

SPECIAL PURPOSE VEHICLES

1 Introduction

In 2020, the spread of the novel coronavirus COVID-19 pandemic battered the economy throughout the year, and a full recovery has yet to materialize. Despite these trying circumstances, the automotive industry is also facing a transformation described as a once in a century event. The whole industry, including the special purpose vehicle field, is facing a wave of changes, such as the adoption of connected, automated, service-related, and electrification (CASE) technologies, the popularization of next-generation zero-emission commercial vehicles, and so on. In addition, as special purpose vehicles are working vehicles, the industry must also face the issue of using these next-generation vehicles to address the continued and growing shortage and aging of drivers.

According to data compiled by the Japan Automobile Dealers Association (JADA), the number of heavy- and medium-duty truck registrations in 2020 decreased to 86,410 units, 92.7% of the level in 2019. This decline reversed the positive trend established in 2019 and reflected the economic and logistical slowdowns spurred by the coronavirus pandemic. In addition, registrations of light-duty trucks in 2020 decreased to 231,683 units, 86.8% of the level in 2019, an even greater decline than that suffered by heavy- and medium-duty truck registrations. However, the industry expects that demand will rebound once the coronavirus pandemic abates. In addition, according to data compiled by the Japan Auto-Body Industries Association Inc. (JABIA), production of special purpose vehicles in 2020 decreased greatly to 90.0% of the previous year, even lower than the decline in heavy- and medium-duty truck registrations described above (92.7% of 2019).

This article describes the main special vehicle trends based on data compiled by JABIA and the Automobile Inspection and Registration Information Association (AIRIA).

2 Market Trends

In 2020, total production of the thirteen types of special purpose vehicles shown in Fig. 1 decreased greatly by 19,453 units to 174,200 (90.0% of 2019). This was the third consecutive year-on-year decrease after the peak in 2017, which was reached after eight consecutive years of increase from the low point in 2009. This decline probably reflects the major impact of the coronavirus pandemic. Although production of three out of the thirteen types of special purpose vehicles increased, the production of ten types fell. The drop in production of the three types of vehicles that account for a high proportion of the total had a marked impact on the rate of decline.

Figure 1 shows the 2020 production results of special purpose vehicles per vehicle type. Compared to 2019,

