
MAINTENANCE AND SERVICEABILITY

1 Introduction

1.1. Vehicle Market in 2016

In 2016 4,970,260 new vehicles were sold in Japan. This was a decrease of 76,250 vehicles or 1.5% compared to the previous year, when 5,046,510 new vehicles were sold. This is the first time in five years that new vehicle sales dropped below 5 million vehicles, and the second consecutive year that new vehicle sales have declined.

A more detailed analysis of new vehicle sales reveals that the number of registered vehicles was 3,244,798, an increase of 94,488 (3.0%) from the previous year.

On the other hand, sales of mini-vehicles in Japan in 2016 fell by 170,738 vehicles (9.0%) compared to the previous year down to 1,725,462 vehicles. This is a decrease of about 550,000 vehicles in comparison to two years ago (2014) when a record high 2.27 million mini-vehicles were sold. This represents a major change over the course of just two years as the size of the market has shrunk to three quarters of its previous size.

Sales of new mini-vehicles as a proportion of all new vehicle sales peaked at 40.9% in 2014, and have since fallen by more than 6 points down to 34.7%.

In terms of used vehicle sales, the number of registered vehicles was 3,762,654, an increase of 30,506 (0.8%) from the previous year. Used mini-vehicle sales were 2,993,468, a decrease of 61,198 (2.0%) from the previous year. It appears that used vehicle sales were affected in the same way as new vehicle sales, with an increase in registered vehicles and a decrease in mini-vehicles.

The number of registered, domestically-produced hybrid vehicles (HV and PHV) sold in Japan in 2016 was 1,069,944 vehicles an increase of 123,202 vehicles (13.0%) compared to the previous year that once again exceeded the 1 million vehicle mark. The number of imported hybrid vehicles was 6,715, an increase of 1,090 vehicles (19.4%) compared to the previous year.

The number of registered, domestically-produced elec-

tric vehicles (EV) sold in 2016 was 14,796 vehicles, while the number of imported EVs was 724 vehicles, so total EV sales reached 15,520 vehicles. This is a large increase of 5,241 vehicles (51.0%) compared to the previous year. The number of fuel cell vehicles (FCV) sold in Japan in 2016 was 1,055 vehicles and this is approximately 2.5 times greater than the number sold during the previous year.

1.2. Vehicle Ownership Trends in 2016

At the end of December 2016, the number of vehicles owned in Japan was 81,602,046, the seventh consecutive increase since 2010. This number exceeded the 80 million vehicle mark for first time in history in 2013, and has only continued to increase and set record highs. Compared to the previous year (2015), this was an increase of 304,592 vehicles (0.4%).

According to model type, the number of 4-wheeled registered vehicles owned in Japan was 47,364,928, an increase of 97,487 (0.2%) from the previous year. This was the first increase in 11 years (since 2005).

Despite the fact that sales of new mini-vehicles have declined precipitously over the past two years, the number of 4-wheeled mini-vehicles owned in Japan continues to increase. In 2015 this number broke through the 30 million vehicle mark, and in 2016 it stood at 30,551,361 vehicles. This was an increase of 252,121 vehicles (0.8%) compared to the previous year. The growth rate has declined for the second consecutive year and appears to be approaching its plateau.

The number of inspected 2-wheeled vehicles owned in Japan also increased to 1,672,438. This was 15,175 (0.9%) more than the previous year. The number of 2-wheeled mini-vehicles owned in Japan is 1,994,825. This is a decrease of 61,294 (3.0%) from the previous year, and the first time in 4 years that this number has dropped below 2 million.

The number of mini-vehicles that are owned in Japan as a percentage of the total number of registered and

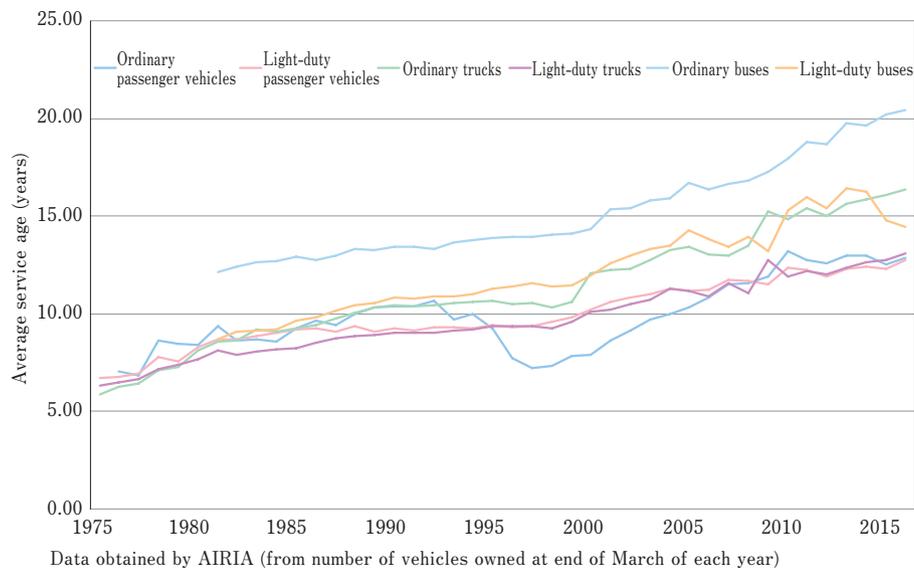


Fig. 1 Trends in number of vehicles owned and average number of years of usage (average vehicle age)

4-wheeled mini-vehicles rose by 0.2% from the previous year and is now at 39.2%, the highest in history. However, it is clear that the growth rate is declining as it approaches the 40% range.

According to a study by the Automobile Inspection & Registration Information Association (AIRIA), the average age of registered passenger vehicles at the end of March 2016 was 8.44 years. This is 0.15 years longer than in the previous year and also means that the average vehicle age has continued to grow for 24 years in succession. This is the highest average vehicle age in history and a record has been set for the past 22 consecutive years. The average vehicle age has increased by 1.54 years compared to 10 years ago in 2006.

The decrease in the number of vehicles owned in Japan over the one-year period from April 2015 to March 2016 is defined as the number of vehicles that were scrapped in a one-year period. If these vehicles are then examined to determine the average number of years of usage (the average number of years from when the vehicle was registered as a new vehicle in Japan until it was registered as being scrapped: equivalent to the average life span of a human being), this comes to 12.76 years. That is an increase of 0.38 years compared to the 12.38 years value from the previous year, and is the first time in two years that this value has increased.

