

An aerial photograph of a large port facility at sunset. In the foreground, a large container ship is docked at a pier, with its deck covered in colorful shipping containers. Several yellow gantry cranes are positioned along the pier, some with containers being loaded or unloaded. To the left, another ship is moving through the water, leaving a white wake. The background features a dense urban skyline with numerous skyscrapers under a warm, orange-hued sky. The water is calm, reflecting the light from the setting sun.

Transport & Logistics Barometer

2021 full-year analysis

M&A deals, joint ventures and strategic alliances
in the transport and logistics industry



This publication has been developed in collaboration between the PwC Transportation and Logistics practice alongside Strategy&, PwC's global strategy consulting business. Our purpose is to build trust in society and solve important problems.

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1 Highlights



Highlights

322

deals were announced in the transport and logistics (T&L) industry in 2021 – an absolute all-time high triggered by a strong pent-up demand that also pushed the total deal value (\$219.1 billion). More than twice as many megadeals (47), deals with a value >\$1 billion, compared to the previous year were announced. In addition, 2021 was the year of strategic investors: they participated in 44% of all deals (2020: 39%) and they accounted for 51% of the total deal value (2020: 35%). The value/sales multiple (1.6) has improved further towards the ten-year median (1.8), with prices for passenger-related targets and freight-related targets balanced.

Freight transport

accounted for 75% of all deals while the share of passenger-related deals slightly declined to 25%. Logistics and Trucking represented the strongest subsector, as usual, with more than 30% of the total deal value, created by 170 deals, thereof 21 megadeals. Some of the major players in logistics and shipping (e.g. DSV, Maersk, MSC, CMA CGM) dominate the M&A landscape and pursue their strategies of integration along the logistics value chain. The Chinese government, likewise, announced the merger of five logistics companies to form a major global player called China Logistics Group. Another 30 transactions related to targets in China/Hong Kong.

Major T&L players participate in small VC deals

despite overall funding in logistics startups has surged and led to a number of new unicorns in 2021, especially in the last mile and platform spaces. One example is the end-to-end supply chain visibility platform provider project44 that turned unicorn after its \$202 million Series E funding round led by Goldman Sachs and Emergence Capital. Europe is basically lagging far behind the US and China. Venture capital funding is not yet as widespread, and existing patterns make it difficult for European startups to grow.

Supply chain disruptions

have affected transport processes resulting in an increased scarcity of capacity and rising transport costs that are now affecting large parts of the economy. Container shortages, closures of the ports in Yantian and Ningbo or the Suez Canal blockade are some of the factors that have led to congestion. Container vessels and ports are currently assuming an additional storage function as the entire supply chain has faltered and won't be fully restored before 2023. However, the pandemic has once again highlighted the relevance of maritime shipping and ports and kept investor interest high. The subsector saw the second highest number of M&A deals in 2021. Of the 59 deal announcements, 41% related to port infrastructure.

Increased pressure to decarbonize

The UN COP26 conference and the EU Fit for 55 package have fuelled the climate discussion. Logistics players are increasingly entering into alliances and M&A to achieve the ambitious goals by pulling different levers. Nearshoring, efficiency gains through digital marketplaces, multimodal transport, alternative delivery methods, shared fleets and assets, new drivetrain technologies or alternative fuels offer a wide range of opportunities. For example, DB Schenker and Lufthansa Cargo established a carbon neutral connection between Frankfurt and Shanghai as of May 2021 based on sustainable aviation fuel (SAF). Though, complex issues and barriers remain.

In H1 2022

M&A activity will continue at a strong level as T&L companies will further seek growth options and expand their service offerings through acquisitions – also beyond the core business. Investments in digitalization and retired infrastructure will be increasingly important in 2022 to combat supply chain disruptions. We also expect more investments, cooperations and acquisitions related to sustainability.



2

Key issues for the industry



Industry recovers despite headwinds

At the beginning of 2021, it seemed that the T&L industry, particularly freight transport, was recovering well. Indices for world trade, air freight, container handling etc. developed positively, but in the course of the year single events like the blockade of important routes, temporary port closures due to repeated COVID-19 outbreaks and the imbalance between supply and demand demonstrated the continued vulnerability of supply chains. The situation has worsened towards the end of the year, triggered by a web of interrelationships leading to a deterioration in the shortages of certain types of goods. The unavailability of raw materials, intermediate products and goods (e.g. steel, wood, plastic, semiconductors, packaging, fuel etc.) combined with rising inflation rates have resulted in an increase in already high prices that affect multiple industries, e.g. automotive, consumer goods or construction. The appearance of virus variants like Omicron and renewed measures that may ensue are further tightening the situation and dampening the business climate.

Due to the relevance of T&L to the functioning of global flows of goods and people, the T&L industry is directly affected

by supply chain disruptions and at the same time adds new challenges to the situation, but can possibly also help to dissolve effects. Read more on page 8.

While these developments result in many struggling T&L companies, including passenger transport in particular, still needing to focus on getting their finances under control, there are other pressing topics that transport and logistics companies must address to ensure future competitiveness. For example, the UN Climate Conference (COP26) in November 2021 and the EU Fit for 55 package have once again fuelled the discussion on climate action. To meet decarbonization goals, various levers need to be activated and some T&L companies have already recognized the opportunity from acquisitions and alliances to do so. Read more on pages 15-19.

To become future-proof, however, T&L companies need to step up not only in terms of sustainability, but also in terms of digitalisation, amidst new requirements related to e-commerce, delivery services or automation, for example. To drive the transformation of the industry, startups enter the market and evolve with new business models and specialized solutions that can help fill the gaps of established companies. Read more on pages 20–23.



Spotlight: Supply chain disruptions

Prior to the COVID-19 pandemic, functioning supply chains were considered self-evident, with the focus on efficiency and costs. In the course of the crisis, global supply chains withstood the external shocks for a long time, except for some delays due to closed borders and slowed clearance processes.

Since the second half of 2020, large parts of the global economy experienced an unexpectedly strong surge in demand, for example, due to shifts in consumption (fewer holiday trips, more consumption / consumer goods), expenditures for home offices and economic stimulus measures. This led to correspondingly positive developments in the freight sector – in basically all subsectors, i.e. trucking, rail, shipping and air. At the same time, recurring disruptive factors have affected transportation processes with the result that an increased scarcity of capacity and rising transport costs are now affecting large parts of the economy.

Especially at the beginning of the demand boom, not enough containers were available at the required locations. Containers had to be relocated and newly purchased. Other factors include the Suez Canal blockade by Ever Given, which halted maritime traffic between Asia and Europe, and repeated terminal closures in China due to China's strict zero-Covid strategy, for example, at the ports of Yantian and Ningbo. As a consequence, container vessels are congested outside ports, particularly in the USA (e.g. Los Angeles) and Europe (e.g. Rotterdam), and the entire supply chain is out of synch.

Hundreds of container vessels worldwide are repeatedly waiting to be unloaded, tightening the already exhausted vessel capacities.

Despite the fact that the large shipping companies in particular have commissioned a strong newbuilding program, the majority of the new vessels will not enter service until 2023.

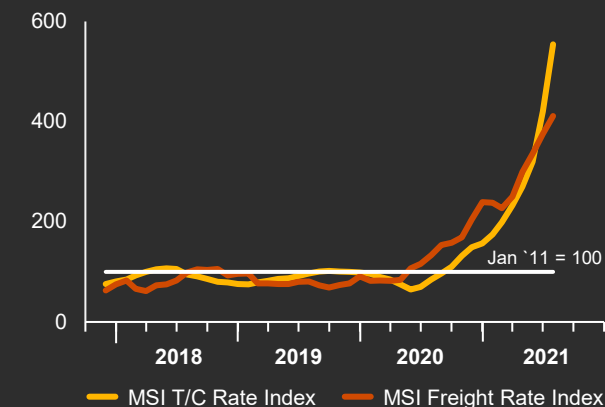
The ports thus assume a storage function in addition to the actual handling – within the scope of their narrow possibilities. Due to the scarce capacities, this storage function causes high costs and freight rates. Congestion at the ports also affects downstream and upstream logistics, i.e. transport from and to the hinterland. Delays (e.g. trucks) additionally reduce freight capacity and cause inefficient warehousing – with the result of rising freight costs.

These factors, in turn, lead to a shortage of container capacity, as containers remain in storage areas (ship, port, truck/rail, logistics centers) for too long. This is reflected in the global development of freight rates. For example, the Shanghai Containerized Freight Index (SCFI) increased by 217% from October 2020 to October 2021, and the European index (Europe Base Port) even increased by 609% overall.

Based on data collected between 2017 and 2020, Transport Intelligence estimates that Europe is short on more than 400,000 truck drivers, and the crisis has even worsened the situation. For example, many European truck drivers have left the UK in the wake of Brexit and the pandemic, and only few have returned so far.

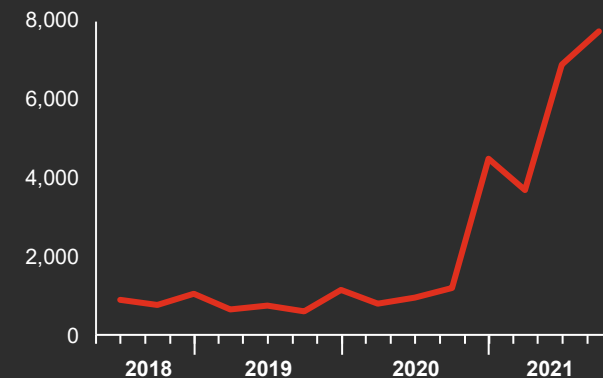
Supply chain disruptions are further fueled by insufficient digitalization and partially outdated infrastructure (ports, bridges, roads, rail network), which affects the transparency of the logistics processes and thus important forecasts for the transport of goods.

MSI Freight Rate Index



Source: MSI

Freight rate Shanghai to Europe (\$/TEU*)



Source: Alphaliner, *TEU: twenty-foot standard container

M&A activity at a new high

Despite the supply chain disruptions or prolonged uncertainty in the global economy and among T&L companies, the high quantity of dry powder in the market has led to an increased overall M&A activity (all industries) after a brief pause in 2020. However, although the number of mergers and acquisitions in the T&L industry has reached its highest level ever since and thus even surpasses the former record year of 2017 (283 deals), the relative share has decreased to 3.5% compared to a long-term average of 4.1%. The simple reason is that M&A activity in other industries has increased even more significantly.

A total of 322 deals worth \$50 billion or more were announced in the T&L industry in 2021, compared to a five-year average of 270. The number of megadeals (47) was more than twice as high as in the previous year, which has a significant impact on the total deal value that stands at \$219.1 billion (2020: \$99.8 billion), indicating that a huge pent-up demand exists. The buyer base has broadened, as strategic investors were involved in 44% of deals (2020: 39%) and accounted for 51% of total deal value (2020:35). See the full list of megadeals and more data on investors in the annex from page 28.

The shift in the share of deals with freight-related targets to passenger-related targets has become even more pronounced towards freight and is now approx. at 75/25, compared to a

long-term average of around 60/40. Nevertheless, the deals with passenger-related targets have a significantly higher average deal value (even when excluding the two biggest deals of the year 2021 that may cause distortion).

