Topsector Logistiek

Users and deployment of delivery vans in the Netherlands

Connekt

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MANAGEMENT SUMMARY

The delivery van is the workhorse of both companies and the self-employed within the Dutch economy. And with good reason: it is a multifunctional and flexible mode of transport and compared to (smaller) trucks and cars it is also cheap to buy and use. Moreover, a drivering license B is sufficient to drive a delivery van, which means that many people in the Netherlands can use such a vehicle. All of these are reasons why the Netherlands has more than 923,000 delivery vans, or roughly 1 delivery van per 9 working Dutchman. However, in the Netherlands relatively little is known about the deployment of delivery vans compared to other modes of transportation.

This prompted Connekt to ask a consortium of five organizations to map out the situation concerning delivery vans in the Netherlands. The most important data on delivery vans in the Netherlands are public and available through several sources, such as RDW (Netherlands Vehicle Authority), CBS (Statistics Netherlands) and RAI (automotive industry association). However, other data are often not publicly accessible because of privacy concerns. By gathering insights through additional research and combining these with the available data sources, it is possible to provide a better overview of the current characteristics and uses of delivery vans.

Objective

The objective of this research is to broadly map out the fleet of delivery vans in the Netherlands, identify developments that have taken place in recent years, and establish how Dutch companies and the self-employed use delivery vans for their daily activities. Specific attention is given to the question of how different types of delivery vans (based on age and size) are deployed for different activities. An important objective derived from this research is to assess the veracity of a number of 'myths' that exist in the Netherlands concerning (the deployment of) delivery vans.

Types of vans

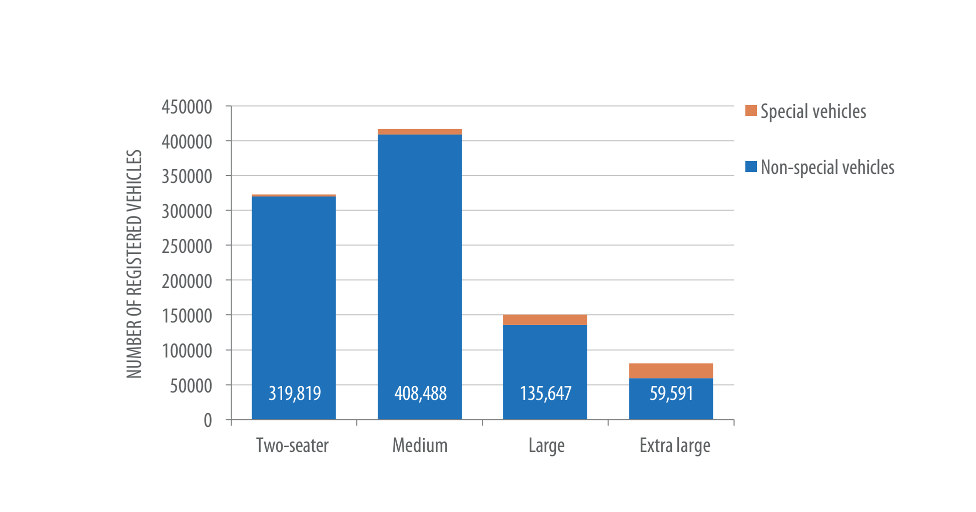
Delivery vans come in all shapes and sizes. What they have in common is, by definition, a maximum permitted total weight (kerb weight plus load capacity) of 3,500 kilograms.

There are four main categories:

1. The 'two-seater': this is the smallest vehicle, with space for a maximum of two people, a kerb weight under 1,500 kilograms and a load capacity of around 700 kilograms;
2. The medium-sized van, with a kerb weight of between 1,500 and 2,000 kilograms and a load capacity of around 1,000 kilograms;
3. The large van, with a kerb weight of between 2,000 and 2,500 kilograms and a load capacity of around 1,000 kilograms. However, the load volume of these vans is higher;
4. The extra-large delivery van, with a kerb weight of between 2,500 and 3,000 kilograms and a reduced load capacity of around 700 kilograms, to prevent exceeding the 3,500 kilograms limit. However, the load volume of these vans is the highest.

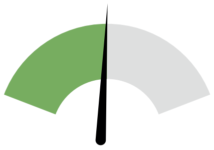
Figure MS 1 shows how many vans have been registered in different categories. The group 'special vehicles' is included separately, since these vehicles are not in the scope of this research and will not be further explored. This category comprises camper vans, ambulances and hearses, for example. Of the more than 923,000 registered vans, over 47,000 belong to this category. Over 876,000 vans were therefore analyzed.