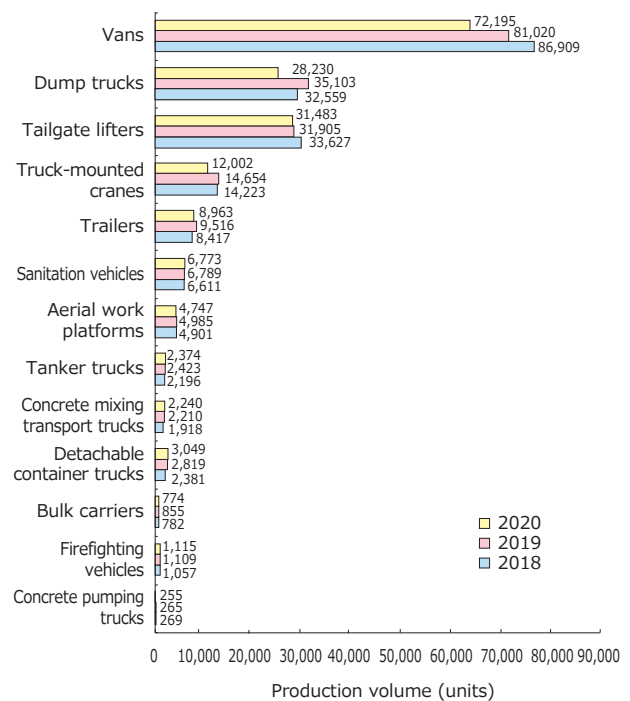


Fig. 1 Production Results of Special Purpose Vehicles per Product Type

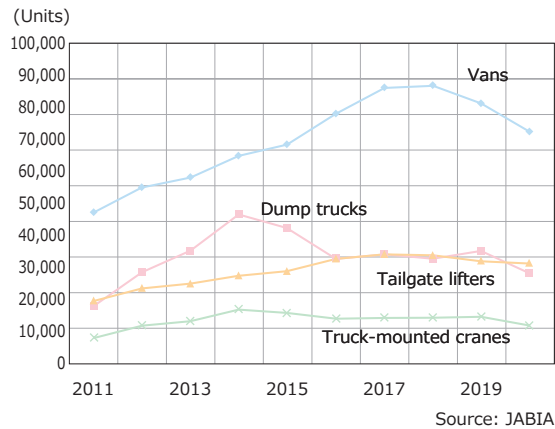


Fig. 2 Production Trends of Four Typical Special Purpose Vehicle Types

production of vans, which are the largest category of special purpose vehicles, decreased by 8,825 units to 72,195 (89.1% of 2019), the second consecutive year in which production dropped by more than 5,000 units. Of the ten types of special purpose vehicles where production fell compared to 2019, three types suffered decreases in excess of 10%. In addition to vans, production of dump trucks decreased by the largest amount, falling by 6,832 units to 28,230 (80.4% of 2019) and production of truck-mounted cranes decreased by 2,652 units to 12,002 (81.9%). In sequence, production of the following types of vehicles decreased: bulk carriers (774 units, 90.5%), trailers (8,963 units, 94.2%), aerial work platforms (4,747 units, 95.2%), concrete pumping trucks (255 units, 96.2%), tanker trucks (2,374 units, 98.0%), tailgate lifters 31,483 units, 98.7%, and sanitation vehicles (6,773 units, 99.8%). In contrast, production of the following types of special purpose vehicles increased: detachable container trucks (3,049 units, 108.2%), concrete mixing transport trucks (2,240 units, 101.4%), and firefighting vehicles (1,115 units, 100.5%).

Figure 2 shows the production trends for four typical products (vans, dump trucks, tailgate lifters, and truck-mounted cranes) with annual production of more than 10,000 units over the past ten years. Van production, which had increased robustly year-on-year decreased substantially for the second successive year. Tailgate lifter production has also continued to decline since its peak in 2017. Despite this situation, demand remains robust, with production in 2020 between 200% and 300% higher than the low point of 2009 in the wake of the global financial crisis.

Figure 3 shows the trends for the average number of

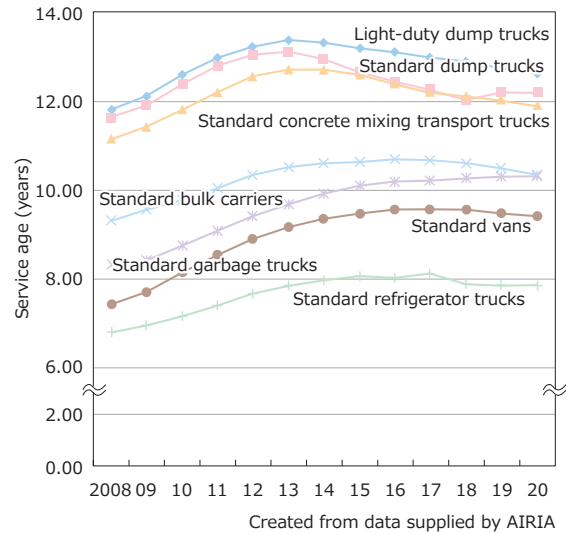


Fig. 3 Average Service Age from Initial Registration

years in service from initial registration. From 2008 to 2016, the service age rose. However, more recently, this increase has ceased for six out of seven of these vehicle types (excluding standard garbage trucks) and the average service age has begun to fall. This is probably because rising production over the last few years has increased the proportion of vehicles with shorter service lives, while reducing the high proportion of vehicles with service lives of over 10 years registered before the global financial crisis. However, as the rate of vehicles undergoing inspections and maintenance and the number of newly registered vehicles declines, the fall in the average service age is not likely to continue for much longer and will probably remain constant. Uniquely, the service age of garbage trucks has continued to increase. Vehicles in this category are now being used for roughly two years longer than was the case in 2008. Possible reasons for this increase include the development and adoption of more durable engines and frames, as well as improvements in the rate of vehicles undergoing inspections and maintenance.