In addition to the exceptionally large deal announcement between Canadian National Railway and US railway operator Kansas City Southern (\$33.5 billion) from H1 2021, another acquisition with an outstanding high deal value was announced in the second half of the year. The deal valued at \$17.37 billion is one in a series of investments by investors in Australian infrastructure assets and will mark one of the country's biggest buyouts once completed. Shortly after the reopening of Australia's borders to international travel, Australia's largest airport, Sydney Airport, accepted the takeover bid by the Sydney Aviation Alliance consortium, which is composed of various international and Australian infrastructure and investment funds.

A breakdown of deals in the subsectors shows that, compared to the pre-crisis year of 2019, the share of the strongest subsector Logistics and Trucking (53%) has even increased by 15 percentage points, while Passenger Air (11%) and Shipping (18%) have remained at a similar level and the shares in Passenger Ground (11%) and Rail (2%) have halved. See more data on subsectors in the annex on page 32.

	2015	2016	2017	2018			2019			2020			2021		
	Total	Total	Total	1H18	2H18	Total	1H19	2H19	Total	1H20	2H20	Total	1H21	2H21	Total
Number of deals	239	237	283	127	100	227	138	123	261	104	152	256	148	174	322
Total deal value (\$bn)	183.8	119.9	134.2	74.6	41.6	116.2	68.4	74.3	142.7	37.1	62.7	99.8	99.0	120.1	219.1
Average deal value (\$m)	769.2	506.1	474.1	587.1	416.5	511.9	495.9	604.1	546.9	356.8	412.7	390.0	668.7	690.2	680.3

M&A on par with GDP, strategic alliances limping

Whereas real GDP had recorded some sharp declines in 2020, the growth rates were entirely positive in 2021. The second quarter in particular stood out with a double-digit growth of 11.5%. In the second half of the year, GDP growth moderated to 4.6% in Q3 and finally to 4.0% in Q4 2021.

After the deal activity in 2020 had behaved atypically – staying relatively high despite the slump in real GDP and even rising sharply in H2 2020 – deal announcements in 2021 broadly reflected economic development, as has historically been the case. M&A activity was slightly lower at the beginning of the year compared to Q4 2020, but then increased and peaked in Q3 with 87 announcements – the highest number in one quarter since our records started. The leap in real GDP in Q2 was thus reflected in M&A activity with a slight delay, which remained at the strong level until the end of the year.

In the first half of 2021, M&A valuations had already slowly improved from the low in 2020 towards the ten-year average (1.8). For the full year, the value/sales multiple recovered further to stand at 1.6. The prices for passenger-related targets (1.6) and freight-related targets (1.7) have aligned over in the course of the year. However, while passenger-related multiples

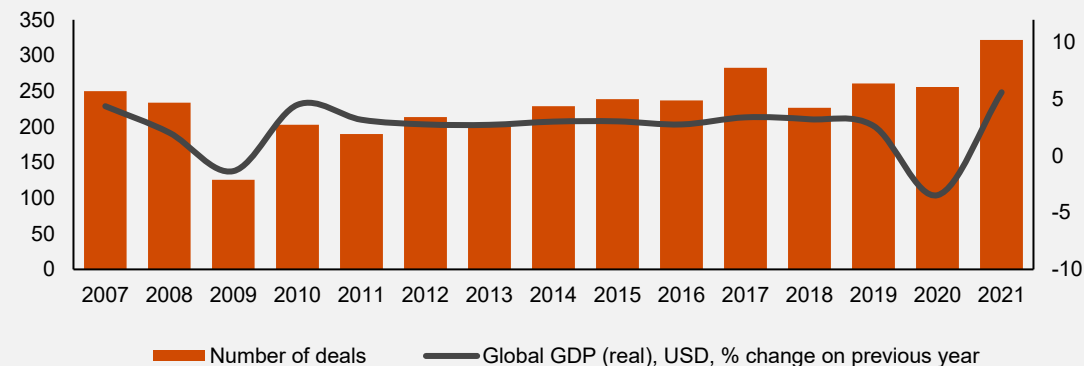
more than doubled compared to 2020 and were exactly in line with the ten-year average, prices for freight-related targets stagnated and were only slightly below the ten-year average of 1.9. Read more on multiples in the annex on page 33.

After reaching a new low in 2020, the number of strategic alliances remained at the same weak level in 2021. The number of codeshare agreements and joint ventures was only half as high as in 2020, which benefited from a comparatively strong first quarter in which announcements were at pre-crisis normal levels.

One might have expected that with the restart of air travel there would be an increase in codeshare agreements, through which airlines share routes and thus also risk. The number has increased minimally compared to the last three quarters of 2020, but remains marginal. The volatile aviation environment and the financial burden due to increased debt have led to airlines still being primarily focused on their financial situation.

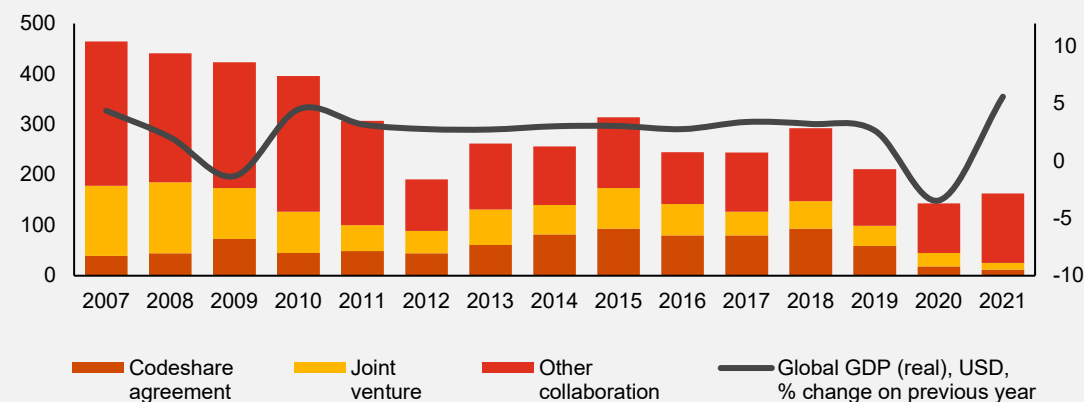
The 13 announced joint ventures were across all subsectors. The number of other collaborations normalized to pre-crisis levels and was 41% higher compared to the previous year.

T&L deals (no. of deals and change in real global GDP)



Source: PwC analysis, based on Refinitiv and IHS

T&L strategic alliances (no. of alliances announced and change in real global GDP)



Source: PwC analysis, based on S&P Global Capital IQ and IHS

Aviation – Omicron increases concerns

Due to strong demand and its beneficial situation in the supply chain, air cargo performed well throughout 2021. After an uptick in H1 2021, air cargo volumes remained at a high level but growth slowed in November. Industry-wide cargo ton kilometres (CTK) were 3.7% above their November 2019 levels, after increasing 8.2% in October vs. October 2019.¹ Supply chain disruptions leading to airport congestion and capacity constraints play into this deceleration. The global passenger business has continued to develop positively but at reduced pace at the end of the year with industry-wide revenue passenger kilometers (RPK) in November being 47% less the same month in 2019 – still a very low level.² While international air travel remained on an upward trend as more markets reopened prior to the emergence of Omicron, domestic travel slowed mainly due to new lockdowns in China. In late November, the subsector recorded the first flight cancellations caused by new travel restrictions with a negative impact on RPKs.

Many airlines continue to depend heavily on financial aid and the surge in jet fuel prices has driven up operating costs. Governments, for example, have so far provided \$243 billion in support to airlines³, and 2021 saw further M&A deals by investors to step in to bail out. Talace Pvt Ltd, a unit of Tata Sons announced to acquire highly indebted Air India from the Indian

Government for \$3.41 billion with the goal to revive the airline, which had already suffered losses before the crisis. Other examples are Attestor Capital LLP acquiring a 51% stake in German Condor Flugdienst GmbH or the announcement by Buona Sorte Holdings Inc. to increase its stake from 80% to 89.5% in Philippine Airline (PAL) for \$251.38 million to keep the financially battered airline afloat. Meanwhile, the planned acquisition of Air Europa by British Airways parent IAG, agreed in 2019, is on the verge of being cancelled due to competition concerns raised by the EU Commission. The aviation industry's debt has increased to \$650 billion⁴ in 2021, which hampers the airlines' ability to invest in more sustainable aircraft or new routes. Nevertheless, some airlines entered into cooperations in 2021 to work together on greener aviation, especially with regard to sustainable aviation fuels (SAF).

The prolonged disruption in commercial air travel has further stimulated investor interest in private aviation services, which was already overserved in H1 2021. This is evident in the joint acquisition of Signature Aviation, the largest private jet fixed base operator (FBO), by Blackstone, Cascade and Global Infrastructure Partners, or the announcement of Sky Harbour LLC, a developer of private aviation infrastructure, going public through the acquisition by Yellowstone Acquisition Company for \$450 million. Airport infrastructure in general became even more attractive for investors; the number of deals increased to 13 (2020:6).

Top 10 M&A deals in aviation (passenger) and airports

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)
Jul 21	Sydney Airport Holdings Pty Ltd	AU	Sydney Aviation Alliance (investor group)	US	Pending	17.37
Dec 21	DHMI Antalya Airport 25-year Concession	TR	Fraport AG and TAV Havalimanlari Holding (JV)	TR	Pending	8.77
Feb 21	Signature Aviation PLC	UK	SPV formed by Cascade Investment Group and Blackstone	UK	Completed	4.66
Jun 21	Atlantic Aviation Corp	US	Kohlberg Kravis Roberts & Co LP (KKR)	US	Completed	3.53
Jun 21	Shanghai Hongqiao International Airport Co Ltd	CN	Shanghai International Airport Co Ltd	CN	Pending	2.94
Oct 21	Air India Ltd	IN	Talace Pvt Ltd	IN	Pending	2.41
Feb 21	Wheels Up Partners LLC	US	Aspirational Consumer Lifestyle Corp	SG	Completed	1.99
Feb 21	China Eastern Airlines Corporation Ltd (additional 13.2% stake)	CN	China Eastern Air Holding Co Ltd	CN	Completed	1.67
Sep 21	Jandakot Airport	AU	Investor Group (APN Industria REIT, Dexus Group)	AU	Pending	0.94
Aug 21	22 Airports in Brazil, 30-year Concessions	BR	CCR SA (15 airports) and Vinci Airports SAS (7)	BR	Completed	0.59

Sources: Refinitiv, PwC analysis

¹ Source: IATA | Air Cargo Market Analysis November 2021 | January 2022

² Source: IATA | Air Passenger Market Analysis November 2021 | January 2022

³ Source: IATA | Economic Performance of the Airline Industry | October 2021

⁴ Source: IATA | Annual Review 2021 | October 2021

Freight transport and logistics

The most obvious development in the past year was the brisk deal activity of the world's major shipping companies. Maersk, MSC and CMA CGM in particular have continued to drive vertical integration through their acquisitions. Their targets are diverse and demonstrate ambitions to gain more influence over global supply chains. They continue to invest in their core shipping business, but also in port terminals to strengthen their global networks (see chapter 'Ports and terminal operations'). Moreover, they are buying freight forwarders to gain direct access to shippers. Maersk in particular is going a step further and entering the growth areas of contract logistics and e-commerce fulfillment, through acquisitions including those of LF Logistics and Visible SCM.