Figure 1 shows the change in the average number of years of usage for different types of vehicle models.

The average age of registered trucks at the end of March 2016 was 11.23 years. This is an increase of 0.14

years compared to the 11.09 years value of the previous year, and is now the highest in history after increasing for 23 consecutive years. The average age of ordinary trucks is 12.02 years, which is an increase of 0.14 years compared to the previous year and the largest increase in age amongst all vehicle models.

The average age of buses in Japan was 11.87 years. This was an increase of 0.11 years compared to the previous year and is now the highest in history after increasing for the 27 years in succession.

In addition, the average age of special-purpose vehicles in Japan in 2015 was 10.85 years, an increase of 0.12 years compared to the previous year. The average age of heavy-duty special-purpose vehicles was 20.46 years, an increase of 0.10 years compared to the previous year, while the average age of light-duty motorcycles was 14.63 years, an increase of 0.32 years compared to the previous year.

According to a study by the Light Motor Vehicle Inspection Organization, the current average age of passenger mini-vehicles at the end of December 2016 was 8.20 years. This is 0.23 years longer than the average age of 7.97 years recorded in 2015. This organization first started recording this data for mini-vehicles in 2005 and the average age that year was 6.13 years. This means that the average age of mini-vehicles has increased by 2.07 years, or over 30.0%, since then. It also means that the average age has increased for the 11 consecutive years.

The average age of mini-vehicle trucks at the end of

December 2016 was 12.30 years. This is 0.26 years longer than the average age of 12.04 years recorded in 2015. This data for mini-vehicles was first recorded in 2005 and the average age that year was 9.33 years. This means that, as with passenger vehicles, the average age of mini-vehicle trucks has increased for the past 11 years, by a total of 2.97 years or over 30.0%.

The average number of years of usage of passenger mini-vehicles was 14.03 years at the end of December 2015. In 2016 this had increased by 0.33 years to 14.36 years. Therefore, the average vehicle age has increased by 2.87 years compared to 11 years ago in 2005. The same trend is seen in the average number of years of usage of mini-vehicle trucks. In 2015 it was 15.73 years, but this had increased by 0.26 years to 15.99 years by 2016. This represents a total increase of 3.21 years compared to the average number of years of usage of 12.78 years recorded in 2005.

The total number of registered passenger vehicles owned in Japan at the end of March 2016 was 1,800,955 for ordinary passenger vehicles, an increase of 283,752 compared to the previous year. Light-duty passenger vehicles accounted for 21,353,690 vehicles, a decrease of 420,224 compared to the previous year. This brought the total number of passenger vehicles to 39,354,645, a decrease of 136,472 vehicles (0.3%) compared to the previous year. Although the number of ordinary passenger vehicles continues to increase, it is still surpassed by the large decrease in the number of light-duty passenger vehicles, resulting in an overall decrease in the total number of passenger vehicles. In addition, the number of passenger mini-vehicles owned in Japan was 21,477,247 vehicles, an increase of 451,115 compared to the previous year. The total number of passenger vehicles owned in Japan was 60,831,892 vehicles, an increase of 314,643 vehicles (0.5%) compared to the previous year.

Both the number of older vehicles within the total number of vehicles owned in Japan and the proportion of the total occupied by these older vehicles have continued to increase. Looking specifically at passenger vehicles, the number of these vehicles with an age of 10 years or more as of the end of March 2016 was 14,292,790, an increase of 423,958 vehicles (3.0%) compared to the previous year. These older vehicles accounted for 36.3% of the total number of registered passenger vehicles, an increase of 1.2% (Fig. 2).

The total number of HVs and PHVs owned in Japan at

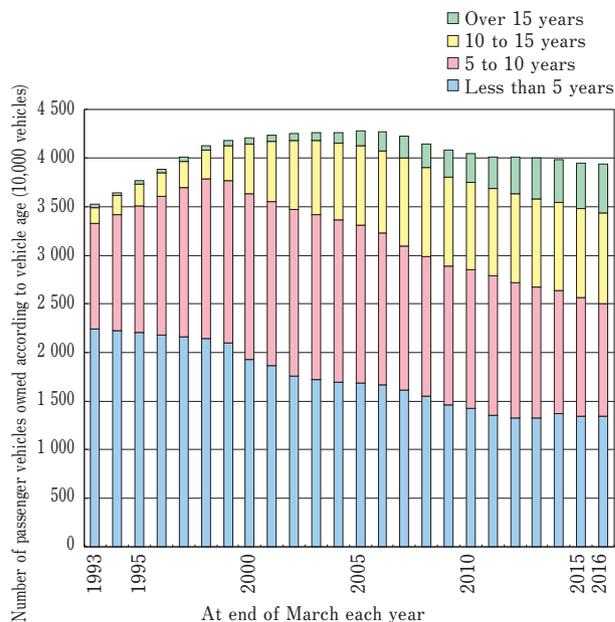


Fig. 2 Trends in vehicle age breakdown of the total number of passenger vehicles owned.

the end of March 2016 was 5,581,578, an increase of 875,145 (18.6%) compared to the previous year. The number of EVs owned in Japan was 63,760, an increase of 10,387 vehicles (19.5%) compared to the previous year. The number of FCVs owned in Japan was 632 vehicles.

At the end of March 2016, the total number of HVs, PHVs, EVs, and FCVs owned in Japan was 5,645,970 vehicles, which accounted for 7.0% of the total number of vehicles owned in Japan (80,900,730), representing an increase of 1.1 percentage points from the 5.9% of the previous year.

2 Recent Trends in the Vehicle Maintenance Industry

The Japan Automobile Service Promotion Association (JASPA) conducted its 2016 survey of the vehicle repair and maintenance industry at the end of June 2016. The targets of the survey were vehicle repair and maintenance businesses as defined by the Road Transport Vehicle Act. The survey was sent to all 92,061 of these businesses, and valid responses were received from approximately 30% of them. It has been six years since this survey was last sent to all such vehicle repair and maintenance businesses in 2010.

The sales volume and other values reported were those from the accounting period closest to the time of the survey at the end of June 2016 (e.g., from the 2015 fiscal year). According to this survey, the total mainte-

Table 1 Maintenance sales volume, composition ratio, and rate of change compared to previous year according to type of business and work content.