Figure MS 1:
Number of registered vans, subdivided into four categories - source: RDW



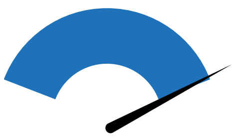
Myths surrounding the van

During the research various assumptions about the deployment of vans emerged. Several of these assumptions were researched as 'myths', after which the myth was either debunked or confirmed. The following 6 myths were assessed:



This partly confirms Myth 1

1 Vans are used mainly for logistic activities: In total 35%-50% of all vans are used for goods logistics. Over half of all vans are deployed in the construction and trade sectors, although a large proportion of these do not fall within the area of goods logistics as defined above, but are used for servicing work that involves carrying tools, for example. The remaining use of vans is mainly service-related (27%-40%) or relates to deployment for passenger transport or private use (about 24%).



This confirms Myth 2

2 The total number of registered vans is increasing: After declining for many years, the number of vans has been increasing again since 2015. The decrease was caused by, among other things, the discontinuation of the 'grey license plate' (which granted private individuals a discount on purchase and vehicle tax) and the economic recession after 2009. Recent economic growth has resulted in an increase of the number of newly registered vans (e.g. due to catch-up investments). The total size of the van fleet has therefore increased accordingly. In 2016, over 70,000 vans were sold in the Netherlands, while only around 56,000 were sold in 2015. This 20% increase in van sales in 2016 was the highest in the European Union. From the interviews conducted it appears, among other things, that professional transporters on the road are increasingly using vans for reasons linked to costs, flexibility and the availability of drivers (B license is sufficient).

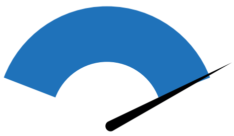
This **partly confirms** Myth 3

3 Old vans are the biggest polluters in the city: As shown in the table below, vans are responsible for 12% of all kilometers driven, but contribute disproportionately to air pollution, accounting for 24% and 34% of NO_x and particulate emissions (from exhausts) respectively. Taken together, cars cause more air pollution, but also drive much further distances than vans. Per driven kilometer, emissions from cars are therefore significantly lower. Trucks are responsible for just a small proportion of the kilometers driven in the city. The average emissions per driven kilometer are, however, significantly higher than those of vans, which means their contribution to air pollution is also disproportionately large.

Table 1:
Contribution of different categories of vehicles to kilometers driven and air-polluting emissions in the city.

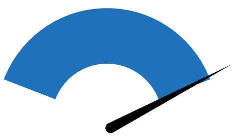
	Kilometers driven	NO_x-emissions	PM_{10}-emissions
Cars	85%	36%	45%
Vans	12%	24%	34%
Trucks	2%	29%	11%
Other	1%	11%	10%

4 Environmental zones for vans mainly affect small entrepreneurs: Small entrepreneurs drive relatively older vehicles in comparison with larger businesses (section 4.4.2). As environmental zones are used to repulse old vehicles from a certain geographical area (e.g. inner cities), a relatively large proportion of small entrepreneurs are affected. For example, 46% of vans belonging to small businesses (1 employee) fall within the Euro 3 or an older category (a typical minimum requirement for an environmental zone). For large businesses (>100 employees) that share is only 13%.



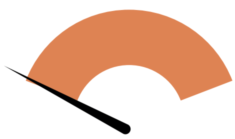
This **confirms** Myth 4

5 On average, vans are increasing in size: The number of vans increased in 2015 and 2016 due to a rise in new sales. In the annual publication 'Mobiliteit in cijfers' (or 'Mobility quantified') by the RAI Association, the total van fleet is divided into City Vans (compact vans), Standard Vans and Large Vans. Next to it, pick-Ups and PC Vans (Jeeps) are categorized separately. Between 2012 and 2016, the number of City Vans rose by 0.9%, the number of Standard Vans by 3.3% and the number of Large Vans by 8.3%. However, the number of Pick-Ups increased the most, by over 36% between 2012 and 2016. These pick-up trucks are used by landscapers and roadworkers, but also by utility companies and public authorities for inspection activities that involve driving on unpaved ground.