The trend towards further consolidation and integration is also being followed in China. 30 transactions in freight forwarding and logistics alone relate to targets in China / Hong Kong; with a few exceptions, these are local deals. At the end of the year, the Chinese government also made people sit up and take notice when it announced the merger of five state-controlled logistics companies to form a major global player called China Logistics Group.

There was also movement on the African continent. 10 deals (> \$50 million) with a total transaction value of \$3 billion mark record values compared to previous years. In addition to a number of port deals, this is due to the acquisitions of Imperial Logistics by DP World, Nile Dutch by Hapag Lloyd, and several corporate acquisitions by CMA CGM. The planned acquisition of Bolloré Africa by MSC – the second largest deal in this segment with a deal value of \$6.41 billion – is not even included in these figures.

Despite vaccine shortages, the African continent has so far only been comparatively mildly affected by the Corona crisis. In addition, the African Continental Free Trade Area (AfCFTA), a catalyst for intra-African trade, came into force on January 1, 2021. These may be reasons for an increasing attractiveness of Africa logistics – which does not necessarily require acquisitions. For example, Kuehne+Nagel recently reported that it has expanded its presence in Africa to 18 countries and plans to continue this expansion in the first quarter of 2022. Maersk, in turn, is planning a joint venture with South African transport and finance conglomerate Grindrod. The JV will provide land transportation services in South Africa, complementing Maersk's end-to-end services.

Top 10 M&A deals in logistics and trucking

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)
Nov-21	Wolt Enterprises OY	Finland	DoorDash Inc	United States	Pending	8.11
Dec-21	Bolloré Africa Logistics SAS	France	MSC Mediterranean Shipping Co SA	Switzerland	Pending	6.41
Apr-21	Global Integrated Logistics	Kuwait	DSV Panalpina A/S	Denmark	Completed	4.08
Dec-21	LF Logistics Holdings Ltd	Hong Kong	AP Moller-Maersk A/S	Denmark	Pending	3.76
Dec-21	Ingram Micro Commerce	United States	Ceva Logistics AG (CMA CGM SA)	France	Pending	3.00
Feb-21	Kerry Logistics Network Ltd	Hong Kong	Flourish Harmony Holdings Co Ltd	China	Completed	2.26
Jul-21	Transplace Inc	United States	Uber Freight LLC	United States	Completed	2.25
Mar-21	Lineage Logistics Holdings LLC	United States	Investor Group of various Financial Investors	Canada	Completed	1.90
Aug-21	JF Hillebrand Group AG	Germany	Deutsche Post AG	Germany	Pending	1.77
Nov-21	LAACO Ltd	United States	CubeSmart	United States	Pending	1.69

Shipping – currently booming, but uncertainties remain

The strong upswing that parts of the shipping industry, and especially liner shipping companies, have experienced in H1 2021 carried on throughout H2 2021. Freight rates in the container market soared to historical heights as a result of increased demand for containerized goods, especially in the US, paired with the congestion of key ports on both sides of the Pacific. The ports of Los Angeles and Long Beach were facing a queue of more than 80 vessels waiting for a berth.

The interest in strategic purchases in the gas transportation sector also persisted in H2 2021. Six out of the top ten M&A deals in shipping concerned these targets which shows that companies want to apply bridging technologies to position themselves in the coming years and anticipate environmental and regulatory challenges.

In addition to investments in areas directly related to sea freight, shipping companies also invested in freight forwarding companies to gain a foothold in other freight markets, such as the air freight market, to expand their service offering and geographical coverage. These investments can be seen as an instrument to lend resilience to their business and counter the risks of bottlenecks in their supply chains, which is an acute problem and a considerable

risk going forward. Maersk, for example, acquired the Senator International logistics group, and CMA CGM expressed a strong interest in extending its foothold in the air freight sector. Current investments in ports by CMA CGM and Hapag Lloyd underline the important function of ports in the global logistics chain. Filling such key positions is crucial for shipping companies to position themselves more broadly after a deep crisis and to diversify their business activities and portfolios.

The overall shipping rates of tankers declined sharply in H1 2021, followed by a slight increase in H2 2021. The crude tanker segment is still suffering from the drop in global oil demand in 2021 and has to face the weakest oil tanker earnings for over 30 years. In the chemical tanker market many small players are still fighting to survive and at the same time a number of urgent investments in new technology is looming on the horizon. Following the steep slump in the bulk market, a recovery boost began, with average bulker earnings showing post-financial crisis highs throughout H2 2021. The increased coal trade has been a significant driver, even though many European countries are turning their backs on coal as a source of energy. However, due to the growing energy demand e.g. in Southeast Asia, the coal trade enjoyed a revival.

Top 10 M&A deals in shipping (freight)

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)
Oct 21	Teekay LNG Partners LP	BD	Stonepeak Partners LP	US	Pending	1.48
Aug 21	CGC Operating-LNG Carriers	GR	Capital Product Partners LP	GR	Pending	0.71
Mar 21	Navis LLC	US	AcceI-KKR LLC	US	Completed	0.45
Mar 21	Diamond S Shipping Inc	US	International Seaways Inc	US	Completed	0.41
Apr 21	Naviera Ultrana Ltd	CL	Navigator Holdings Ltd	UK	Completed	0.39
Oct 21	Hengtong Logistic Co Ltd	CN	Nanshan Group Co Ltd	CN	Pending	0.37
Dec 21	Esvagt A/S	DK	3i Infrastructure PLC	JE	Pending	0.36
Jan 21	Golar LNG Partners LP	BD	New Fortress Energy Inc	US	Completed	0.25
Feb 21	GasLog Ltd (45% stake)	GR	Global Energy & Power Infrastructure Fund	US	Completed	0.25
Aug 21	Avance Gas Holding Ltd	BD	Hemen Holding Ltd	CY	Pending	0.25

Sources: MSI, Clarksons Shipping Intelligence Network, Danish Ship Finance, Bloomberg, Refinitiv, PwC analysis

Ports and terminal operations

According to EMSA, port calls in Europe from January to November 2021 were 2% above the pre-crisis level of 2019. Nevertheless, ports which specialized in, for example, vehicle carriers or cruise ships, are still being badly affected by COVID-19. At the same time, there have been many congestion issues, especially in the trade between China and the US West Coast. After the congestion eased on the Chinese side, which was caused due to a COVID-19-induced partial lockdown of the Port of Ningbo-Zhoushan, the ports in the US and Europe now are becoming the bottlenecks. Vessels are lining up at the ports of Los Angeles-Long Beach due to acute labor shortage on the shore side.

One of the largest observed deals in 2021 was announced to be the acquisition of the remaining 90% interest in Fenix Marine Services Ltd, the third largest terminal in the Los Angeles/Long Beach area in terms of capacity, by CMA CGM for \$1.8 billion. Once completed, the key infrastructure asset will bolster CMA CGM's rapid growth in the US. CMA CGM already has major investment plans aimed at improving service quality to better meet customer expectations.

Besides this, Hamburger Hafen und Logistik AG is in negotiations with a subsidiary of the Chinese shipping company Cosco about a minority stake (35%) in Container Terminal Tollerort. Hapag-Lloyd will acquire a 30% stake in Container Terminal Wilhelmshaven (CTW) and 50% of the shares of Rail Terminal Wilhelmshaven (RTW) at JadeWeserPort.

Moreover, H2 2021 saw announcements of major deals within the Chinese port infrastructure. For example, China Merchants Port Group Co Ltd, ultimately owned by the Chinese state-owned China Merchants Group Co Ltd, intends to raise its stake to 20.98%, by acquiring a further 18.75% in Ningbo Zhoushan Port Co Ltd with a transaction value of \$2.23 billion, which marks the largest deal in 2021. India's largest integrated port company Adani Ports & Special Economic Zone Ltd pursued the acquisition of several ports in India to transform itself into a pan-India port company. These planned acquisitions are in line with the declared company's strategy of East Coast to West Coast parity and will provide access to growth from new hinterland markets.

Likewise, some major port operators expand into freight forwarding, aiming at providing a more integrated logistics offering. For example, PSA International has acquired freight forwarder BDP International (deal value undisclosed), following DP World's acquisitions of Syncreon and Imperial.

Top 10 M&A deals ports

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)
Jul 21	Ningbo Zhoushan Port Co Ltd (18.8% stake)	CN	China Merchants Port Group Co Ltd	CN	Pending	2.23
Nov 21	Fenix Marine Services Ltd (90% stake)	US	CMA CGM SA	FR	Pending	1.80
Jul 21	China Merchants Port Grp Co (23.1% stake)	CN	Zhejiang Province Port Investment Operation Group Co Ltd	CN	Pending	1.72
Oct 21	Yingkou Port Bulk Cargo	CN	Liaogang Holdings (Yingkou) Co Ltd	CN	Pending	1.14
Jun 21	MMC Corp Bhd (48.2% stake)	MY	Seaport Terminal (Johore) Sdn Bhd	MY	Pending	0.71
Jul 21	Marsa Maroc (35% stake)	MA	Tanger Med Dev Log SA	MA	Completed	0.61
Mar 21	Gangavaram Port Ltd (58.1% stake)	IN	Adani Ports & Special Economic Zone Ltd	IN	Pending	0.50
Apr 21	Adani Krishnapatnam Port Ltd (25% stake)	IN	Adani Ports & Special Economic Zone Ltd	IN	Pending	0.38
Oct 21	DP World Plc-Port Assets(3)	EG	CDC Group PLC	UK	Pending	0.32
Jan 21	Red Sea Gateway Terminal Ltd (40% stake)	SA	Investor Group of COSCO Shipping Ports Ltd and Saudi Arabian Sovereign Wealth Fund PIF	SA	Completed	0.28

Sources: MSI, Refinitiv, Bloomberg, PwC analysis



3

Decarbonization of logistics



Cooperations and alliances are taking off to tackle the decarbonization challenge

Transport accounts for more than 16% of greenhouse gas emissions globally and 25% of GHG emissions in the EU. In view of COP26 and the EU Fit for 55 package, pressure to decarbonize logistics is mounting on an European and global scale. To meet these ambitious goals a broad set of levers needs to be pulled:

1. Management of freight demand growth
2. Smart utilization of multimodal transport modes
3. Shared fleets and assets
4. Energy efficient fleets and assets
5. Low emission energy sources

We have seen a rise in sustainability-related acquisitions and – even more so – in cooperation and alliances to develop cross-industry solutions at the interface of logistics, truck OEMs, infrastructure companies, energy players and logistics customers. Some of these alliances encompass startups and SMEs, but increasingly logistics players engage in major alliances with large incumbents. The alliances help address the decarbonization levers described above:

1. Management of freight demand growth

The most sustainable solution to decarbonize transportation is to reduce transportation. Nearshoring is a lever to reduce the carbon footprint of the supply chain along with reduced lead-times and improved supply chain security.

During the pandemic, nearshoring gained momentum, e.g. leading to the relocation of fashion manufacturing to North Africa, Turkey and Eastern Europe, and we expect

decarbonization pledges and requirements in many industries to have an impact on how supply chains are set up in the future.