(Sales volume units: hundred million yen)

Business type		Work content			Regular inspection and maintenance				Collision repair	Other maintenance	Total	Number of shops and composition ratio	Number of mechanics and composition ratio
		Vehicle inspection (shaken) maintenance			1 year	6 months	3 months	Total					
		2 years	1 year	Subtotal									
Full-time	Sales volume	5 846	3 298	9 144	316	79	277	672	4 227	5 708	19 751	56 735	161 317
	Proportion	29.6%	16.7%	46.3%	1.6%	0.4%	1.4%	3.4%	21.4%	28.9%	100.0%	61.6%	48.2%
	Change in sales volume compared to previous year	-100	-120	-220	-48	-22	14	-56	-81	-116	-473	-289	-4 833
	Ratio of increase or decrease compared to previous year	98.3%	96.5%	97.7%	86.8%	78.2%	105.3%	92.3%	98.1%	98.0%	97.7%	99.5%	97.1%
Additional business	Sales volume	2 365	614	2 979	170	33	39	242	1 294	2 019	6 534	15 476	48 293
	Proportion	36.2%	9.4%	45.6%	2.6%	0.5%	0.6%	3.7%	19.8%	30.9%	100.0%	16.8%	14.4%
	Change in sales volume compared to previous year	-226	-82	-308	-9	-3	3	-9	-127	-200	-644	266	-905
	Ratio of increase or decrease compared to previous year	91.3%	88.2%	90.6%	95.0%	91.7%	108.3%	96.4%	91.1%	91.0%	91.0%	101.7%	98.2%
Full-time + additional business	Sales volume	8 211	3 912	12 123	486	112	316	914	5 521	7 727	26 285	72 211	209 610
	Proportion	31.2%	14.9%	46.1%	1.8%	0.4%	1.2%	3.5%	21.0%	29.4%	100.0%	78.4%	62.6%
	Change in sales volume compared to previous year	-326	-202	-528	-57	-25	17	-65	-208	-316	-1 117	-23	-5 738
	Ratio of increase or decrease compared to previous year	94.1%	98.4%	95.5%	91.0%	81.2%	117.0%	97.0%	96.7%	94.6%	95.5%	100.0%	97.1%
Dealer	Sales volume	6 846	1 217	8 063	1 902	254	177	2 333	5 350	9 609	25 355	16 213	109 383
	Proportion	27.0%	4.8%	31.8%	7.5%	1.0%	0.7%	9.2%	21.1%	37.9%	100.0%	17.6%	32.7%
	Change in sales volume compared to previous year	-28	-203	-231	50	-25	-1	24	-27	225	-9	-8	480
	Ratio of increase or decrease compared to previous year	99.6%	85.7%	97.2%	102.7%	91.0%	99.4%	101.0%	99.5%	102.4%	100.0%	100.0%	100.4%
Private owner-run	Sales volume	695	265	960	93	12	46	151	511	682	2 304	3 637	15 662
	Proportion	30.2%	11.5%	41.7%	4.0%	0.5%	2.0%	6.6%	22.2%	29.6%	100.0%	4.0%	4.7%
	Change in sales volume compared to previous year	7	10	17	7	-13	27	21	39	-140	-63	-68	-86
	Ratio of increase or decrease compared to previous year	101.0%	103.9%	101.8%	108.1%	48.0%	242.1%	116.2%	108.3%	83.0%	97.3%	98.2%	99.5%
Total	Sales volume	15 752	5 394	21 146	2 481	378	539	3 398	11 382	18 018	53 944	92 061	334 655
	Proportion of work content	29.2%	10.0%	39.2%	4.6%	0.7%	1.0%	6.3%	21.1%	33.4%	100.0%	100.0%	100.0%
	Change in sales volume compared to previous year	-347	-395	-742	0	-63	43	-20	-196	-231	-1 189	-99	-5 344
	Ratio of increase or decrease compared to previous year	97.8%	93.2%	96.6%	100.0%	85.7%	108.7%	99.4%	98.3%	98.7%	97.8%	99.9%	98.4%

maintenance sales were 5 trillion 394.4 billion yen, a decline of 118.9 billion yen (2.2%) compared to the results in the survey from the previous year. This was the second consecutive year that total maintenance sales decreased.

For the purpose of the 2016 vehicle repair and maintenance industry survey, the target vehicle repair and maintenance businesses were classified as follows: full-time vehicle maintenance shops (workplaces other than vehicle dealers where maintenance sales account for over 50% of total sales), maintenance shops run as an additional business (workplaces where sales from other businesses, such as vehicle sales, parts and accessory sales, insurance sales, or gasoline sales, account for over 50% of total sales), maintenance shops at vehicle dealers (workplaces at companies that have signed an exclusive distributor agreement with an automaker or a domestic exclusive retailer), and private owner-run maintenance shops (mainly workplaces that perform maintenance work on vehicles that are privately owned).

2.1. Maintenance Facilities and Maintenance Personnel

2.1.1. Outline of Maintenance Facilities

The number of businesses in the vehicle repair and maintenance industry was 73,371 at the time of the sur-

vey on June 30, 2016, a decrease of 259 businesses (0.4%) compared to the previous year.

The total number of workplaces (number of certified maintenance shops) was 92,061. This was a decrease of 99 such workplaces (0.1%) compared to the previous year. This was the first decrease in this number after three straight years of increases (Table 1).

When the number of workplaces was examined according to the types of business, full-time vehicle maintenance shops accounted for the majority at 56,735 (61.6% of the total number of workplaces). This represented a decrease of 289 workplaces (0.5%) compared to the previous year. Maintenance shops that were run as an additional business accounted for 15,476 workplaces (16.8% of the total). This was an increase of 266 workplaces (1.9%) from the previous year.

The number of maintenance shops at vehicle dealers was 16,213 (17.6% of the total), a decrease of 8 shops from the previous year. Consequently, the number of dealer-based maintenance shops decreased for the first time in 4 years. The number of private owner-run maintenance shops was 3,637 (4.0% of the total). This was a decrease of 68 (1.8%) from the previous year.

The number of designated workshops (i.e., private

Table 2 Number of vehicle maintenance-related personnel.