This **confirms** Myth 5

6 The growth of e-commerce has doubled the number of vans: The analysis shows that approximately 15,000 to 25,000 vans are currently involved in the delivery of internet orders. This is about 1.8% to 3.2% of the total number of vans in the Netherlands. The average annual mileage of these vehicles is about 50% higher than the average of all vans. Their share in the kilometers driven by vans therefore amounts to 2.6% to 4.6%. In recent years, the online ordering of products has grown by 15% to 20% per year in the Netherlands. This has resulted in a gradual increase in the number of vans deployed for deliveries, although this growth does not even represent a whole percentage point of the entire van fleet per year. A doubling of e-commerce activities will therefore not lead to an exponential increase in the number of registered vans, nor in the number of kilometers driven.



This **debunks** Myth 6

Other research results

The research has also yielded a number of other notable results:

- Vans have a significantly longer life expectancy than trucks and diesel cars - up to approximately 20 years. The average age is around 9.3 years.
- The average annual mileage declines with age: new vans drive an average of 35,000 km/year, while 20-year-old vans drive around 11,000 km/year.
- Old vans drive significantly more kilometers outside of working hours (40% or more) than new vans (approximately 20%). Especially in the weekend they are used relatively often.
- Vans are especially active in the morning rush hour, particularly vans that are used in the construction industry.
- More than half of the vans (approximately 54%) are deployed by companies in the 'construction' and 'trade' sectors.
- The average annual mileage is similar to that of cars, with 80% at or under 30,000 km/year and 95% under 40,000 km/year.
- Annual mileage is heavily dependent on the deployment of the van. 25% of vans has a low annual mileage and is responsible for as many driven kilometers as the category that drives the most, which makes up only 3.2% of the total number of vans. 1% of vans drives more than 65,000 km/year, or 250 kilometers per working day. Generally speaking, these are light to medium-sized, new vehicles (<3 years). These frequent road users are present in different business sectors, although the 'transport and storage' sector is strongly overrepresented.
- Approximately 11% of vans are not registered to a company (registration with Chamber of Commerce, incl. self-employed). These are generally older vans.
- Older vans are responsible for a relatively large share of air pollution: 8% of the kilometers driven by vans (Euro 0-2) account for 9% of the NO_x and 40% of the particulate emissions of vans.
- Vans are responsible for approximately 14% of CO_2 emissions of Dutch vehicles (transport of persons and freight), and approximately 35% of CO_2 emissions of logistic traffic (including inland shipping).
- In the case of vans, between the Euro 1 and Euro 6 engine classes NO_x emissions have hardly declined, although particulate emissions have decreased keenly.
- Engine technology for heavy goods vehicles (Euro VI or better) has advanced at a faster rate, in terms of reducing particulate/NO_x emissions, than it has for diesel cars or diesel vans. The most modern heavy goods vehicles emit the same quantity of or less (!) NO_x per driven kilometer than a modern Euro 6 van. A heavy truck carries a load 12 to 15 times that of a van. This means that per unit of weight transported (ton/km), a heavy truck (Euro VI or better) emits far less particulate matter than a Euro 6 van.

1 Introduction

The delivery van is the workhorse of companies and the self-employed within the Dutch economy. It is not just small and medium-sized enterprises that are enthusiastic users of vans, but also large enterprises and private individuals. And not without reason: it is a multifunctional and flexible mode of transport and compared to (smaller) trucks and cars it is also cheap to buy and use. Moreover, a driving license B is sufficient to drive a delivery van, which means that many people in the Netherlands can use such a vehicle. Trucks require a license B, which incurs extra costs and means that fewer people can drive them. All of these are reasons why, according to the RDW database, more than 923,000 vans are in use in the Netherlands. This means approximately 1 delivery van per 9 working Dutch people.

However, in the Netherlands relatively little is known about the use of vans compared to other modes of transportation. Up to now, reliable data on the deployment and ownership of these modes of transportation has only been available to a limited extent. This lack of information has given rise to a number of persistent myths surrounding the use of vans in the Netherlands. In order to formulate an appropriate policy for the effective and sustainable use of vans in the future, an overview of facts and data is useful. This prompted Connekt to ask five agencies to combine available information on vans from different sources and to summarize it in order to gain a clear insight into the current situation. The result of this collective research is presented in this report.

1.1 Reasoning

In the Netherlands, alongside trucks vans are used to a large extent for the transport of goods, people and materials. The van is a good alternative for the truck for smaller shipments in particular, being a mode of transportation that is relatively cheap to use and flexible and reliable to deploy. This flexible deployment makes the van a popular choice, but it also has a downside. Besides their contribution to congestion, vans make a significant contribution to the emission of greenhouse gases (CO_2). Furthermore, vans mainly run on diesel and have a relatively long lifespan compared to other diesel road vehicles. Because of this, vans contribute substantially to the emission of environmentally harmful substances such as nitrogen oxides (NO_x) and particulates (PM_{10}). The question is what else is known about the van fleet and the deployment of these vehicles.