Moreover, digital marketplaces in freight forwarding with their potential to optimize networks and reduce empty runs and emissions are about to take off. A recent notable deal was the investment by Manbang, a Chinese truck-hailing platform that matches shippers with drivers and fleet operators, in Plus.ai, a US-based autonomous trucking company, as part of a successful \$200m fundraising. This supports our belief that the combination of autonomous trucks and AI-enabled digital marketplaces will be a significant source of disruption in the market and a driver of higher network, fuel and carbon efficiency.

2. Smart utilization of multimodal transport modes

Multimodal transport is becoming smarter. This is due to increasing customer demand for sustainable transportation as well as higher costs for road transport, spurred by increasing CO2 tax and regulatory tightening. DP-DHL recently announced to partner with DB Cargo to shift its parcel long-haul transport from road to rail. In the short term, 6 percent of DP-DHL's parcels in Germany will be transported by DB Cargo and the partners aspire to increase the rail share to 20 percent in the mid term with an average train carrying approx. 100,000 parcels.

Additionally, an increasing congestion in major cities paired with restricted parking space and the climate footprint of delivery creates an opportunity of sustainable last mile deliveries for cargo bikes.

The German startup fairsenden with its bike fleet is partnering with local businesses in Berlin for this purpose.

3. Shared fleet and assets

Optimizing the utilization of assets and fleets is a major lever to reduce overall carbon emissions: Freight exchanges and marketplaces such as Transporeon and sender have been reconciling shippers and logistics service providers for some time. With digitally enabled marketplaces such as Cargonexx, a step change in (emission) efficiency is feasible. Accordingly, Cargonexx became a member of the Greentech Alliance and announced a partnership with project44 to improve supply chain and shipment transparency already in autumn 2020. Cross-company load consolidation, for example, on the last mile, is becoming relevant to increase asset utilization and reduce the environmental footprint. The former pilot project on crowd logistics in Berlin ("Kiezbote") that started in 2020 will now become an independent company. Parcels from DHL, Hermes and UPS are consolidated in a micro-depot and delivered locally by handcart or cargo bike.

4. Energy-efficient fleets and assets

As zero emission vehicles are not available at scale, many logistics players have started experimenting with new drivetrain technology and are engaging in partnerships with OEMs to make up time. German logistics provider DB Schenker recently announced a partnership with Swedish Volta Trucks aimed at accelerating the transition to an all-electric urban fleet. First prototypes for distribution transports are expected to start in early 2022.

Framo, a leading e-truck retrofitting company, increased its capital in March 2021 to participate in the electrification of heavy-duty trucks and to become the #1 retrofitter in Europe. At the end of 2020, Quantron, an e-mobility specialist, announced a cooperation with MAN TopUsed to electrify used trucks. In March 2021, Volvo Venture Capital announced its investment into Driivz with the goal to develop recharging networks tailored to the needs of electrified trucking.

5. Low emission energy sources

Several new alliances to explore climate-friendly energy sources and develop the required infrastructure are being set up. The alliances bring major players from different industries to the table and – in view of uncertain technology paths – cover a set of technologies such as battery trucks, catenary trucks, hydrogen and sustainable aviation fuels (SAF). In this field we see the boldest moves and the most ambitious alliances:

A \$600 million joint venture has been formed by the original equipment manufacturers Daimler, Volvo and Traton to build an electric battery charging network for long-haul trucks and buses. The goal is to facilitate the mass adoption of battery-powered vehicles. On the other hand, joint projects like eHighway from Siemens and Scania in collaboration with infrastructure providers are currently testing catenary trucks along three test tracks in Germany. The technology is aiming to allow electric transportation while reducing the size of batteries up to 70% due to direct power supply on major highways.

The Port of Rotterdam and Uniper just announced a collaboration to develop the production of green hydrogen at the Uniper location on Maasvlakte as part of the European hydrogen value

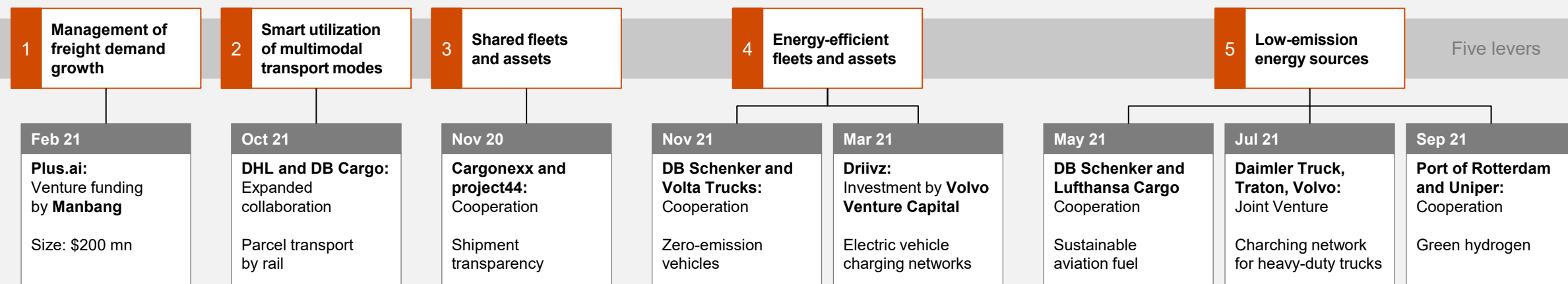
chain. The goal is to replace gray hydrogen with sustainably produced green hydrogen and later extend the use of hydrogen for transportation in a larger format.

France-KLM, Total, Groupe ADP and Airbus have teamed up to operate the first long-haul flight using SAF produced in France. Air Liquide, Airbus and Groupe ADP have signed a Memorandum of Understanding to prepare for the introduction of hydrogen-powered commercial aircraft at airports by 2035. DB Schenker and Lufthansa Cargo established a carbon neutral connection between Frankfurt and Shanghai as of May 2021 based on SAF. Lufthansa Cargo and Kühne + Nagel recently announced a partnership that promotes and uses synthetic fuel (SAF) from atmosfair, a German environmental organization. With 25,000 liters per year, the deal is mainly seen as an investment to test the use of carbon neutral fuels. In the long term both partners consider synthetic fuel as a solution to decarbonize the industry.

The same approach is also applied in sea transport, where Maersk recently invested into the Dutch startup Vertoro which is developing liquid lignin out of sustainably sourced forestry which can be used as fuel for marine operations.

Sources: Refinitiv, PwC analysis

Selected deals, JV and strategic alliances related to decarbonization



Challenges for the decarbonization of logistics

While improvement levers in principle are clear, there are serious challenges to the rapid decarbonization of logistics. These include:

- **Efficient networks:** In the European Union, trucks are empty for around 20 percent of the distance they travel each year. In Germany, for example, trucks travelled 6.6 billion kilometers empty in 2018, 22 percent of the overall distance travelled. Optimizing networks and routing and overcoming fragmented and outdated IT systems may help to reduce the climate impact of empties. However, optimization is also limited by lack of transparency and availability of shipment and carrier data.
- **Drivetrain technology:** Mature zero-emission vehicles (ZEV) are not yet available at scale. Major truck OEMs have made pledges for ZEV amounting to on average 43% of their output by 2030 (T&E), which may not be enough to attain the required decarbonization path. Moreover, there is still considerable uncertainty about the winning technology: Electrification seems to outpace hydrogen in alternative drivetrain technology for trucks, but for long-haul, heavy-duty trucks hydrogen may still be an option. While vehicle prices for ZEV will remain significantly higher than for diesel trucks, total cost of ownership (TOC) is likely to be significantly lower for ZEV than for diesel by the end of the decade.

- **Availability of alternative fuels:** For air transport, electrification is not an option due to weight and range restrictions and hydrogen requires a completely different aircraft design, making sustainable aviation fuels (SAF) the only viable short- and mid-term option for decarbonization. Fit for 55 steps up the required share of SAF when refueling an aircraft (e.g. to 20% SAF in 2035), making air transport more expensive as SAF currently cost 2–6 times more than conventional kerosine. To obtain the required SAF volumes a massive upscaling of production is required involving intricate and new supply chains.
- **Infrastructure:** For the electrification of trucking, massive investments into infrastructure are required – from chargers at depots and hubs to (super-)chargers along the roads and parking lots for trucks. While Fit for 55 defines the requirements for concerning the building of charging infrastructure (e.g. chargers every 60km along the highways), the ramp-up may not be steep enough. Investment into a hydrogen fueling infrastructure is also foreseen, but critical voices question whether parallel infrastructures for electrification and hydrogen make sense. The infrastructure for SAF also need to be created and substituting SAF by hydrogen would entail a significant adjustment of airport infrastructure along with completely new aircraft designs.

In view of these challenges and the technological, operational and financial risks linked to the imperative climate-friendly transformation of logistics, many logistics players have become aware that their own capabilities are not sufficient for the scope and scale of the required transformation.



Spotlight: Sustainability in the maritime industry

The maritime sector has a major role to play in reducing the carbon footprint of logistics chains, which is underscored by the fact that 90% of the worldwide cargo volume is transported by sea. As a recent report published by the International Chamber of Shipping (ICS) shows they have even set themselves more ambitious goals and are pushing for a net-zero target already by 2050, as opposed to the International Maritime Organisation's (IMO) target to cut CO₂ emissions from international shipping by at least 50% by 2050 compared to 2008 levels, with a 40% reduction of carbon intensity by 2030.

In connection with these goals, the Energy Efficiency Design Index (EEDI) for new vessels and the Energy Efficiency Existing Ship Index (EEXI) for existing tonnage have both been introduced by the IMO. Stakeholders are asked to provide incentives to better-rated vessels and it is possible that non-compliant vessels will be taken out of service. The latest developments in pushing forward decarbonization of shipping include, for example, the signing of the Clydebank Declaration by over 20 countries during the UN Climate Summit (COP 26). The signatories pledge to develop at least six green shipping corridors between two or more ports by 2025.

However, in PwC's Shipowner Study 2021 ("Reederstudie 2021"), more than half of the surveyed German shipping companies stated that the EU climate targets for 2030 will probably not be achievable. Nevertheless, many shipowners have already taken measures to reduce emissions (33%) or are planning to do so (47%).

At the moment, roughly 30% of the current order book (by GT) consist of alternative fuel-powered vehicles. Considering the lifetime of a vessel, choosing the right drive technology is crucial. Several companies have decided to power their newbuilds with liquefied natural gas (LNG), but most experts consider LNG to be only a bridge solution. Therefore, the majority of vessels are still equipped with conventional diesel engines and only 0.1% of the energy consumed by ships originates from low-carbon fuels.

Moreover, a worldwide storage and refuelling infrastructure for alternative fuels will require significant global investments. Shipping is now facing the fourth propulsion revolution and experts agree that this necessitates a major scaling up of investments into technology development as well as ambitious regulatory policies and effective public-private alliances.





4

Venture deals in transport and logistics



Investment rush pacing up valuations

Amid the difficult market environment, logistics startups have continued to prosper. They have been able to demonstrate the benefits of their solutions to overcome headwinds affecting both shippers and carriers, which have been exacerbated by the pandemic.