Scale of business	A1 (2 to 3 people)	A2 (4 to 10 people)	B (11 to 20 people)	C (21 to 30 people)	D (31 people or more)	Total	Change from previous year	Rate compared to previous year
Number of shops	51 106	36 767	3 615	430	143	92 061	-99	99.9%
Number of shops that obtained designation		26 804	2 635	313	103	29 855	118	100.4%
Acquisition ratio		72.9%	72.9%	72.8%	72.0%	32.4%		
Total number of personnel	164 344	287 130	64 840	14 175	7 391	537 880	-9 062	98.3%
Number of female personnel within that total	32 643	43 185	6 352	1 053	502	83 735	8 104	110.7%
Total number of maintenance personnel	121 124	213 705	49 421	10 464	5 999	400 713	-288	99.9%
Number of female maintenance personnel within that total	10 592	6 872	747	132	62	18 405	1 717	110.3%
Number of Class 1 auto mechanics	1 258	6 029	1 597	160	159	9 203	443	105.1%
Number of female mechanics within that total	37	63	13	0	1	114	-8	93.4%
Number of Class 2 auto mechanics	77 178	152 353	34 903	6 484	3 542	274 460	-5 355	98.1%
Number of female mechanics within that total	1 982	1 785	292	24	8	4 091	468	112.9%
Number of Class 3 auto mechanics	19 131	25 152	4 752	1 245	712	50 992	-432	99.2%
Number of female mechanics within that total	4 745	1 914	56	6	9	6 730	-128	98.1%
Total number of mechanics	97 567	183 534	41 252	7 889	4 413	334 655	-5 344	98.4%
Number of female mechanics within that total	6 764	3 762	361	30	18	10 935	332	103.1%

Survey in June 2014 : The number of women was also surveyed.

Table 3 Number of businesses according to number of employees

	2 to 5 people	6 to 10 people	11 to 15 people	16 to 20 people	21 to 30 people	31 to 50 people	51 to 100 people	101 to 300 people	More than 300 people	Private company total	Public offices	Overall total
June 2006	39 187	13 685	4 189	2 547	2 667	1 641	1 905	2 608	2 150	70 579	438	71 017
June 2016	43 080	15 969	4 164	1 827	1 851	1 507	1 535	1 954	1 090	72 977	394	73 371
Change	3 893	2 284	-25	-720	-816	-134	-370	-654	-1 060	2 398	-44	2 354

shops permitted to carry out the Japanese shaken vehicle inspection procedure) has increased consistently since the system was established in 1962 and is setting a record every year. In the 2016 survey, the number of such workshops reached 29,855, an increase of 118 (0.4%) from the previous year. The number of workplaces that have obtained this designation (i.e., the designation acquisition ratio) is 32.4% of the total number of workplaces (Table 2).

Examining the designation acquisition ratio according to the different types of businesses shows that 13,443 of the total number of full-time vehicle maintenance shops (56,735) have obtained the designation, a decrease of 46 shops (0.3%) compared to the previous year. This represents a designation acquisition ratio of 23.7%. This is the first such decrease since the 2005 survey, but the number of full-time vehicle maintenance shops that have obtained this designation has increased by 1,478 (12.4%) over the 10 years since 2006.

Among maintenance shops run as an additional business, 4,680 of the total of 15,476 have obtained the designation. This is an increase of 118 shops (2.6%) from the previous year, and represents a designation acquisition

ratio of 30.2%. It also is an increase of 290 shops (6.6%) compared to the number in 2006.

There were a total of 16,213 maintenance shops at vehicle dealers, 10,504 of which have obtained the designation. This is an increase of 63 (0.6%) from the previous year, representing a designation acquisition ratio of 64.8%. It also represents a decrease of 634 shops (5.7%) from 2006.

Among private owner-run maintenance shops, 1,228 out of the total of 3,637 have obtained the designation. This is a decrease of 17 (1.4%) from the previous year, for a designation acquisition ratio of 33.8%. It also represents an increase of 36 shops (3.2%) from 2006.

Table 2 compares the scale of the maintenance shops based on the number of vehicle maintenance personnel employed.

At the time of this survey in June 2016, after subtracting the number of public offices, the number of private companies was 72,977. However, at the time of the June 2006 survey 10 years ago, after subtracting the number of public offices, the number of private companies was 70,579. Table 3 compares them based on the number of employees.

2.1.2. Outline of Mechanics and Maintenance Personnel

At the time of the 2016 survey, the number of maintenance-related personnel was 537,880, a decrease of 9,062 (1.7%) from the previous year.

When these changes in the numbers of maintenance-related personnel are examined by business type, the full-time vehicle maintenance businesses employed 257,608 people, a decrease of 5,210 (2.0%) from the previous year. This was the first time in 4 years that the number decreased. Vehicle maintenance businesses run as an additional business employed 89,877 people, 3,058 (3.5%) more than the previous year. In addition, the number of maintenance-related personnel at maintenance shops at vehicle dealers decreased to 158,122 people, 3,060 (1.9%) less than the previous year. In private owner-run maintenance shops, the number of maintenance-related personnel once again decreased significantly for the fifth consecutive year, down to 32,273 people, which is 3,850 (10.7%) less than the previous year.

The number of maintenance personnel (shop workers) was 400,713, a decrease of 288 people from the previous year.

The number of mechanics was 334,655 people, a decrease of 5,344 (1.6%) from the previous year. The number of female mechanics within this total has been recorded since 2014, when there were 9,527, while there were 10,604 in 2015. According to the survey results from June 2016, the number of female mechanics was 10,953, an increase of 1,408 people (14.8%) over the past two years.

The number of personnel who obtained the Class 1 vehicle mechanic qualification was 9,203 people, an increase of 443 (5.1%) from the previous year. The number of female mechanics within this total who also obtained the Class 1 vehicle mechanic qualification was 114 people, a decrease of 8 (6.6%) from the previous year.

The number of personnel who obtained the Class 2 vehicle mechanic qualification was 274,460, a decrease of 5,355 (1.9%) from the previous year. The number of female mechanics within this total who also obtained the Class 2 vehicle mechanic qualification was 4,091 people, an increase of 468 (12.9%) from the previous year. The number of personnel with the Class 3 vehicle mechanic qualification was 50,992 a decrease of 432 (0.8%) from the previous year. The number of female mechanics within this total who also obtained the Class 3 vehicle mechanic

qualification was 6,730 people, a decrease of 128 (1.9%) from the previous year (Table 1, Table 2).

The number of female mechanics is continuing to increase, especially those who have obtained the Class 2 vehicle mechanic qualification, but there are a larger number of male mechanics overall and their numbers are decreasing. The number of vehicle mechanics in Japan as a whole has been decreasing for the past 5 years since reaching a peak of 347,276 people according to the 2011 survey.