The most important data on the number of vans are public and available through several sources, such as RDW, CBS and RAI. One important source is RDW's license plate database. This mainly contains technical details about the vehicle, such as the kerb weight and manufacturing year. Additional information about the holder/owner and the user of the vehicle is known from other sources, such as the Chamber of Commerce and Tax and Customs Administration, but is not publicly accessible because of privacy concerns. For details on the daily use of vans, additional research is therefore often needed, because these data are not sufficiently available for public use from any source. By gathering insights through additional research and combining these with the available data sources, it is possible to acquire greater knowledge of the current characteristics and uses of delivery vans.

1.2 Objective

The objective of this research is to broadly map out the current characteristics of the Dutch van fleet, identify developments that have taken place in recent years, and establish how Dutch companies and the self-employed use delivery vans for their daily activities.

In this context, we pay specific attention to the question of how different types of vans (based on size and age) are deployed for different activities. An important objective derived from this research is to assess the veracity of a number of 'myths' that exist in the Netherlands concerning (the deployment of) delivery vans.

1.3 Method

The research has been approached from two angles:

- **Top down:** the focus on a quantitative analysis of the number and characteristics of vans in the Netherlands, using various larger databases.
- **Bottom up:** a qualitative approach involving discussions with van users. As part of this research, discussions were held with important parties within various categories (sectors). The experiences of these users were subsequently generalized so that statements could be made about larger groups of van users.

The results of both angles have been integrated into this report to achieve a single picture of the users and deployment of vans in the Netherlands.

1.4 Types of delivery van

Delivery vans come in all shapes and sizes. What they have in common is, by definition, a maximum permitted total weight (kerb weight plus load capacity) of 3,500 kilograms. Annex A explains what is understood by a delivery van. Vehicles with a higher permitted total weight are categorized as light trucks and were left out of this research.

Vans in the category 'special vehicles' also fall outside the scope of this study. These include camper vans, ambulances and hearses, for example. Of the more than 923,000 registered vans, over 47,000 belong to this category. Over 876,000 vans were therefore analyzed.

Within this study we distinguish between four main categories of vans. The most important difference between the categories is the vehicle's kerb weight.

The main categories are:

1 The 'two-seater': this is the smallest vehicle, with space for a maximum of two people, a kerb weight under 1,500 kilograms and a load capacity of around 700 kilograms;
2 The medium-sized van, with a kerb weight of between 1,500 and 2,000 kilograms and a load capacity of around 1,000 kilograms;
3 The large van, with a kerb weight of between 2,000 and 2,500 kilograms and a load capacity of around 1,000 kilograms. However, the load volume of these vans is higher;
4 The extra-large delivery van, with a kerb weight of between 2,500 and 3,000 kilograms and a reduced load capacity of around 700 kilograms, to prevent exceeding the 3,500 kilograms limit. However, the load volume of these vans is the highest.

These four main categories of vans are explained in more detail below:

1 The 'two-seater'

The lightest version of the van is the so-called 'two-seater'. As the name indicates, this type of vehicle has room for two persons (see Figure 1). Additionally, it has limited space for transporting goods.
The kerb weight of this kind of van is up to 1,500 kilograms. This kerb weight was therefore taken as the limit below which all vans belong to the category of two-seaters. The average kerb weight is 1,250 kilograms and the load capacity is around 700 kilograms. With over 316,000 vehicles, this is the second largest group within the category of delivery vans.

Figure 1:
Example of a two-seater

2 The medium-sized van

The medium-sized van is somewhat larger and heavier than the two-seater. Vans with a kerb weight between 1,500 and 2,000 kilograms belong to this category. The average kerb weight is around 1,800 kilograms and the load capacity is 1,000 kilograms. Considering the high average load capacity in kilograms of the medium-sized van and the load volume below the maximum possible level, this type of vehicle is mainly used to transport heavier goods with not too large a volume.
With around 400,000 active vans registered in this category, it is the largest group.

Figure 2:
Example of a medium-sized van

3 The large van

'Large vans' are defined as vehicles with a kerb weight between 2,000 and 2,500 kilograms. The average kerb weight amounts to around 2,200 kilograms. Because the maximum allowed weight including load is also higher, the load capacity (the difference between maximum mass and kerb weight) is around 1,000 kilograms. This is roughly equal to that of medium-sized vans. However, the load volume is larger.