The COVID-19 related disturbances drew investors' attention – including large investments funds – to supply chains and the relevance of logistics. This paced up investment into logistics technology, leading to increased valuations for digital ventures and ultimately to the greater emergence of unicorns (privately held startups valued at over \$1 billion). According to Pitchbook, supply-chain technology startups received \$24.3 billion in venture capital (VC) in the first three quarters of 2021, 58% more than in the whole year of 2020. Most of the financial backing poured into startups that specialize in two key areas: last mile and parcel business and freight platforms (focus road transportation).

Last mile and parcel business

After on-demand grocery delivery startup Gorillas reached unicorn status in record time at the beginning of the year, further last mile and parcel business startups surpassed \$1 billion valuations throughout 2021 in the midst of surging ecommerce: Chinese on-demand logistics and delivery startup Lalamove filed to go public in June, after it had closed a \$1.5 billion of Series F round led by Hillhouse Capital and Sequoia Capital. The company connects drivers with customers and small and medium-sized enterprises to fulfill same-day deliveries. Singapore's Ninja Van turned unicorn through its latest and biggest \$578 million funding round from investors including the e-commerce giant Alibaba and Geopost/DPD group. With the fresh capital, Ninja Van will invest in automation and infrastructure while preparing for an IPO. The startup developed from a last-mile-express-logistics company to one of the region's fastest growing tech-enabled logistics companies in recent years.

Other examples include e-commerce logistics and delivery service provider Flash Express – Thailand's first unicorn, or Hive Box with its unconventional delivery system.

Selected venture capital deals

Deal date	Company	Company nation	(Lead) Investor	Series	Deal value (\$bn)
Jan 21	Lalamove	CN	Hillhouse Capital Group, Sequoia Capital China	Series F	1.50
Nov 21	Nuro	US	Tiger Global Management	Series D	0.60
Sep 21	Ninja Van	SG	Alibaba Group, B Capital Group, Brunei Investment Agency, Dynamic Parcel Distribution, Geopost, Monk's Hill Ventures	Series E	0.58
Nov 21	Uber Freight	US	Abu Dhabi Growth Fund, D1 Capital Partners, GCM Grosvenor	n/a	0.55
Jan 21	Hive Box Technology	CN	All-Stars Investment, Hidden Hill Capital, Redview Capital, Sequoia Capital China, Trustbridge Partners	n/a	0.40
Aug 21	Inceptio Technology	CN	JD Logistics, Meituan, PAG	Series B	0.27
Oct 21	Flock Freight	US	SoftBank Investment Advisers	Series D	0.22
Jun 21	Project44	US	Emergence Capital Partners, Goldman Sachs Merchant Banking Division	Series E	0.20
May 21	Flash Express	TH	Blockchain Founders Fund, Bu'er Capital, SCB 10X	Series E	0.15
May 21	Einride	SE	Build Capital Partners, EQT Ventures, Ericsson Ventures, Maersk Growth, NordicNinja VC, Norrsken VC, Northzone Ventures, Plug and Play Tech Center, Plum Alley Investments, Soros Fund Management, Temasek Holdings	Series B	0.11

Apart from that, a considerable amount of VC funding was directed at developers and operators of autonomous vehicles, further suggesting investors' appetite for non-traditional last mile services to complement and transform existing fleets. Examples are the funding rounds of Nuro (delivery robots), Inception (autonomous trucks) or Saildrone (autonomous surface vehicles).

Freight platforms

Software-enabled freight platforms and marketplaces use artificial intelligence-based matchmaking models to effortlessly connect all parties. They promise significant efficiency and vehicle capacity utilisation gains for road transportation and thus attracted investor interest in 2021.

For example, Chicago-based end-to-end supply chain visibility platform provider project44 turned unicorn after raising \$202 million Series E funding led by Goldman Sachs and Emergence Capital. Proceeds shall be used to expand globally and project44 was already active as a buyer itself in three transactions in 2021. The most recent acquisition of Convoy, a digital freight network, adds parcel, courier, and doorstep delivery to the company's coverage of the entire global end-to-end supply chain.

Flock Freight, a freight technology platform that bundles Less-Than-Truckload (LTL) freight into full truckloads, raised a \$215 million Series D funding by Softbank and thus reached unicorn status in October. The startup will use the fresh capital to further invest in its patent-pending technology that drives algorithmic shipment optimisation to maximize truck utilization, find the optimal route and reduce emissions. Online trucking platform BlackBuck raised \$67 million of Series E venture funding in a deal led by IFC Emerging Asia Fund, Tribe Capital, and VEF and thus attained unicorn status. The platform connects shippers with fleet operators and truck drivers, reaching about 700.000 truckers and 1.2 million trucks. After the backing, BlackBuck aims at strengthening its presence across India and expanding the service offering.

Other funding rounds included e.g. Porter, developer and operator of an online logistics marketplace intended to offer a standardized service for the utilization of trucks, or digital freight forwarder Zencargo. The startup provides key supply chain insights, enabling freight operators to make informed decisions that shorten lead times, increase supply chain agility and reduce working capital.

These financings are examples of many new market participants that want to digitize the market with their solutions and make it viable for the future; and many new businesses are already on the way intending to contest the traditional freight forwarding model. However, there are still complex issues on both the incumbent and new entrants sides that are currently preventing the transformation potential of digital platforms and marketplaces from being fully exploited.

Venture capital not yet common in Europe

The intellectual hub for the development of new solutions is located in Asia, followed by the USA and Europe. Among the 100 biggest T&L venture capital deals, 26% took place in China and 13% in India respectively, on the back of strong overall economic performance and fundamental receptiveness to innovation and new business models. The USA accounted for 28%, while Europe ranks third (16%). Although there are large players in the T&L industry in Europe, the financial backing in startups is lagging behind in comparison to the other regions. On the one hand, funding is not yet as widespread in Europe as in the USA or China, on the other hand, incumbents in Europe are still hesitant to cooperate with startups, which are often regarded as a threat rather than an opportunity to the T&L industry. Another disadvantage is that Europe consists of numerous smaller countries and several national borders, that represent an obstacle to growth of new entrants.

Sources: Pitchbook, PwC analysis, TechCrunch



Major T&L players joined the VC game

Although the main share of startup backing was issued by investment funds, some startups received corporate funding. While T&L companies in 2020 were focusing on realigning their strategy and on their core business, there was some space for technological shifts in 2021 to enable logistics processes to run seamlessly and become more resilient, sustainable, customer-centric and efficient.

The general trend was mirrored in the global top 25 T&L companies (by revenue), which in 2021 primarily provided financial backing to startups working on platforms, the last mile, but also to sustainable solutions.

Maersk Growth, the venture capital arm of A.P. Moller – Maersk founded in 2017, was particularly active, leading or participating in a large number of financing rounds, predominantly in the early stages. These included the Swedish startup Einride, specializing in electric and self-driving vehicles coordinated by intelligent routing software that integrates traffic data and customer data to optimize delivery times and reduce emissions. The company received \$110 million Series B venture funding. Other investors were Ericsson Ventures and Northzone Ventures. In addition, Maersk Growth was, among other investors, involved in a \$200 million Series D venture funding in Wiliot led by Softbank. Wiliot is a Sensing as a Service and IoT technology company. Its platform is built on IoT Pixels, tiny self powered tags that attach to any product or packaging to sense a set of physical and environmental data (fill level, motion, humidity etc.) that is then translated into actionable insights for businesses by machine learning algorithms. Besides, Maersk Growth took part in some significantly

smaller financing rounds, e.g. in e-commerce order fulfillment startup Huboo or trucking platform Trella.

Deutsche Bahn Digital Ventures was active in the estimated \$3.3 million combined Seed-1 and Seed-2 funding round of MonoLets, a developer of digital labels and provider of data services intended to offer real-time item-level supply chain data. DB Schenker participated in Gideon Brother's \$31 million of Series A venture funding in a deal led by Koch Disruptive Technologies. Gideon Brothers is a developer of visual perception-based autonomous robots designed to assist in warehouses and other industrial logistics processes. The funding will be used to expand its portfolio of AI and 3D vision autonomous mobile robots.

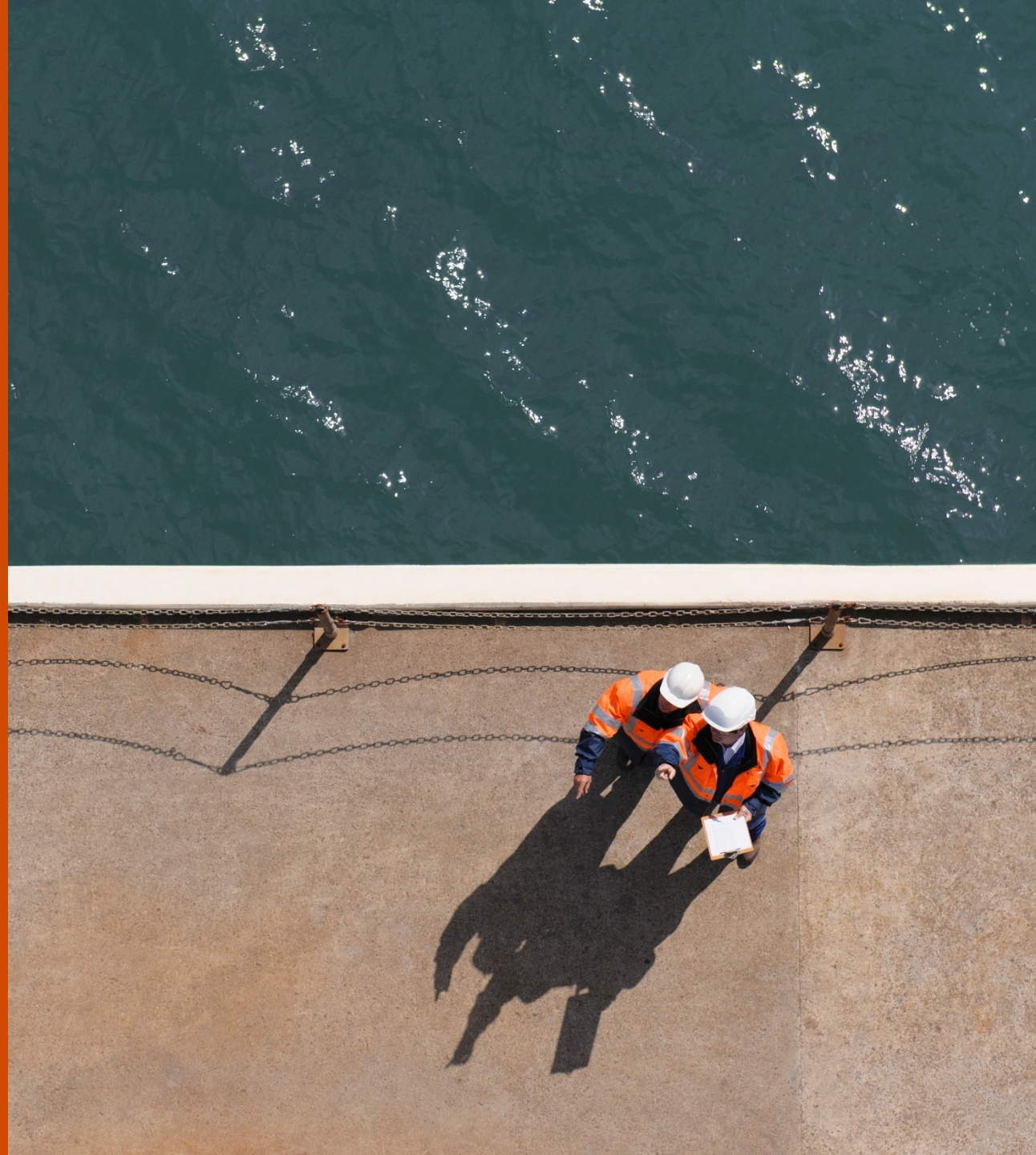
Skyports is in the process of raising approx. \$135 million of venture funding from Aéroports de Paris, Irelandia Aviation, Deutsche Bahn Digital Ventures, Levitate Capital and other undisclosed investors. Skyports locates, builds, owns, and operates vertiports at strategic locations within urban environments, thereby helping vehicle manufacturers and operators, city authorities, regulators and real estate partners in creating resilient infrastructure networks which enable safe and efficient operations of passenger and cargo drones.