In addition to the retirement of many mechanics from the baby boom generation, it has started to become quite difficult to recruit and replenish the number of vehicle mechanics due to the highly specialized nature of their skills and decreasing enrollment at automotive technical schools. Consequently, young people who have graduated from a general high school and do not yet possess the mechanic qualifications are now being hired and then aided in obtaining the mechanic qualifications through training at secondary training facilities run by JASPA after joining their maintenance shop. As a result, even though the number of mechanics is decreasing, the number of maintenance personnel in Japan continues to hold steady at approximately 400,000 people.

The average age of maintenance personnel has continued to rise consistently. A decline was recorded for the first time in the history of the survey in 2010, but the average age started to increase once again in 2011. In 2015 and 2016 the average age of maintenance personnel in Japan remained steady at 44.3 years, but the average age of maintenance personnel employed at vehicle maintenance businesses run as an additional business was 45.1 years, a reduction of 0.4 years compared to the previous year.

2.1.3. Measures to Help Ensure Sufficient Numbers of Trained Mechanics

According to the School Basic Survey of the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), in 2016 the number of there were 9,342 students who applied for admittance to the vehicle maintenance departments of vocational schools that train mechanics relative to a total student capacity of 12,549, with 8,649 students admitted. The total student capacity, number of applicants, and number of students admitted have all decreased. The previous lowest number of students admitted to these departments was 8,669 in 2012, and until 2016 the number of students had increased for three

consecutive years until 2015.

JASPA conducts a registration test to help people obtain the qualifications to become mechanics. The number of people taking this test reached its peak in 2004 at 72,623 people, but has continued to decrease since then, dropping to 43,863 people in 2013. In 2014 the number of people taking the test had rose by 1,517 (3.5%) compared to the previous year and stood at 45,380 people. In 2015 it increased again by 983 people (2.2%) up to 46,363, for two successive years of increases.

In 1991, the Japanese automobile industry established the Japan Automobile Education Foundation (JAEF). This organization has been providing automotive technology educational materials to industrial high schools and other vocational schools teaching vehicle mechanics courses. It also regularly conducts activities that provide a wide range of materials related to automobiles to regular high schools, as well as hold workshops for teachers to help raise interest in automotive technologies and maintenance.

In April 2014, fifteen different automobile-related organizations, including JASPA, established the Council to Promote the Recruitment and Training of Automobile Maintenance Personnel with the cooperation of the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT). In addition, the Study Group Concerning Recruitment and Training of Automobile Maintenance Personnel was also set up in June 2015 to enable collaboration between MLIT and the Japanese automobile industry on issues such as ensuring sufficient numbers of young people in the labor force, utilizing untapped human resources such as women, non-Japanese, and retirees, and examining how to improve the working environment of the vehicle maintenance industry as a whole. These efforts aim to build the foundations for the acceptance of a wider range of human resources in the industry. The increase in the number of people taking the JASPA registration test for two successive years is seen as evidence that these efforts by the government and the industry are bearing fruit, and expectations are now rising.

2.2. Demand for Vehicle Maintenance

2.2.1. Trends in Total Maintenance Sales Volume

The total maintenance sales volume in the 2016 survey of the situation in the vehicle maintenance industry (results from the 2015 fiscal year) was 5 trillion 394.4 billion yen. Table 1 compares the maintenance sales volume

generated by full-time vehicle maintenance businesses, those run as an additional business, those at dealers, and private owner-run businesses. It also compares the sales volume according to the content of the work that was performed, such as shaken vehicle inspection and maintenance, regular inspection and maintenance, collision repairs, and other maintenance (extraordinary maintenance due to a breakdown or malfunction, simple maintenance such as oil changes, voluntary inspection and maintenance requested by the vehicle's owner, re-inspection of a vehicle that has been issued a limited vehicle inspection certificate, customization services, and the like).

When the total vehicle maintenance sales are examined by business type, the maintenance sales at full-time vehicle maintenance businesses accounted for 1 trillion 975.1 billion yen, a decrease of 47.3 billion yen (2.3%) compared to the previous year. If the maintenance sales at those businesses are then broken down according to the different kinds of maintenance work, the shaken vehicle inspection and maintenance sales amounted to 914.4 billion yen, a decrease of 22.0 billion yen (2.3%) compared to the previous year. This accounted for 46.3% of the total maintenance sales. Regular inspection and maintenance sales amounted to 67.2 billion yen, a decrease of 5.6 billion yen (7.7%) compared to the previous year. This accounted for 3.4% of the total maintenance sales. Collision repairs amounted to 427.7 billion yen, a decrease of 8.1 billion yen (1.9%) compared to the previous year. This accounted for 21.4% of the total maintenance sales. Finally, other maintenance sales amounted to 570.8 billion yen, a decrease of 11.6 billion yen (2.0%) compared to the previous year. This accounted for 28.9% of the total maintenance sales at full-time vehicle maintenance businesses.

The maintenance sales at vehicle maintenance businesses run as an additional business amounted to a total of 653.4 billion yen, a decrease of 64.4 billion yen (9.0%) compared to the previous year. If the maintenance sales at those businesses are then broken down according to the different kinds of maintenance work, the shaken vehicle inspection and maintenance sales amounted to 297.9 billion yen, a decrease of 30.8 billion yen (9.4%) compared to the previous year. This accounted for 45.6% of all their maintenance sales. Regular inspection and maintenance sales amounted to 24.2 billion yen, a decrease of 0.9 billion yen (3.6%) compared to the previous year. This accounted for 3.7% of the total. Collision repairs amounted to 129.4 billion yen, a decrease of 12.7 billion yen (8.9%)

compared to the previous year. This accounted for 19.8% of the total. Finally, other maintenance sales amounted to 201.9 billion yen, a decrease of 20.0 billion yen (9.0%) compared to the previous year. This accounted for 30.9% of the total maintenance sales at vehicle maintenance businesses run as an additional business.

These results show that the maintenance sales for all types of maintenance work decreased at both full-time vehicle maintenance businesses and vehicle maintenance businesses run as an additional business.

Vehicle maintenance sales at the maintenance shops at vehicle dealers, amounted to a total of 2 trillion 535.5 billion yen. This was a small decrease of 0.9 billion yen compared to the previous year. If the maintenance sales at those shops are then broken down according to the different kinds of maintenance work, the shaken vehicle inspection and maintenance sales amounted to 806.3 billion yen, a decrease of 23.1 billion yen (2.8%) compared to the previous year. This accounted for 31.8% of all their maintenance sales. Regular inspection and maintenance sales amounted to 233.3 billion yen, an increase of 2.4 billion yen (1.0%) compared to the previous year. This accounted for 9.2% of the total.