The service age of construction vehicles including light-duty and standard dump trucks and concrete mixing transport trucks remains around two years longer than other logistics-related vehicles, which is affected by the distances driven and lengths of time that these vehicles are in operation, and it is likely that this clearly separated dual trend will continue in the future. There was also no change in the particular trend of standard refrigerator trucks having a much lower service age than oth-

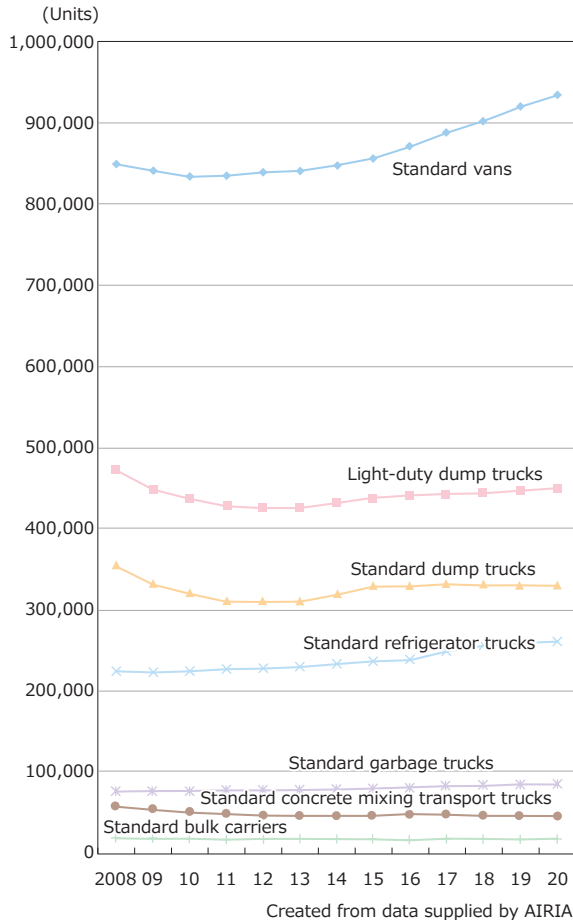


Fig. 4 Overall Numbers of Special Purpose Vehicles in Japan

er vehicle types.

Note: The graph in Fig. 3 (average service age from initial registration) was prepared from registration data provided by AIRIA. The original registration data includes the number of registered vehicles at the end of March 2020 for each registration year between 2000 and 2020, and as collective data for 1999 and before (i.e., vehicles in service for more than 20 years). The average service age was extrapolated from these figures.

Figure 4 shows the overall number of each of these vehicle types in Japan at the end of March each year. Despite small decreases depending on the year, the total number of each vehicle type has continued to increase slightly. In 2020, the total number of logistics-related vehicles such as standard vans and standard refrigerator trucks increased to the highest level since 2008. In addition, standard garbage trucks in the sanitation-services-related category is the only type of vehicle that has increased in number every year unaffected even by the global financial crisis. The number of these three vehicle

types is at least 110% of the level in 2008. In contrast, the total numbers of small and standard dump trucks and standard concrete mixing transport trucks, which were all greatly affected by the drop in demand for construction after the global financial crisis, have still not recovered to pre-crisis levels, creating a clearly separated dual trend.

The numbers of construction vehicles such as dump trucks and concrete mixing transport trucks decreased sharply after the global financial crisis. The increase in these vehicles after bottoming out in 2012 and 2013 may be attributed to greater demand for special purpose construction vehicles for projects related to earthquake and natural disaster recovery, the Tokyo Summer Olympics, infrastructure projects, and the like.