Despite the attention that logistics startups are currently receiving and the enormous amount of investor money being distributed broadly in financing rounds, all of the top logistics companies basically made rather small financings in terms of value. As strategic investors they are much more selective than investment funds and seek startups and technologies that match their requirements best.





5 Outlook



Macroeconomic outlook

Global economic recovery is likely to continue at a reduced pace and despite increased uncertainty. The IMF October 2021 World Economic Outlook report projects global growth of 5.9% in 2021 – revised down marginally from the April report – and 4.9% in 2022. The prospects across regions remain uneven: While output in developed countries is projected to reach the trend path projected before the crisis in 2022, it will not even be reached in developing and emerging countries (excl. China) by 2024. The threat of repeated COVID-19 outbreaks in combination with potential new travel restrictions, lockdowns, supply chain disruptions and inflation casts an additional shadow on the recovery. However, consumer price inflation is expected to peak in most advanced and emerging economies in Q1 2022 and is projected to slowly disappear through 2022-23.

OECD projections are similar with global GDP expected to increase by 5.6% in 2021 and by 4.5 % in 2022. In the Eurozone, strong recovery is estimated to continue despite the emergence of a fourth wave of COVID-19 infections. GDP growth is projected 5.2% in 2021 and 4.25% in 2022 and will be bolstered by strong consumer spending and higher investments, partly triggered by national and European recovery programs. China's strong rebound is expected to decelerate, while in the US real GDP growth is expected to pick up until early 2022 as a result of improved public health and higher demand for services, as well as expected increases in goods consumption and inventories due to easing supply constraints.

Overall, economic recovery and enduring growth depend heavily on international cooperation, proper political levers and the equitable distribution of vaccines.

Positive growth forecasts for transportation and logistics

The subsectors of the T&L industry have developed differently in the course of the pandemic: extreme price increases for containers, volume growth in CEP (especially B2C), strong fluctuations in trucking (consumer-related positive, industry-related often rather stagnant or declining), collapse in demand in passenger transport. We expect that the

various developments of subsectors will continue in the medium term. However, all subsectors will have to cope with increasing fluctuations in prices and volumes, and rising uncertainty in planning and forecasting.

In the shipping subsector, the question arises of how long the current boom phase will last, still facing challenges such as digitalization and sustainability and also taking into account that the demand for containerized goods may weaken, especially in the US. Freight and charter rates for container shipping (and presumably also for bulk and heavy lift cargo) are projected to remain at a high level until the end of 2022 – but extreme peaks (as in the spot market in 2021) currently appear rather unlikely. The inflow of new tonnage will be a manageable 4% of the fleet in 2022, albeit this will mainly consist of large vessels (> 15,000 TEU). At the same time, smaller vessel types and feeders will receive hardly any new tonnage with possible negative effects on the hub-and-spoke system if smaller vessels are not available for servicing smaller ports.

Air cargo, which has already rebounded above pre-crisis levels, is projected to grow further in 2022, bolstered by robust global trade and capacity enhancements due to rising passenger capacity. The demand for domestic air travel is expected to remain high, while the development of international traffic is still subject to policies and further vaccination progress in some markets. Several countries have imposed new travel restrictions due to the Omicron variant, increasing the risk to airlines' financial recovery. Rising infrastructure costs put additional pressure on the financial situation of airlines and hamper recovery.

Volume growth in the CEP sector will moderate somewhat in 2022 compared to the previous year, offering parcel service providers the chance to concentrate more on the quality of shipments, make investments in productivity or use surcharges more effectively to compensate for labor restrictions, for example, and increase margins.

Little prospect of swift relief for container supply chains

Global supply chains that rely on containerized transports are not expected to be entirely restored until 2023, so further uncertainty and disruption must be expected during 2022. Although some goods could be diverted to rail or air in recent months, looking forward, both modes can only marginally relieve water transport due to their limited capacity respectively higher prices. We assume that the currently discussed “decontainerization” – goods previously transported in containers are again transported without containers (e.g. coffee in bags on bulk carriers) – will not completely prevail either. What is needed are more resilient supply chains.

Large parts of logistics will have to seek and find a new optimum of efficiency and scale combined with flexibility and robustness. In the coming quarters, measures to stabilize supply chains will dominate among carriers and logistics providers. In the medium term, we expect digitalization to unleash further potential: global transparency, higher automation and thus increasing reliability and cost control. In addition to the expertise of logistics specialists, this will require considerable investment in digital assets. Furthermore, the smooth functioning of important hubs (e.g. ports) is essential. This requires investments in often outdated transport infrastructure and hinterland connections, especially in terms of capacity expansion, connectivity and infrastructure for alternative fuels.

In the medium term, ESG and decarbonization will gain in importance, first of all with regard to transparency towards

customers (reporting). Depending on how strictly and quickly corresponding requirements are implemented (e.g. EU taxonomy, pressure from consumers or industry), the useful life of existing truck, rail, aircraft and ship fleets will change – and investments with corresponding capital requirements will be triggered. Questions of financing and access to capital and cost of capital will arise.

Outlook for M&A

The T&L industry witnessed some major steps of consolidation in 2021 and we expect the M&A market to develop positively at a continued high level in 2022. However, distinctions will become apparent with regard to individual subsectors: While targets in shipping and ports, for example, will remain attractive, traditional carriers with network disadvantages will face increasing pressure. Larger T&L players will continue to look for growth options to expand their market share, network coverage and service offerings. They will achieve this through acquisitions of competitors or in related business as well as digital solution providers. In addition, we anticipate accelerated activity – in form of alliances, cooperation and selected acquisitions – in the field of decarbonization to close gaps in knowhow and capabilities, and to speed up the decarbonization process.

Organic growth remains difficult for various reasons, e.g. due to the shortage of skilled workers, lack of required infrastructure or limited access to freight. A solid base for this is the comparatively normal price level at present, while prices in other industries are already well above historical averages. For 2022, however, rising prices and growing volumes are also expected in the T&L industry.





6

Appendix: M&A deals in figures, methodology, contacts



Megadeals = deals with a value of \$1 billion or more

2021: 47 deals, \$161.0bn
2020: 20 deals, \$46.7bn

Megadeals in 2021 (1/3)

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)	Sector
Apr-21	Kansas City Southern	US	Canadian National Railway Co	CA	Completed	31.19	Rail
Jul-21	Sydney Airport Holding	AU	Group of Infrastructure Investment Funds	AU	Pending	17.37	Passenger Air (infrastructure)
Dec-21	DHMI-Antalya Airport Concession	TR	Fraport AG and TAV Havalimanlari Holding AS	TR	Pending	8.22	Passenger Air (infrastructure)
Nov-21	Wolt Enterprises Oy	FI	DoorDash Inc	US	Pending	8.11	Logistics and Trucking
Sep-21	WestConnex Pty Ltd	AU	Investor Group led by Sydney Transport Partners	AU	Completed	8.06	Passenger Ground (infrastructure)
Dec 21	Bolloré Africa Logistics SAS	F	MSC Mediterranean Shipping Co SA	CH	Pending	6.41	Logistics and Trucking
Feb-21	Signature Aviation plc	UK	SPV formed by Cascade Investment Group and Blackstone	UK	Completed	4.66	Passenger Air (infrastructure)
Apr-21	First Transit, Inc.	US	EQT Infrastructure V fund	SE	Completed	4.16	Passenger Ground
Apr-21	Global Integrated Logistics	KW	DSV Panalpina A/S	DK	Completed	4.08	Logistics and Trucking
Dec-21	LF Logisitics Holdings Ltd	HK	AP Moller-Maersk A/S	DK	Pending	3.76	Logistics and Trucking
Apr-21	Ermewa SA	F	Investor Group including DWS Group	DE	Completed	3.73	Rail
Jun-21	Atlantic Aviation Corp	US	Kohlberg Kravis Roberts & Co LP (KKR)	US	Completed	3.53	Passenger Air (infrastructure)
Dec-21	Ingram Micro Commerce & Lifecycle Services Inc (incl. order management platform “Shipwire”)	US	Ceva Logistics AG	F	Pending	3.00	Logistics and Trucking
Jun-21	Shanghai Hongqiao Int. Airport Co Ltd	CN	Shanghai International Airport Co Ltd	CN	Pending	2.94	Passenger Air (infrastructure)
Mar-21	Hertz Global Holdings, Inc.	US	Investor group	US	Pending	2.78	Other
Jul-21	Europcar Mobility Group SA	F	Green Mobility Holding (SPV formed by Volkswagen AG, Attestor and Pon Holdings)	DE	Intended	2.64	Other

Sources: PwC analysis, Refinitiv

Megadeals = deals with a value of \$1 billion or more

2021: 47 deals, \$161.0bn
2020: 20 deals, \$46.7bn

Megadeals in 2021 (2/3)

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)	Sector
Oct-21	Air India Ltd	IN	Talace Pvt Ltd	IN	Pending	2.41	Passenger Air
Feb-21	Kerry Logistics Network Ltd	HK	Flourish Harmony Holdings Co Ltd	CN	Completed	2.26	Logistics and Trucking
Jul-21	Transplace Inc	US	Uber Freight LLC	US	Completed	2.25	Logistics and Trucking
Jul-21	Ningbo Zhoushan Port Co Ltd	CN	China Merchants Port Group Co Ltd	CN	Pending	2.23	Shipping (Infrastructure)
Feb-21	Wheels Up Partners LLC	US	Aspirational Consumer Lifestyle Corp	SG	Completed	1.99	Passenger Air
Feb-21	ASTM SpA	IT	NAF 2 SpA	IT	Completed	1.96	Passenger Ground (infrastructure)
Mar-21	Lineage Logistics Holdings LLC	US	Investor group	CA	Completed	1.90	Logistics and Trucking
Nov-21	Fenix Marine Services Ltd	US	CMA CGM SA	F	Pending	1.80	Shipping
Aug-21	JF Hillebrand Group AG	DE	Deutsche Post AG	DE	Pending	1.77	Logistics and Trucking
Jul-21	China Merchants Port Grp Co	CN	Zhejiang Province Port Investment Operation Group Co Ltd	CN	Pending	1.72	Shipping (Infrastructure)
Nov-21	LAACO Ltd	US	CubeSmart	US	Pending	1.69	Logistics and Trucking
Feb-21	China Eastern Airlines Corp Ltd	CN	China Eastern Air Holding Co Ltd	CN	Completed	1.67	Passenger Air
Oct-21	One Rail Australia Pty Ltd	AU	Aurizon Holdings Ltd	AU	Pending	1.52	Rail
Oct-21	Teekay LNG Partners LP	BM	Stonepeak Partners LP	US	Pending	1.48	Shipping
Sep-21	Angel Trains Ltd	UK	PSP Investments and International Public Partnerships Ltd	CA	Completed	1.38	Rail
Jul-21	AAA Cooper Transportation Inc	US	Knight-Swift Transportation Holdings Inc	US	Completed	1.35	Logistics and Trucking