Collision repairs amounted to 535.0 billion yen, a decrease of 2.7 billion yen (0.5%) compared to the previous year. This accounted for 21.1% of the total. Finally, other maintenance sales amounted to 960.9 billion yen, an increase of 22.5 billion yen (2.4%) compared to the previous year. This accounted for 37.9% of the total vehicle maintenance sales at the maintenance shops at vehicle dealers.

The total vehicle maintenance sales at private owner-run vehicle maintenance businesses were 230.4 billion yen. This was a decrease of 6.3 billion yen (2.7%) compared to the previous year. If the maintenance sales at those businesses are then broken down according to the different kinds of maintenance work, the shaken vehicle inspection and maintenance sales amounted to 96.0 billion yen, an increase of 1.7 billion yen (1.8%) compared to the previous year. This accounted for 41.7% of all their maintenance sales. Regular inspection and maintenance sales amounted to 15.1 billion yen, an increase of 2.1 billion yen (16.2%) compared to the previous year. This accounted for 6.6% of the total. Collision repairs amounted to 51.1 billion yen, an increase of 3.9 billion yen (8.3%) compared to the previous year. This accounted for 22.2% of the total. Finally, other maintenance sales amounted to 68.2 bil-

lion yen, a significant decrease of 14.0 billion yen (17.0%) compared to the previous year. This accounted for 29.6% of the total vehicle maintenance sales at private owner-run vehicle maintenance businesses.

The total maintenance sales volume in 2016 was 5 trillion 394.4 billion yen. When this total is broken down according to the different kinds of maintenance work that was performed, the shaken vehicle inspection and maintenance sales amounted to 2 trillion 114.6 billion yen, a decrease of 74.2 billion yen (3.4%) compared to the previous year. This accounted for 39.2% of the total maintenance sales volume. Regular inspection and maintenance sales amounted to 339.8 billion yen, a decrease of 2.0 billion yen (0.6%) compared to the previous year. This accounted for 6.3% of the total sales volume. Collision repairs amounted to 1 trillion 138.2 billion yen, a decrease of 19.6 billion yen (1.7%) compared to the previous year. This accounted for 21.1% of the total sales volume. Finally, other maintenance sales amounted to 1 trillion 801.8 billion yen, a decrease of 23.1 billion yen (1.3%) compared to the previous year. This means that other maintenance sales were 33.4% of the total maintenance sales volume.

The maintenance sales from collision repair work have decreased significantly for three years in succession and over those three years the total decrease amounts to 135.9 billion yen.

The number of traffic accidents in Japan peaked at 952,709 cases in 2004. Since then it has decreased by 453,447 cases (47.6%) down to 499,232 cases in 2016, which is about half. The progress of ASVs and other safety technologies is effectively suppressing the occurrence of accidents, and this is reflected in sales volume of vehicle collision repairs.

2.2.2. Average Number of Vehicles Serviced According to Type of Business and Work Content

The average number of vehicles brought in for maintenance service per shop during the year (2016) was 1,643. This was an increase of 38 vehicles (2.4%) from the previous year. Broken down according to the content of the work that was performed, the average number of vehicles brought in for shaken vehicle inspection and maintenance service per shop was 356. This was an increase of 6 vehicles (1.7%) from the previous year. This accounted for 21.7% of the total number of vehicles that were brought in (1,643 vehicles). The average number of vehicles brought in for regular inspection and maintenance

per shop was 239. This was an increase of 4 vehicles (1.7%) from the previous year and accounted for 14.5% of the total number of vehicles brought in. The average number of vehicles brought in for collision repairs per shop was 89. This was a decrease of 5 vehicles (5.3%) from the previous year and accounted for 5.4% of the total number of vehicles brought in. The average number of vehicles brought in for other maintenance per shop was 959, an increase of 33 vehicles (3.6%) from the previous year. This accounted for 58.4% of the total number of vehicles brought in.

Looking at the average number of vehicles brought in for maintenance per shop during the year according to the type of business, the average number of vehicles brought into full-time vehicle maintenance businesses was 804, an increase of 9 vehicles (1.1%) from the previous year. The average number of vehicles brought into maintenance shops run as an additional business was 1,248 per shop, a decrease of 4 vehicles (0.3%) from the previous year. The average number of vehicles brought into maintenance shops at dealers was 4,963 per shop, an increase of 169 vehicles (3.5%) from the previous year.

Furthermore, looking at the content of the maintenance work according to the type of business, the average number of vehicles brought into full-time vehicle maintenance businesses for shaken vehicle inspection and maintenance during the year was 275 per shop, an increase of 10 vehicles (3.8%) from the previous year. This accounted for 34.2% of all the vehicles brought into those shops for maintenance. In the same category, the average number of vehicles brought into maintenance shops run as an additional business was 330 per shop, a decrease of 7 vehicles (2.1%) from the previous year, and accounted for 26.4% of the total number of vehicles brought into those shops for maintenance. At the same time, the average number of vehicles brought into maintenance shops at dealers for shaken vehicle inspection and maintenance was 663, which was the same as the previous year. This accounted for 13.4% of all the vehicles brought into those shops for maintenance.

Next, the average number of vehicles brought into full-time vehicle maintenance businesses for regular inspection and maintenance during the year was 79 vehicles per shop, an increase of 1 vehicle (1.3%) from the previous year. This accounted for 9.8% of all the vehicles brought into those shops for maintenance. In the same category, the average number of vehicles brought into

maintenance shops run as an additional business was 97 vehicles per shop, a decrease of 7 vehicles (6.7%) from the previous year. This accounted for 7.8% of the vehicles brought into those shops for maintenance. The average number of vehicles brought into maintenance shops at dealers was 939 vehicles per shop, an increase of 28 vehicles (3.1%) from the previous year. This accounted for 18.9% of the vehicles brought into those shops for maintenance.