It is therefore not surprising that these vehicles are mainly used to transport goods for which the volume of the goods is more of a limiting factor than their weight. Vans with a so-called double cabin also fall within this category. The double cabin offers space for three extra passengers, although this is at the expense of load capacity.

The number of vehicles that fall within this category amounts to roughly 121,000. Within the field of commercial use, 'trade' is the most important user of these vehicles.

Figure 3:
Example of a large van

4 The extra-large van

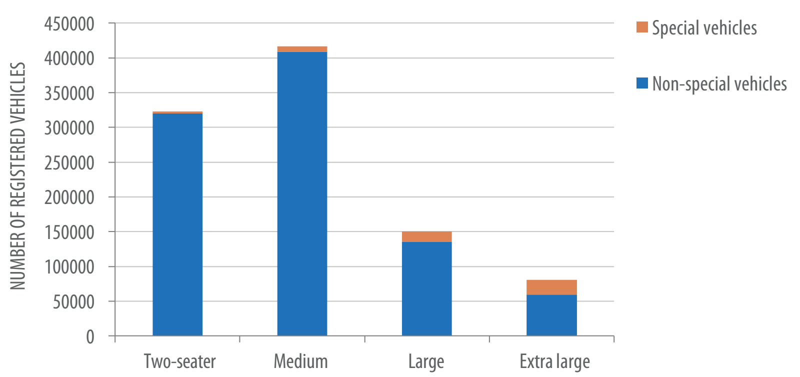
The 'extra-large' van category is characterized by a very high kerb weight and relatively limited load capacity. Many of the vehicles in this category are so-called 'scaled-down' vehicles. In fact these are light trucks, but the legally (technically) permitted total weight has been scaled down to under 3,500 kilograms. Because of this, these vehicles can be driven by holders of a license B instead of the license C that is mandatory for light trucks. This scaling down results in a low load capacity, as a light truck has a higher kerb weight than a (large) van. The average kerb weight of these extra-large vans is around 2,800 kilograms. This results in a (lower) maximum load capacity of around 700 kilograms.

In the Netherlands, a group of 38,000 of these types of vehicles are registered. They are mainly used to transport goods (and perform services) for which the weight of the load is not the main factor. Examples include furniture and white and brown goods. These types of vehicles are also often hired privately, e.g. for moving house.

Figure 4:
Example of a scaled-down van

Figure 5 shows the number of registered vans for each category. The group 'special vehicles' is shown separately. As mentioned earlier, these vans were not included in the rest of the analysis.

Figure 5:
Number of registered vans, subdivided into four categories - source: RDW



1.5 Structure of the report

Chapter 2 focuses on the quantitative and qualitative information sources used for this research.

In chapter 3 a number of 'myths' surrounding vans are analyzed and either confirmed or debunked on the basis of the information found. In some cases, the argumentation is elaborated on in the chapters that follow.

Chapter 4 offers some deeper analysis and insights into the make-up of the overall van fleet. This includes, among other things, data on vehicle numbers, fuel types, total CO_2 emissions and the size of companies that deploy vans.

Chapter 5 takes a closer look at the two economic sectors that deploy the most vans, 'construction' and 'trade'.

Finally, in chapter 6, some trends and developments are discussed. The subjects covered in this chapter include:

- **Load capacity:** What are the consequences of changing the maximum total weight limit?
- **Electric vans:** Are these a viable transport alternative or not?
- **Costs:** What influence do they have on the purchasing decision?
- **E-commerce:** What percentage of vans are deployed for e-commerce?

2 Databases and interviews

This chapter will provide an overview of the sources of the qualitative and quantitative data used for this study. The sources are described in sections 2.1 and 2.2 respectively. The combination of quantitative and qualitative data delivers additional insights, as described in section 2.3.

2.1 Databases of CBS, RDW and the KvK

There are three sources of quantitative information on the number of vans and how they are deployed in the Netherlands. This information has been made available by RDW, KvK (Chamber of Commerce) and CBS through databases. These databases contain data that was collected in various ways, which explains why they cannot be easily incorporated into a single database.

RDW Database

An important data source is the RDW's database containing details of all the vans which were registered in the Netherlands during the past nine years. This reveals that on June 1, 2016, 923,000 vans were registered at RDW, of which 47,000 were special vehicles. Among other things, this database contains technical information on the vehicles, such as the vehicle's weight and fuel types (see annex B).