Megadeals = deals with a value of \$1 billion or more

2021: 47 deals, \$161.0bn
2020: 20 deals, \$46.7bn

Megadeals in 2021 (3/3)

Announcement	Target	Target nation	Buyer	Buyer nation	Deal status	Deal value (\$bn)	Sector
Sep-21	Echo Global Logistics Inc	US	The Jordan Co LP	US	Completed	1.33	Logistics and Trucking
Sep-21	China Logistics Pty Hldg Co	CN	JD Property Group Corp	CN	Intended	1.33	Logistics and Trucking
Oct-21	Ontrac Logistics Inc	US	LaserShip Inc	US	Pending	1.30	Logistics and Trucking
Feb-21	Apex Intl Logistics (China)	CN	Kuehne + Nagel International AG	CH	Completed	1.23	Logistics and Trucking
May-21	CCR SA	BR	Macquarie Asset Mgmt and IG4 Capital Investimentos	BR	Withdrawn	1.20	Passenger ground (infrastructure)
Jul-21	syncreon NewCo BV	US	DP World PLC	AE	Completed	1.20	Logistics and Trucking
Mar-21	GoBrands Inc (minority stake)	US	Investor Group including various Funds	US	Completed	1.15	Logistics and Trucking
Oct-21	Yingkou Port Bulk Cargo	CN	Liaogang Holdings (Yingkou) Co Ltd	CN	Completed	1.14	Shipping (infrastructure)
Oct-21	BEST Inc-Express Delivery Asts	CN	J&T Express Co Ltd	CN	Completed	1.06	Logistics and Trucking
Dec-21	Nobina AB	SE	Ride BidCo AB (Basalt Infrastructure Partners III BLP)	SE	Pending	1.03	Passenger ground
Mar-21	LeasePlan Australia Ltd	AU	SG Fleet Group Ltd	AU	Completed	1.00	Other
Sep-21	Milestone Equipment Holdings	US	Investor Group comprised of Barings and Partners Group	CH	Completed	1.00	Other
Sep-21	Transfix Inc	US	G Squared Ascend I Inc	US	Pending	1.00	Logistics and Trucking
Aug-21	33.5% stake in three Mobility Businesses of Yandex.Taxi previously owned by joint venture partner Uber Technologies	RU	Yandex.Taxi OOO	RU	Completed	1.00	Logistics and Trucking
Jul-21	GoBrands Inc (minority stake)	US	Investor Group including various Funds	US	Completed	1.00	Logistics and Trucking

Regional distribution of deals

While Asia remains the region with the most mergers and acquisitions and the second highest total deal value, it is also the region with the lowest growth rate of M&A announcements compared to the previous year (+11.9%). All other regions have seen a more dynamic growth in M&A announcements, with Europe reaching +30.5%, North America +75.9% and South America +100%. Regarding the Americas, this is partly due to a catch-up effect as these were the regions where deal announcements receded most during the crisis-ridden year of 2020. Catching up on postponed deals from 2020 may also explain part of the growth in deal announcements of European participants, although we hadn't seen any decline in deals in 2020 here.

Africa experienced a boom in M&A transactions during 2021, not only among targets in the transport and logistics sector, but also across other industries. We counted a record of 6 transactions with African targets, with an overall value of more than \$900 million. We find that Africa is becoming more interesting for strategic investors with the African Continental Free Trade Area coming into effect by the beginning of 2021, continued or renewed interest in the region from China, the UK and the EU and the COVID-19 inflicted uncertainty slightly decreasing.

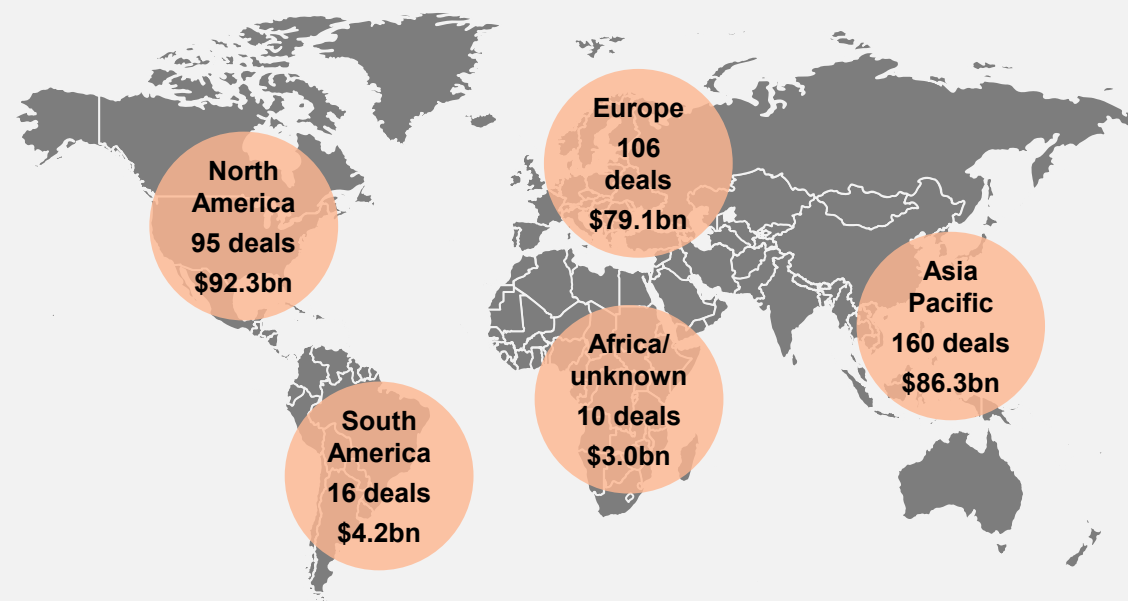
Europe	No. of deals	Value (\$bn)	Ø value (\$m)
Local	64	41.5	648.5
Inbound	19	14.0	735.6
Outbound	24	23.6	983.6
Total	107	79.1	739.1

Asia Pacific	No. of deals	Value (\$bn)	Ø value (\$m)
Local	127	67.5	531.7
Inbound	23	13.3	578.2
Outbound	10	5.5	552.1
Total	160	86.3	539.7

North America	No. of deals	Value (\$bn)	Ø value (\$m)
Local	49	59.4	1,213.0
Inbound	18	16.7	926.3
Outbound	28	16.2	578.1
Total	95	92.3	971.6

South America	No. of deals	Value (\$bn)	Ø value (\$m)
Local	12	3.4	287.4
Inbound	4	0.8	190.6
Outbound	0	0.0	-
Total	16	4.2	263.2

Africa/unknown	No. of deals	Value (\$bn)	Ø value (\$m)
Local	4	1.2	308.5
Inbound	2	1.2	599.9
Outbound	4	0.6	148.7
Total	10	3.0	302.9



Local = target and buyer in the region
Inbound = target in the region, but buyer outside the region
Outbound = target outside the region, but buyer in the region

An inbound deal in one region is also an outbound deal in another.
Inbound and outbound deals are, therefore, recorded twice in the list.

Source: PwC analysis, based on Refinitiv

Subsector analysis

Logistics and Trucking have always been the subsector with the most mergers and acquisitions announced, not least due to their fragmented nature. However, in 2021, for the first time since the beginning of this analysis, deals with targets in this subsector made up for more than half of the total number of transactions announced. Moreover, the largest number of megadeals (21 out of 47) involved targets in this subsector, pushing the total value of deals to \$78.5 billion, (more than 35% of the overall total in 2021).

Shipping was the second most active subsector in 2021, reaching the highest number of transactions announcements since 2017. 24 of the 59 shipping deals in 2021 were related to port infrastructure. This makes ports the most active segment among the infrastructure targets.

The rail subsector, which has been quite inactive in recent years, saw the fewest deals in 2021 again, although the total deal value was comparably high due to the merger of Canadian Pacific and Kansas City Southern, the largest transaction this year.

Overall, the shift towards freight-related targets of recent years continued with freight-related targets accounting for 3 in 4 deals in 2021, whereas the ratio of freight-related to passenger-related transactions has historically been around 2/3 to 1/3. Compared to last year, deal announcements with freight-related targets grew by around 30%, while only 14% more passenger-related deals were announced in 2021 than in 2020.

All deals (incl. infrastructure)	1H2019		2H2019		1H2020		2H2020		1H2021		2H2021	
	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value
Total value (\$bn)												
Passenger Air	21	10.1	10	7.7	13	7.3	14	8.9	20	17.6	15	31.6
Passenger Ground	22	8.6	31	34.7	13	4.6	22	19.0	13	9.0	21	14.0
Rail	8	2.1	8	11.4	2	1.2	5	1.3	4	36.2	3	3.1
Logistics and Trucking	51	37.1	48	13.3	52	10.5	73	19.5	72	24.9	98	53.6
Shipping	30	8.8	19	6.4	22	13.2	26	6.1	27	6.3	32	13.4
Other	6	1.7	7	0.9	2	0.3	12	7.9	12	4.8	5	4.4
Total	138	68.4	123	74.3	104	37.1	152	62.7	148	99.0	174	120.1