The average number of vehicles brought in for collision repairs during the year was 66 vehicles at the full-time vehicle maintenance businesses and this was a decrease of 4 vehicles per shop (5.7%) from the previous year. This accounted for 8.2% of all the vehicles that were brought in to those shops for maintenance service. In the same category, the average number of vehicles brought into maintenance shops run as an additional business was 69 vehicles, a decrease of 5 vehicles per shop (6.8%) from the previous year. This accounted for 5.5% of all the vehicles brought in for maintenance service. The average number of vehicles brought into maintenance shops at dealers was 189 per shop, a decrease of 8 vehicles (4.1%) from the previous year. This accounted for 3.8% of all the vehicles brought in for maintenance service.

Other maintenance accounted for the largest portion of vehicles brought in for maintenance or service. The average number of vehicles brought into full-time vehicle maintenance businesses for other maintenance was 384 per shop, an increase of 2 vehicles (0.5%) from the previous year. This accounted for 47.8% of all the vehicles brought into those shops for maintenance during the year. In the same category, the average number of vehicles brought into maintenance shops run as an additional business for other maintenance was 752 per shop, an increase of 15 vehicles (2.0%) from the previous year. This accounted for 51.4% of all the vehicles brought into those shops for maintenance. The average number of vehicles brought into maintenance shops at dealers for other maintenance was 3,172 per shop, an increase of 149 vehicles (4.9%) from the previous year. This accounted for 63.9% of all the vehicles brought into those shops for maintenance.

2.2.3. Trends in Shaken Vehicle Inspection and Regular Inspection Maintenance Fees According to Type of Business

Two-year vehicle inspections account for over three-

quarters of the shaken vehicle inspection sales volume. Comparing the unit prices of the 2-year vehicle inspection fees at the different types of businesses, the unit price at the full-time vehicle maintenance businesses was 48,971 yen, which was a decrease of 2,825 yen (5.5%) over the unit price of the previous year. The unit price at the maintenance shops run as an additional business was 53,908 yen, a significant decrease of 5,308 yen (9.0%) over the unit price of the previous year. The maintenance shops at automobile dealers were no exception to this trend, as their unit price was 70,211 yen, a decrease of 1,180 yen (1.7%) from the unit price of the previous year.

The price difference between the 2-year shaken vehicle inspection fees at full-time vehicle maintenance businesses and maintenance shops at dealers has shrunk for the past several years, but in the 2016 survey the difference once again expanded to 21,240 yen.

One-year vehicle inspections account for approximately three-quarters of the regular inspection and maintenance sales volume. Comparing the average unit prices of the 1-year regular inspections at the different types of businesses, the average unit price at the full-time vehicle maintenance businesses was 20,035 yen according to the 2012 survey. This price exhibited a rising trend in both the 2013 and 2014 surveys, but the average unit price according to the 2015 survey was 20,973 yen, and in 2016 it was 18,616 yen, decreasing by 2,357 yen (11.2%) compared to the previous year. This is a significant drop to below the 20,000 yen level.

The average unit price of a one-year vehicle inspection at the maintenance shops run as an additional business was 16,266 yen according to the 2012 survey. It rose to 18,087 yen according to the 2013 survey and this rising trend has continued until the 2016 survey, in which the unit price was 18,866 yen, an increase of 61 yen (0.3%) compared to the previous year. The average unit price of a one-year vehicle inspection at the maintenance shops at dealers was 18,208 yen according to the 2012 survey, after which it fell into the 17,000 yen range. In the 2016 survey it was 17,777 yen, a decrease of 119 yen (0.7%) compared to the previous year.

2.3. Maintenance Technical Information and Promotion of ICT Usage

JASPA began operating the FAINES Internet-based vehicle maintenance technical information subscription service in 1998. At the end of 2016 the number of FAINES subscribers had reached 33,646 businesses, an

increase of 515 (1.2%) from the previous year. In July 2016 the system was updated to improve its search functionality.

The average number of times that FAINES was used per month has increased every year, from approximately 450,000 times in 2011, to about 900,000 times in 2016.

The number of times that FAINES was used each month per business was 24 times a month in 2011, and had increased to 27 times a month in 2016.

The types of information accessible via FAINES that were used most often each month are as follows: the "Maintenance manual information", which was accessed most often at 340,000 times a month, followed by the "Vehicle maintenance standard work points table", accessed 330,000 times a month, and then the "Service data", accessed 100,000 times a month, and finally the "Examples of breakdown repairs and maintenance advice", accessed 90,000 times a month. There is a lot of recorded information for older model years that have been in use for many years, so the number of registered cases in the "Examples of breakdown repairs" has grown steadily over time, and the information is viewed very frequently.

The types of information that FAINES provides and the data stored in its system are as follows: (1) Maintenance manual information: 1,371 pieces of data, 584 vehicle models (last year: 1,297 pieces of data and 557 models), (2) Vehicle maintenance standard work points table: 5,341 pieces of data from the 1995 to the 2015 versions (last year: 5,189 pieces of data), (3) Examples of breakdown repairs and maintenance advice: 6,390 pieces of data (last year: 5,838 pieces of data), (4) Vehicle data (sampling data) from registered vehicles equipped with OBD, mainly vehicles compatible with J-OBD II: 209 pieces of data (last year: 209 pieces of data), (5) Technical information: 1,686 pieces of data (last year: 1,609 pieces of data), (6) Service data, which until last year was called "Service data for Japanese and imported vehicles", (main specification values and inspection standard values for vehicles, engines, and chassis, etc.): 3,191 pieces of data (last year: 2,959 pieces of data), (7) Guidelines for timing belt changes: 76 pieces of data (last year: 76 pieces of data), (8) New technologies for vehicle maintenance: 660 pieces of data (last year: 601 pieces of data), (9) Fuel injection system troubleshooting manual: 338 pieces of data (last year: 338 pieces of data), (10) List of applicable tire rims (updated to the latest version in conjunction with publication of

new service data): 1 piece of data, (11) Illustrated manual for chassis number and power unit model stamping positions, and the like: 184 pieces of data (last year: 184 pieces of data), and (12) List of tire additional capability correspondence tables, and the like (every year, information from the previous year is updated as the latest version): 1 piece of data.

The “Maintenance manual information” provides information on 584 vehicle models (1,371 pieces of data) and covers approximately 90% of all vehicles that owned and on the road in Japan since 1995.