3 Special Purpose Construction Vehicles

3.1. Dump Trucks

Dump truck production in 2020 decreased greatly to 28,230 units (80.4% of 2019). According to vehicle class, the production of heavy-duty dump trucks increased by 473 units to 5,730 (109.0%). However, the production of light- and medium-duty dump trucks fell heavily. The production of medium-duty dump trucks decreased by 1,683 units to 13,218 (88.7%) and the production of light-duty dump trucks increased by 5,749 units to 8,389 (59.3%). Although the coronavirus pandemic hardly affected production of heavy-duty dump trucks, it had a particularly large impact on light-duty dump trucks. As the coronavirus pandemic shows signs of abating, this kind of dual trend will probably not continue as demand picks up due to infrastructure projects and projects related to earthquake and natural disaster recovery. Although total dump truck production was significantly higher than the low of 10,853 units reached during the global financial crisis in 2009, concerns are likely to grow as capital investment and employment growth in the industry remains unlikely. According to each class, the proportion of heavy- and medium-duty dump trucks increased from 15.0% to 20.3% and from 42.4% to 46.8%, respectively, between 2019 and 2020. In contrast, the proportion of light-duty dump trucks fell from 40.3% to 29.7%. These figures clearly demonstrate the impact of the coronavirus pandemic.

Table 1 shows the proportions of dump trucks produced in 2020 for transporting material other than earth

Table 1 Production Proportions of Non-Earth and Sand Dump Trucks, and Dump Trucks with SUS or Aluminum Bodies

Type	Non-earth and sand	SUS	Aluminum
2-ton trucks	2.7%	0.5%	0.0%
4-ton trucks (GVW: less than 8 tons)	9.1%	1.6%	0.0%
GVW: more than 8 tons (6 to 8 tons)	18.7%	7.0%	0.0%
GVW: 20 tons	6.1%	4.8%	0.0%
GVW: 22 tons	59.1%	40.6%	1.0%
GVW: 25 tons	90.7%	42.7%	2.9%

Source: JABIA

or sand (i.e., non-earth and sand dump trucks). Almost all dump trucks with a gross vehicle weight (GVW) up to 20 tons were used for transporting earth and sand, and the proportion of dump trucks in this weight class used to transport other material was low. In contrast, almost 60% of dump trucks with a GVW of 22 tons and 90.7% of dump trucks with a GVW of 25 tons were used to transport material other than earth or sand. Demand is rising for the transportation of comparatively heavy loads, such as industrial waste, debris, wood chips, and recycling materials. As a result, an increasingly high proportion of these dump trucks have long, heavy-duty bodies manufactured from corrosion-resistant long-life stainless steel (SUS). The proportion of SUS-bodied dump trucks also rises in accordance with the proportion of non-earth and sand transportation (GVW of 22 tons: 40.6%, GVW of 25 tons: 42.7%). Aluminum bodies tend to be adopted by dump trucks with a GVW of 22 or 25 tons that transport comparatively heavy loads to reduce body weight and increase the carrying capacity of the truck. Furthermore, all dump trucks produced in 2020 were equipped with diesel engines, and none were produced with compressed natural gas (CNG) or hybrid powertrains.

3. 2. Concrete Mixing Transport Trucks

Production of concrete mixing transport trucks in 2020 increased to 2,240 units (101.4% of 2019). Heavy-duty truck production increased to 1,466 units (100.9% of 2019), medium-duty truck production decreased slightly to 571 units (99.7%), and light-duty truck production increased to 196 units (107.1%). There were no major changes in the proportions of the light-, medium-, and heavy-duty classes compared to 2019. Although the average service age since initial registration of concrete mixing transport trucks increased from 11.15 to 12.70 years between 2008 and 2014, it has fallen since then, reaching 11.88 years in 2020. Furthermore, the overall number of concrete mixing transport trucks has not increased or decreased greatly since 2013.

