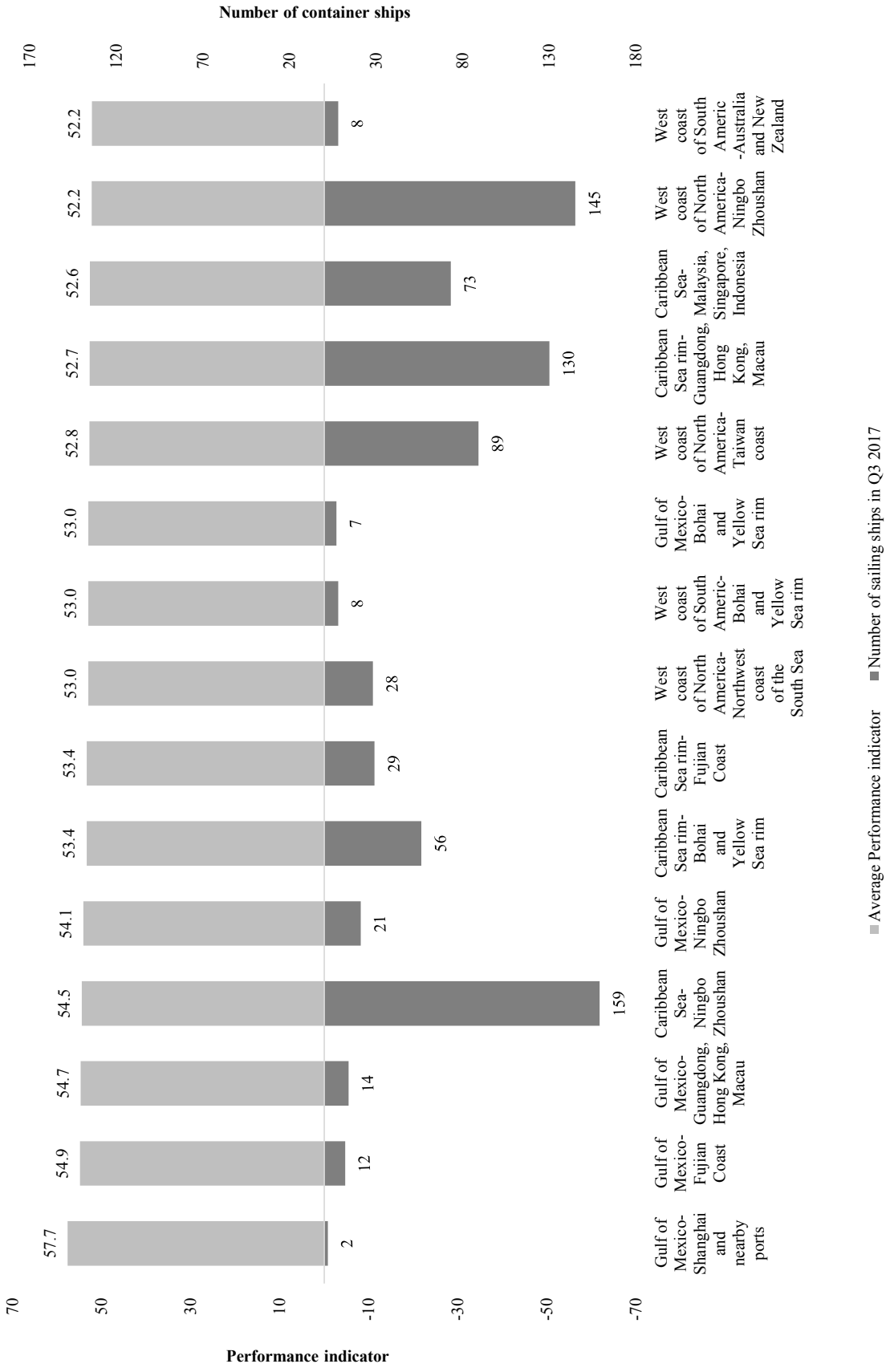
Graph 19 - Source: SPBD-Lab, SISI

Popular ship types on pan-Pacific shipping routes

Graph 20 shows the performance of popular container ship types on pan-Pacific shipping routes. Among the Top 15 shipping routes, performance indicators of those from ports around the Gulf of Mexico to China-based ports (especially ports in south China) are generally high, followed by shipping routes from ports around the Caribbean Sea to ports in the Far East. The indicators of shipping routes from the west coast of North America and the west coast of South America to ports in the Far East come after the two. Meanwhile, we can also find that in the pan-Pacific market, shipping routes from Australia and New Zealand, the Singapore-Malaysia-Indonesia region, and Taiwan to the Americas are also booming, in addition to those from the Far East to the Americas.