In August 2006, JASPA began operating an illegal parking fee delinquent vehicle information inquiry system that allows vehicle maintenance personnel to confirm the illegal parking fee payment status of a vehicle that has been brought in for a shaken vehicle inspection. By the end of 2016, some 36,095 maintenance shops (23,484 full-time vehicle maintenance businesses and vehicle maintenance businesses run as an additional business, as well as 12,611 maintenance shops at vehicle dealers) had registered to use this system. During that same year, 1,555,494 queries were entered into the system. The system is used constantly and there are hundreds of thousands of inquiries every month. In fact, from the start of operations until March 2017 there have been a total of 15,748,255 queries entered into the system (7,462,787 inquiries from full-time vehicle maintenance businesses and vehicle maintenance businesses run as an additional business, and 8,285,468 inquiries from maintenance shops at vehicle dealers).

As part of the environmental conservation measures being pursued by the vehicle maintenance industry, JASPA also operates an environmental budgeting system to help reduce the amount of CO₂ emissions associated with the vehicle maintenance industry. The maintenance businesses that register with the system input the amount of energy used in each registered shop, calculate the amount of CO₂ emissions, and then utilize this information to implement improvements in working environments and methods to reduce emissions. In 2016, some 2,522 vehicle maintenance businesses are cooperating with a survey of the amount of CO₂ emissions and are using this same system to carry out the survey and reduce emissions.

The automobile maintenance industry has decided to introduce a one-stop service (OSS) for shaken renewal inspections in an effort to improve the efficiency of the rel-

evant inspection work, and is now considering various issues and attendant measures to allow operations to begin in April 2017. At the same time, the industry also intends to design and build a new service system that will digitize and register the certificates of compliance with Japanese Safety Regulations for Road Vehicles. To test the connection between this system and related systems, as well as perform certificate information processing work, an application to register as a registration information processing organization was filed with MLIT, and they were registered as such on March 31, 2017.

3 Inspection and Maintenance System Trends

Vehicle Inspections

In 2016 the total number of shaken renewal inspections (using materials from MLIT, the National Agency for Automobile and Land Transport Technology (NALTEC), and the Light Motor Vehicle Inspection Organization (LMVIO)) according to the data collated by MLIT and LMVIO was 32,993,837 cases, an increase of 685,658 cases (2.1%) compared to 2015. This is the second year in a row that shaken renewal inspections have increased.

The total number of registered vehicles and mini-vehicles specified to receive maintenance was 23,965,673, an increase of 746,457 vehicles (3.2%) compared to 2015. The specified maintenance rate rose by 0.8% from the previous year to 72.7%.

Closer analysis of the data for registered vehicles collated by NALTEC shows that the number of registered vehicles subjected to a shaken renewal inspection was 21,336,343, an increase of 466,598 vehicles (2.2%) compared to 2015. The number of registered vehicles specified to receive maintenance was 16,156,043 and the specified maintenance rate increased by 0.6% from the previous year to 75.7%.

In 2016, the number of inspections conducted by NALTEC at inspection centers throughout Japan to assess compliance with the Japanese Safety Regulations for Road Vehicles (total number of new inspections, shaken renewal inspections, structural change inspections, and re-inspections) was 6,965,987. This was an increase of 35,715 inspections (0.5%) compared to 2015.

The number of on-street inspections was 121,077, an increase of 9,716 (8.7%) compared to 2015.

The breakdown of the number of the different types of inspections indicates that there were 1,050,104 new in-

spections (including preliminary inspections), an increase of 23,259 (2.3%) compared to 2015. The number of shaken renewal inspections was 5,180,300, a decrease of 23,154 (0.4%) compared to 2015. The number of structural change inspections was 65,121, an increase of 1,366 (2.1%) compared to 2015.

There were 670,462 re-inspections in 2016, an increase of 34,244 (5.4%) compared to 2015. This means that the number of re-inspections increased for the first time in 11 years since 2005.

The number of inspections that were performed at NALTEC inspection centers reached its peak at 8.79 million in 2005, the third year after the former National Agency of Vehicle Inspection started these inspections. However, it fell below 8 million inspections in 2008, and by 2014 the number of inspections had fallen to less than 7 million.

Examining the data for mini-vehicle inspections reveals that there were 11,648,205 shaken renewal inspections, an increase of 299,771 (1.8%) compared to 2015. The number of shaken renewal inspections for mini-vehicles first exceeded 10 million in 2010 and it continued to increase from then until a decrease in 2014. Despite this, the number of such inspections started to increase again in 2015 and now exceeds 11 million.

The number of mini-vehicles specified to receive maintenance was 7,809,630 and the specified maintenance rate was 67.0%, an increase of 1.0% from the previous year. The specified maintenance rate for mini-vehicles has risen by approximately 5% over the past 9 years.

The number of vehicles brought into LMVIO for a shaken renewal inspection was 3,838,575. This total consisted of 2,712,488 vehicles brought in by maintenance personnel, and 1,126,086 vehicles brought in by the owner for vehicle inspection and maintenance.

4 Machine Tools

Every year at the end of July, the Japan Automotive Service Equipment Association examines and announces the actual results of the automotive machine tool sales from the previous fiscal year. The latest announced machine tool sales are those from fiscal year 2015 (from April 2015 to March 2016).

In 2015, total automotive machine tool sales amounted to 105 billion 583.41 million yen, an increase of 3 billion 383.64 million yen (3.9%) compared to the previous fiscal year. This is the third year in a row that the total sale of

automotive machine tools has exceeded 100 billion yen.

This recent increase in the amount of automotive machine tool sales is attributed to several factors, including the replacement of headlight testers due to the partial revision of the examination standards for automobile headlights, the utilization of the tax system to promote investment in equipment and facilities to improve productivity, the use of government subsidies to purchase more energy-efficient equipment, as well as automobile dealers and other shops investing in their facilities by purchasing lifts, jacks, presses, inspection equipment, vehicle washing equipment, and servicing equipment for batteries and air-conditioners.

The sales results for scanning tools show that in 2011, slightly fewer than 56,000 tools were sold at an average unit price of 39,000 yen. In 2012 sales dropped to 31,984 tools and the average unit price rose to 65,000 yen. In 2013 the sales volume was 22,530 tools at an average price of 141,000 yen. In 2014 the sales volume was 13,239 tools and the average unit price was 131,000 yen, while in 2015 the sales volume was 12,435 tools at an average unit price of 141,705 yen. Clearly, the number of units sold has continued to decrease, but the price has risen by approximately 10,000 yen.

The sales volume of the scanning tool diagnostic software was 27,963 units, an increase of 62.8% compared to the previous year. The amount of sales revenue also increased to 358.17 million yen, an increase of 28.2%.

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