4 Fixed Capacity Special Purpose Vehicles

4. 1. Tanker Trucks

Production of tanker trucks in 2020 decreased to 2,374 units (98.0% of 2019). According to class, production of heavy-duty tanker trucks increased to 627 units (105.0%) and production of medium-duty tanker trucks also increased to 1,509 units (100.2%). However, production of light-duty tanker trucks decreased substantially to 220 units (70.7%). In addition, the proportion of heavy-duty trucks was 26.4%, compared to 63.6% for medium-duty trucks and 9.3% for light-duty trucks. The proportion of light-duty trucks decreased compared to the previous year. Similarly to the trend for dump trucks, it is thought that the coronavirus pandemic caused customers to put off purchases of replacement light-duty vehicles.

According to use, the production of oil tanker trucks increased to 1,213 units in 2020 (102.6% of 2019). However, the amount of oil being transported has not increased. The figures suggest that older trucks are probably being replaced in significant numbers. Production of water spraying or water supply trucks, which are in high demand for lease or rental, decreased after the upward turn in the previous year to 93.1% of the level in 2019. Production of tanker trucks for transporting poisonous materials or foodstuffs also decreased to 75.0% of the level in 2019. According to use, the proportion of oil tanker trucks was 51.1%, and the proportion of water spraying or water supply trucks was 43.9%.

4. 2. Bulk Carriers

Production of bulk carriers in 2020 decreased substantially to 774 units (90.5% of 2019). According to class, heavy-duty bulk carriers accounted for approximately 99.4% of this total, demonstrating the dominance of heavy-duty vehicles in this market. According to use, production of bulk cement carriers decreased to 408 units (94.0% of 2019) and production of bulk feedstuff carriers fell similarly to 279 units (91.8% of 2019). Although this demonstrates the underlying robust demand for bulk feedstuff carriers, it also shows the negative impact of the coronavirus pandemic on demand for these vehicles. Although the overall number of standard bulk carriers has risen and fallen virtually year-by-year over the last ten years, the number has remained virtually stable at around 18,000 units. Furthermore, the average service age has remained at around 10.5 years without major in-

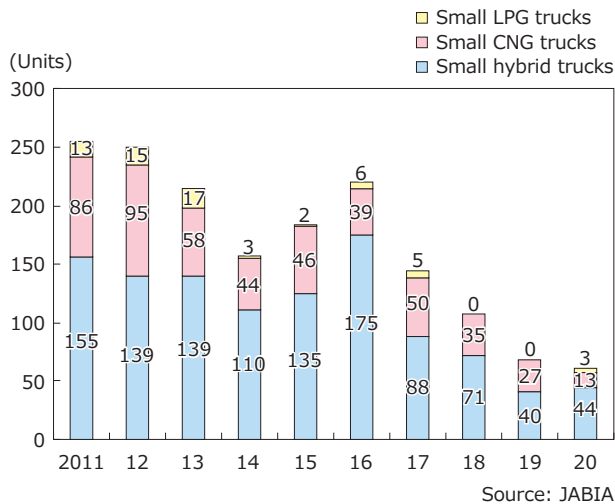


Fig. 5 Production Volumes of Hybrid, CNG, and LPG Garbage Trucks

creases or decreases.

4.3. Vans

Production of vans in 2020 decreased by 8,825 units to 72,195 (89.1% of 2019). Although van production increased steadily after the global financial crisis, more than doubling in 2018 compared to the level in 2009, production has now fallen for two consecutive years. According to class, production of large vans decreased to 21,717 units (97.6% of 2019), medium vans to 22,821 units (95.0%), small vans to 26,282 units (82.2%), and mini-vehicle vans to 1,375 units (49.7%). The decrease in small and mini-vehicle van production is particularly noticeable. This is also probably due to the negative impact of the coronavirus pandemic on demand. The proportion of large, medium, and small vans remains basically equal at just over 30% each. According to use, the production of all types of vans decreased. Production of ordinary goods vans decreased to 18,356 units (86.8% of 2019), refrigerator and freezer vans to 20,317 units (86.8%), and side-opening vans to 29,569 units (93.3%). In total, production of these main three types of vans fell by 7,977 units. No walk-through type vans were produced in 2020. According to proportion of type, ordinary goods vans accounted for 25.4% of production, compared to 28.1% for refrigerator and freezer vans and 41.0% for side-opening vans. These main three types of vans accounted for nearly 95% of production, unchanged from 2019. According to body material, steel accounted for 1,127 units (a proportion of 1.6%), aluminum for 63,900 units (88.5%), and fiber reinforced plastic (FRP) for 7,168 units (9.9%). These figures demonstrate the continuing shift toward lightweight aluminum and FRP van