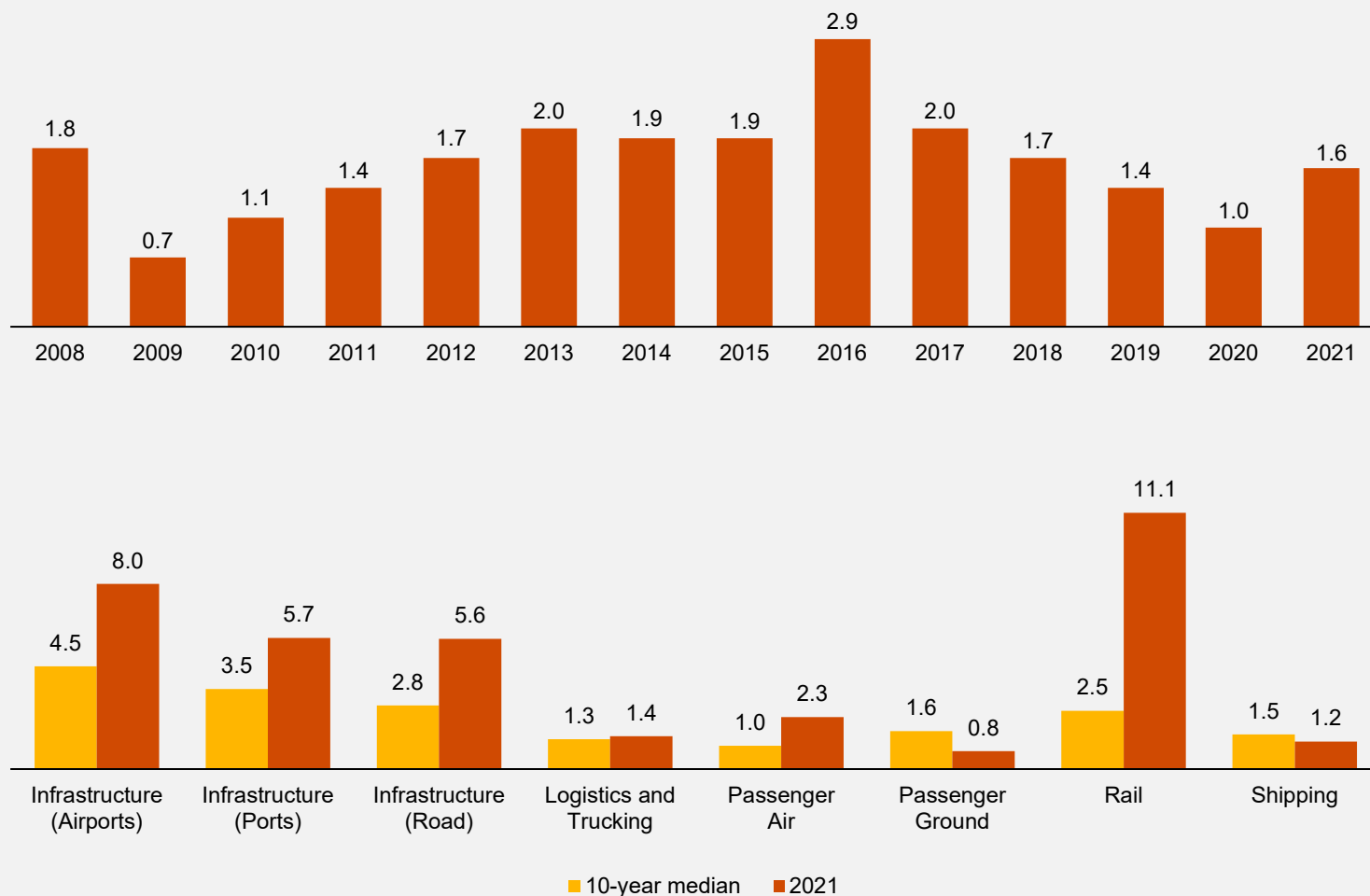
Infrastructure	1H2019		2H2019		1H2020		2H2020		1H2021		2H2021	
	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value
Total value (\$bn)												
Infrastructure (Airports)	9	4.2	4	1.0	5	2.1	1	0.4	8	8.2	5	27.1
Infrastructure (Road)	13	8.0	24	32.8	6	4.0	19	18.3	10	4.2	7	9.7
Infrastructure (Ports)	12	5.3	9	1.1	10	8.6	12	2.3	11	3.1	13	8.6
Total (infrastructure)	34	17.5	37	35.0	21	14.7	32	21.0	29	15.5	25	45.5

Freight vs. passenger	1H2019		2H2019		1H2020		2H2020		1H2021		2H2021	
	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value
Total value (\$bn)												
Freight	89	48.7	77	41.9	76	26.1	109	29.4	106	37.2	135	70.6
Passenger	49	19.7	46	32.5	28	11.0	43	33.3	42	61.8	39	49.5
Total	138	68.4	123	74.3	104	37.1	152	62.7	148	99.0	174	120.1

Sources: Refinitiv, PwC analysis

Deals with a volume greater than \$50 million

Median of value/sales multiples



Prices back to pre-crisis levels

After the median of sales multiples fell to only 1.0 in 2020, nearly reaching the record low set in the financial crisis, 2021 saw prices of T&L targets recovering to reach a level slightly above 2019, the year before the COVID-19 crisis hit and nearing the overall long-term median for T&L targets, which currently stands at about 1.8 times sales. We are now seeing the same development in EBITDA multiples: During the crisis in 2020 they were down to 4.7, but have now recovered to 7.8 (2019: 6.5), reaching exactly the ten-year median.

With respect to individual subsectors, we are seeing extraordinarily high valuations for Airport and Rail targets, but they can be considered outliers as they are based on very few transactions. However, the fact that both Airports and targets in the Passenger Air subsector reach valuations far above their respective 10-year median indicates that the investors are confident that the recovery of air travel is near.

Only two subsectors are achieving multiples below their ten-year median: Passenger Ground and Shipping, with Passenger Ground also being the only subsector where valuations were below the previous year (1.8 times sales in 2020 to 0.8 times sales in 2021).

In 2021, sales multiples being paid by financial investors (3.0) were five times higher than in 2020 and have been twice as high as those paid by strategic investors (1.4).

Financial investor activity accelerates, but strategic investors rebound stronger

2021 seemed to be the “year of the strategists”. The deal activity of financial investors was 15% higher than in 2020. Strategic investors, however, announced over 40% more deals than in the previous year and thus the share of deals with financial investors receded to 56% in 2021, the same level as in 2019, before the pandemic.

While financial investors have focused on smaller deals and spent less money in 2020, their total deal value exceeded \$100 billion in 2021 and their average deal size has increased again to \$590 million (from \$441 million in 2020).

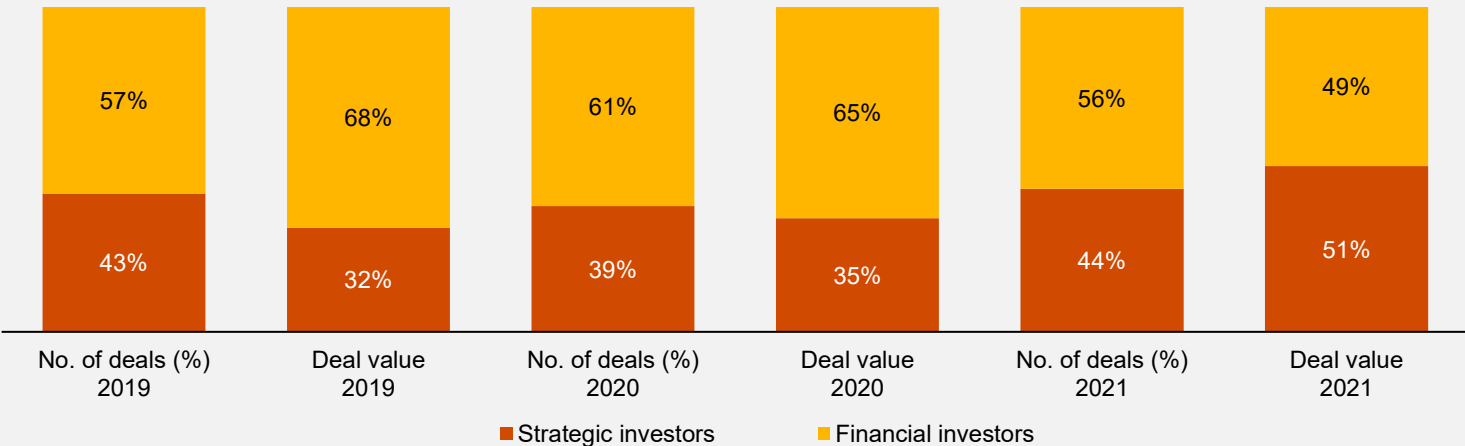
Nevertheless, strategic investors have overtaken financial investors in terms of deal value for the first time, accounting for 51% of the total deal value in 2021. They have more than tripled their total deal value, partly driven by the \$33 billion Kansas City Southern deal.

Focusing on the key investment areas of financial investors, Logistics and Trucking remains most attractive, accounting for more than half of the deals announced in 2021. Among these 101 deals, 40% relate to warehousing and storage targets. Trucking, delivery, mail and courier services, and transport arrangement were the other focus areas within this subsector.

Shipping was the only subsector where financial investors had a significantly lower share of deal announcements than strategic investors. In fact, roughly 50% of the shipping deals announced in 2021 were horizontal deals with both target and acquirer being active in the shipping subsector.

Deals with a volume greater than \$50 million

Number and total value of deals involving financial investors



Total value (\$bn)	2019		2020		2021	
	No. of deals	Total value	No. of deals	Total value	No. of deals	Total value
Passenger Air	14	11.1	18	11.8	23	41.1
Passenger Ground	29	17.6	21	20.1	19	19.2
Rail	7	11.0	5	1.3	4	5.9
Logistics and Trucking	73	39.4	85	20.0	101	27.7
Shipping	19	16.2	14	5.5	20	4.7
Other	8	1.7	12	5.9	14	8.1
Total	150	96.9	155	64.7	181	106.8

Sources: Refinitiv, PwC analysis

Methodology

This report is an analysis of the current industry environment and of global transaction and strategic collaboration activities in the T&L industry.

The analysis covers all mergers, acquisitions, sales, leveraged buyouts, privatizations and acquisitions of minority interests with a transaction value greater than \$50 million. All transactions announced between January 1 and December 31, 2021 have been included. Project transactions, such as public-private partnerships – which are more common than corporate transactions, especially in the field of infrastructure – do not fall within the scope of the analysis.

The data for the transaction analysis is derived from Refinitiv and includes all deals announced where the target company comes from one of the NAICS industries listed below. Historical data is continuously updated.

The analysis included all transactions whose status at the time of analysis was “completed”, “not yet completed because of antitrust approval procedures”, “unconditional” (buyer-side conditions have been met but the deal has not yet been completed) or “withdrawn”.

The data for the strategic collaboration analysis is based on information from S&P Global Capital IQ, covering key strategic alliance-related developments disclosed by listed companies related to the T&L industry.

The venture deals analysis is based on the Top 100 Transportation & Logistics VC-Deals in Pitchbook announced until November 2021, including mobility verticals and investments by the top 25 T&L companies globally including their Corporate Venture Capital subsidiaries.

Sectors and assigned NAICS industries

Passenger Air: scheduled passenger air transportation; non-scheduled chartered passenger air transportation; air traffic control; other airport operations; other support activities for air transportation

Passenger Ground: highway, street, and bridge construction; all other specialty trade contractors; commuter rail systems; bus and other motor vehicle transit systems; other urban transit systems; inter-urban and rural bus transportation; taxi service; limousine service; school and employee bus transportation; charter bus industry; special needs transportation; all other transit and ground passenger transportation; other support activities for road transportation

Rail: line-haul railroads; short-line railroads; support activities for rail transportation

Logistics: gas distribution; freight transportation arrangement; packing and crating; all other support activities for transportation; postal service; couriers; local messengers and local delivery; general warehousing and storage; refrigerated warehousing and storage; farm product warehousing and storage; other warehousing and storage; process, physical distribution and logistics consulting services

Trucking: general freight trucking, local; general freight trucking, long distance, truckload; general freight trucking, long distance, less than truckload; used household and office goods moving; specialised freight (except used goods) trucking, local; specialised freight (except used goods) trucking, long distance

Shipping: deep-sea freight transportation; deep-sea passenger transportation; coastal and great lakes freight transportation; coastal and great lakes passenger transportation; inland water freight transportation; inland water passenger transportation; port and harbour operations; marine cargo handling; navigational services to shipping; other support activities for water transportation; regulation and administration of transportation programmes

Other: scheduled freight air transportation; non-scheduled chartered freight air transportation; other non-scheduled air transportation; mixed-mode transit systems; commercial air, rail and water transportation equipment rental and leasing; passenger car rental; passenger car leasing; truck, utility trailer and RV rental and leasing

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