In terms of the number of vessels, the in-service ships on shipping routes from ports around the Caribbean Sea to ports in the Far East are far more than those on shipping routes to/from the Gulf of Mexico. The pivotal status of the Panama Canal determines that most ships from the Far East to the Americas have to berth and load/unload cargoes at Caribbean ports. Therefore, the indicators of shipping routes from the Caribbean Sea rim and the Gulf of Mexico rim to the Far East are a key target of study for pan-Pacific shipping routes.

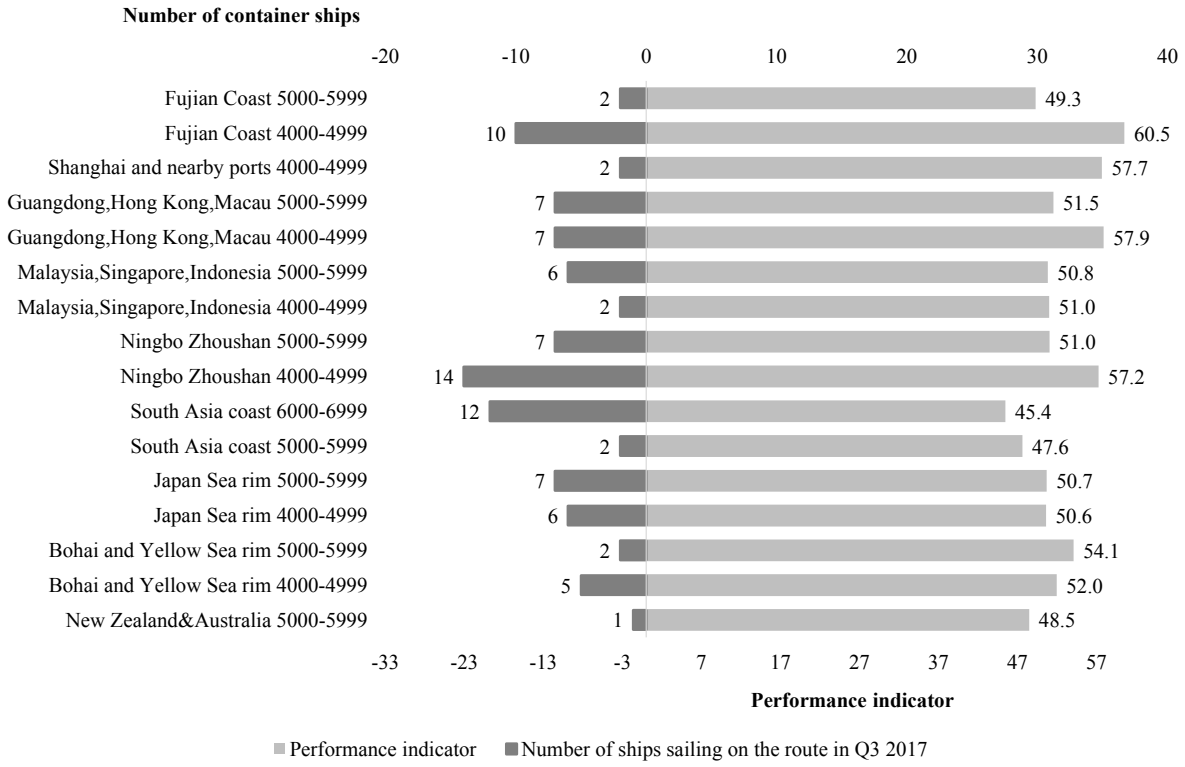
Top 15 Pan-Pacific shipping routes in terms of comprehensive performance indicator



Graph 20 - Source: SPBD-Lab, SISI

Graph 21 illustrates the indicators of various ship types and shipping routes and the numbers of sailing ships on routes from the Gulf of Mexico rim to Asia. We can see that only 4,000 to 5,999 TEU ships sail on this route. On the shipping routes from the Gulf of Mexico rim to ports in north China (the Bohai Sea rim), the indicator for 5,000-5,999 TEU ships is higher than that of 4,000-4,999 TEU ships. On shipping routes from the Gulf of Mexico rim to ports in south China (the Pearl River Delta, the Guang-dong-Hong Kong-Macao region, and the Singapore-Malaysia-Indonesia region), the indicator of 5,000-5,999 TEU ships also outperforms that of 4,000-4,999 TEU ships.