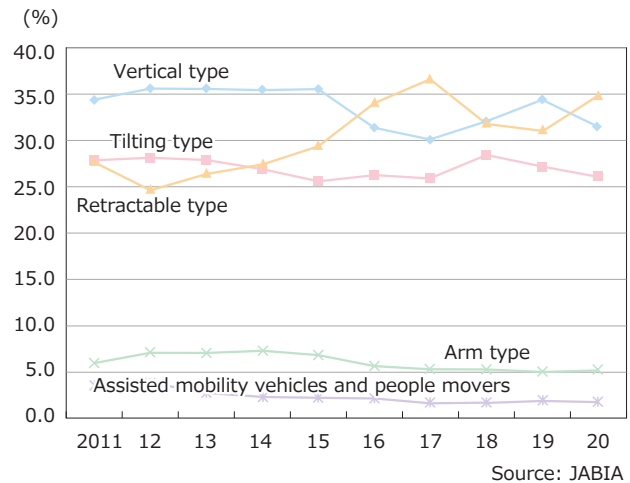


Fig. 6 Production Proportion of Tailgate Lifters per Type and Use

bodies.

The total number of standard vans in use has continued to increase, rising from 832,809 units in 2010 to 933,915 in 2020. The average service age of standard vans and standard refrigerator and freezer vans was 9.43 and 7.88 years, between two and four years shorter than that of special purpose construction vehicles, reflecting the long distances driven by these vehicles.

5 Other Special Purpose Vehicles

5.1. Sanitation Vehicles

The category of sanitation vehicles includes garbage trucks, large capacity garbage dump trucks, cesspool emptiers (also known as vacuum trucks), as well as cleaning trucks and road sweepers (i.e., dewatering trucks and trucks that clean by spraying water or using suction). Production of these vehicles in 2020 fell slightly to 6,773 units (99.8% of 2019). According to type, production of garbage trucks in 2020 increased to 5,077 units (101.1% of 2019), maintaining the recent increase in production of these vehicles. Production of cesspool emptiers, the next most prevalent type of sanitation vehicle (proportion: 13.2%) decreased to 892 units (93.6% of 2019).

The overall number of standard garbage trucks in use has continued to increase year-by-year, virtually unaffected by the state of the economy, rising from 77,371 units in 2008 to 87,257 units in 2020. Production in 2020 was 112.8% of the level in 2008. Furthermore, the average service age from initial registration has continued to increase each year from 8.35 years in 2008 to 10.33 years in 2020.

Figure 5 shows the production status of hybrid, CNG,

and liquid petroleum gas (LPG) garbage trucks, which joined the market as environmental awareness increased. These trucks are currently produced only in the light-duty category. In 2020, production continued its recent year-on-year declining trend and fell to 60 units, 89.6% of the level in 2019. Production has stagnated to around 13% of the level in 2009 (436 units) and 2010 (424 units), when purchasing incentives were available, and the proportion of low-polluting environmentally friendly garbage truck production has fallen to 1.2% of the whole, indicating that this type of truck has failed to find mainstream acceptance. However, with electrification expected to pick up as part of the trend toward carbon neutrality, it is hoped that more electric garbage trucks will find their way onto the market in the future.