Indicators of various ship types and shipping routes and numbers of sailing ships on routes from the Gulf of Mexico rim to Asia



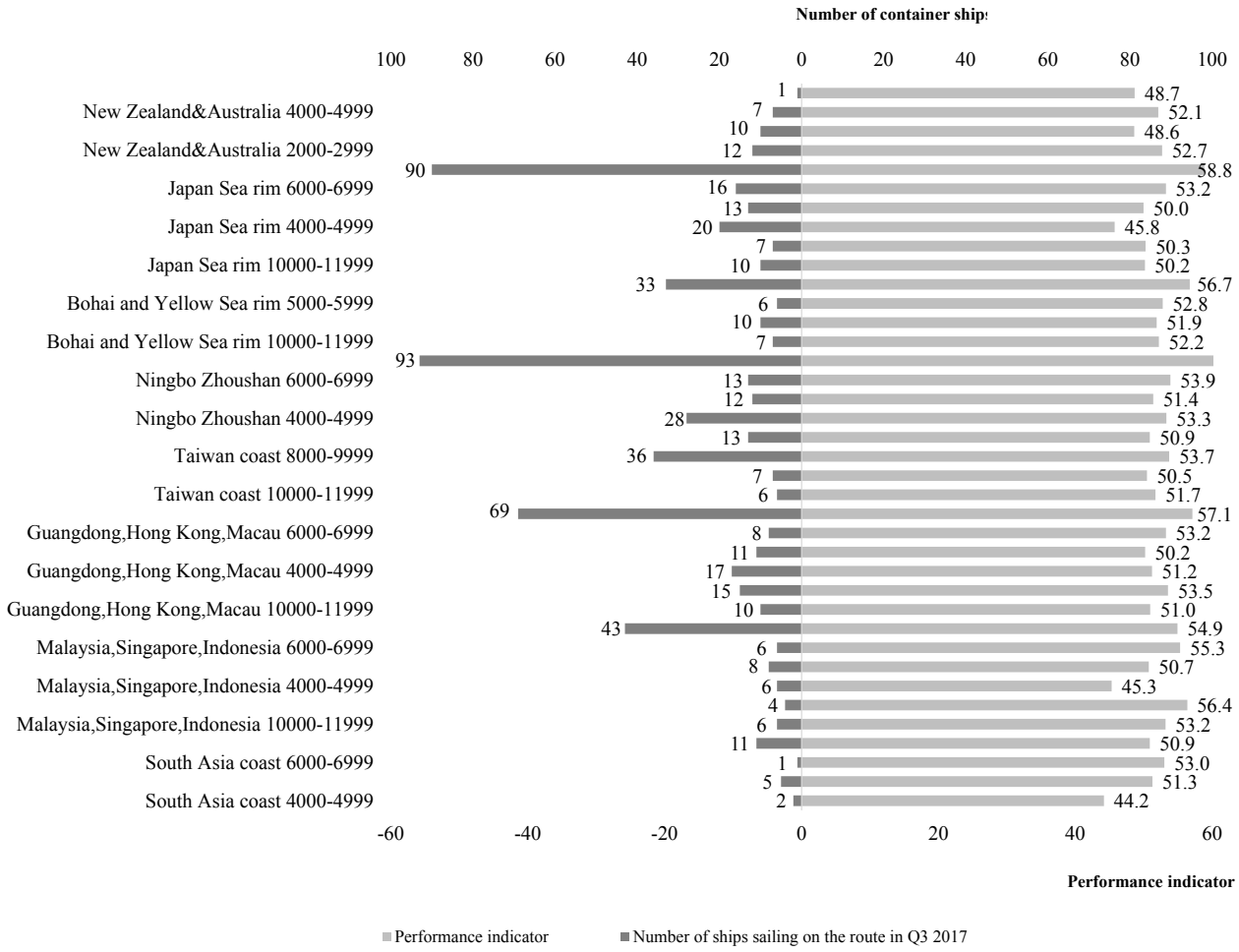
Graph 21 - Source: SPBD-Lab, SISI

However, as shown in Graph 22, the numbers of ships on shipping routes from the Caribbean Sea rim to Asian ports are larger, with more ship types in operation. We can see that there are more 8,000-9,999 TEU ships which also deliver higher performance indicators.

Shipping routes from the Caribbean Sea rim to Australia and New Zealand employ limited numbers of container ships and all of the container ships are below 6,000 TEUs with a wide gap in performance. Shipping routes from the Caribbean Sea rim to the Japan Sea employ quite a few 4,000-4,999 TEU container ships, but they deliver low performance indicators.

In fact, 4,000-4,999 TEU container ships sailing to ports in the Far East all suffer lower performance than other ship types.

Indicators, numbers of ships and shipping capacity of shipping routes from the Caribbean Sea rim to the Far East



Graph 22 - Source: SPBD-Lab, SISI

NOTE

Shipping & Port Big Data Laboratory (SPBD-Lab) was co-founded by Shanghai Municipal Transportation Commission, Shanghai Municipal Education Commission, and Shanghai International Shipping Institute (SISI), and is affiliated to SISI. It has set up an experimental environment suitable for storage and analysis of big data in shipping & port area, and has studied and mastered the world-class key technologies and application schemes for shipping & port big data analysis. It provides value-added data services such as consulting, training, strategic planning, technical solutions, technology research and development, data analysis, and data visualization for the shipping & port industry.

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