5.2. Detachable Container Trucks

Production of detachable container trucks in 2020 increased greatly to 3,049 units (108.2% of 2019). According to class, the production of heavy-duty trucks increased to 622 units (100.5%) and the production of medium-duty trucks increased to 1,981 units (116.1%). The decrease in production of light-duty trucks to 438 units (91.6%) is in line with similar falls experienced by other types of light-duty vehicles. According to the proportion of each class, heavy-duty trucks accounted for 20.4% of the total, medium-duty trucks for 65.0%, and light-duty trucks for 14.4%. The proportion of medium-duty detachable container trucks increased greatly.

5.3. Aerial Work Platforms

Production of aerial work platforms in 2020 decreased to 4,747 units (95.2% of 2019). Categories of aerial work platforms include truck-mounted and self-propelled types. Truck-mounted aerial work platforms are mainly used for electrical and communication system engineering work, whereas self-propelled aerial work platforms tend to be found on construction sites, inside buildings and so on.

5.4. Truck-Mounted Cranes

This category of vehicle mostly comprises a crane mounted behind the cab of a flat-bed truck and is used for construction or building work, or for handling cargo. In 2009, production of truck-mounted cranes fell to 4,565 units, only one-third of the 13,864 units produced in 2008, due to the slowdown in construction and building demand in the wake of the global financial crisis. Production then increased drastically for five consecutive years, recovering to 16,848 units in 2014, before stabilizing at a

level above 14,000 units up to 2019. In contrast, production dropped substantially in 2020 to 12,002 units, 81.9% of the level in 2019. Truck-mounted cranes are a type of vehicle that is greatly affected by the state of the economy.

5.5. Tailgate Lifters

Tailgate lifters are mounted to the back of flat-bed vehicles or vans as a typical labor-saving device for handling cargo. Production of tailgate lifters decreased in 2020 decreased to 31,483 units (98.7% of 2019). According to type and use, production of vertical tailgate lifters decreased to 9,931 units (90.3% of 2019), production of tilting tailgate lifters decreased to 8,247 units (94.8%), and production of tailgate lifters for assisted mobility vehicles and people movers decreased to 606 units (95.6%). In contrast, production of retractable tailgate lifters increased to 10,996 units (110.5%) and production of arm-type tailgate lifters increased to 1,703 units (104.5%). The decrease in van production and lower demand for light-duty vehicles probably had a major effect on the production of tailgate lifters. Future increases in tailgate lifter production likely depends on logistical demand, van production trends, as well as demand for labor-saving devices.

Figure 6 shows the proportion of tailgate lifter production per type and use. Vertical tailgate lifters accounted for 31.5% of production, retractable tailgate lifters for 34.9%, and tilting tailgate lifters for 26.2%. Although these proportions differed from 2019, these three types still account for more than 90% of total tailgate lifter production. The increase in the proportion of retractable type tailgate lifter production, which account for a high proportion of tailgate lifters attached to refrigerator and freezer vans and the like despite the slowdown in demand for temperature-controlled vehicles, was probably due to an increase in the number of vehicles being equipped with tailgate lifters.

5.6. Trailers

Trailers are used to transport large volumes or heavy items. In 2020, production decreased by 553 units to 8,963 (94.2% of 2019). According to type, production of low-bed trailers decreased to 235 units (97.9% of 2019), flat-bed trailers decreased to 1,672 units (83.0%), van-type trailers decreased to 3,018 units (96.4%), trailers for marine containers decreased to 2,831 units (98.9%), tanker trailers decreased to 444 units (91.7%), dump trailers increased to 245 units (103.8%), car carrier trailers decreased to 255 units (90.7%), and full trailers decreased to 186 units

(93.0%). Although the proportion of trailer types did not change greatly, the proportion of flat-bed trailers decreased, while the proportion of van-type trailers and trailers for marine containers increased. Furthermore, these three types of trailers continued to account for more than 80% of total trailer production. The increase in logistics volumes and number of large cargoes being transported indicates the presence of substantial underlying demand, creating expectations for future increases in production.