KvK Database

Where possible, the RDW database has been enriched with data from the KvK about the user and the company's activities, such as the KvK number (see annex D). The KvK number is only available for 38% percent of the vans in the RDW database. These are mainly vans up to four years old. The KvK database can therefore only be used for a limited number of analyses.

CBS Database

The CBS database is the third important source. This database offers more information on how different types of vans are deployed for various business activities. It provides an insight into the distribution of vans that is not revealed by the RDW and KvK databases. The following information about the vehicle and its owner and/or user is available from the CBS database:

- ownership (business or private);
- the legal form;
- the different sectors and company activities according to the Standard Industrial Classification (Standaard Bedrijfsindeling or SBI, a system developed by CBS);
- The size of the company (based on the number of employees).

In the CBS database, 89% of the vans have their business activity registered, a considerably higher proportion than in the RDW database. Data concerning business activities in the CBS database relate to the user and not the owner, in contrast to the RDW data. This is important because 20% to 25% of all vans are leased. Business information on lease vehicles in the CBS database therefore concerns the user and not the lease company.

Due to privacy concerns, this CBS information could not be made available for every individual registered vehicle. Consequently, registered vehicles were categorized into 25 clusters based on a number of vehicle characteristics (for example mass, mileage and number of seats). For these categories, the data could be made available at an aggregated level. More information concerning this can be found in annex F.

As mentioned in section 1.4, the assumed number of vans for the purposes of this analysis was 876,000. CBS takes a figure of 828,000 as a basis for its own analyses. This difference results from the fact that CBS does not take into account vans that are part of a stock-in-trade, while this study does include those vans.

Other data used besides the RDW, KvK and CBS databases

This study also used provisional data from a survey carried out by CBS, co-commissioned by the Netherlands Institute of Transport Policy Analysis (KiM). The survey was sent to 32,000 van owners who together own 38,000 vans and who are representative of the van population. The survey contained questions about the use of the van, with subjects such as the time of deployment, the place of use, transported weight and type of goods. At the time of this research the CBS survey had not yet been completed. For the purposes of this study, CBS made a file available containing provisional results in which the data could not be traced back to individual businesses. The provisional results of the survey are based on 14,171 license plate responses. Later this year the definitive results will be published by CBS and the KiM, based on the complete survey results.

The analyses in this report are based directly on the answers from the survey and have not been weighted according to the size of certain target groups. CBS will, however, apply this national weighting to the definitive results. There may also be some outliers within the answers (if these have not yet been removed), for which a correction will be made in the definitive results. The definitive results of CBS and KiM may therefore deviate from the results in this study in certain areas. CBS and KiM will publish details of the design and justification of the survey data in due course.

Cost information, such as the current market value and the derived depreciation, taxes and fuel costs, has been calculated for vans, in part by compiling a separate database. This was done by reading out data from a website on which second-hand vans are sold. Depreciation curves were estimated based on the asking prices, age, annual mileage, size category and make of the van.

Finally, fleet-scan data were used (more information on these scans is available in annex J). For this, license plates of passing vehicles were registered on different types of roads at multiple locations in the Netherlands over several consecutive days. Vehicle characteristics were then added based on the RDW database. After this enrichment of the data the license plates were removed to safeguard privacy. The data gathered in this way offers an insight into where and when various types of vans are deployed for different business activities.

Using the above data sources, a project database was created that served as a basis for the analyses in this report.

2.2 Interviews

Besides using quantitative sources, for the purposes of this research interviews were also conducted with a large number of industry organizations and market participants that use vans.

The interviews were held to gain a greater insight into the deployment of vans within the logistic process of companies and into developments in the use of vans. The interviews were also used to enrich the project database that was created (see section 2.1.) with vehicle data and journey information of individual companies. Various companies have given us together with their licensep late data a detailed insight into the number of vans that they manage and the way these vans are used in practice. The files made available contain data on 50 to 1,000 vans under management. In total, 47 parties were interviewed, spread over different market segments. One or more representatives from each market segment (shippers, transporters or industry organizations) were approached for an interview. The top 5 market segments in which interviews were conducted are shown in Table 2.

Table 2:
Top 5 market segments in which individual representatives were interviewed

Market segment	Number of interviews
Self-employed	12
mail and parcel transport	4
Construction companies	4
Municipalities	3
Retail companies	2

Annex L contains a complete overview of interviewed parties, organized by market segment/SBI code. Information from the interviews has been incorporated into this report. As the interviews may contain competitively sensitive information, the content of the results has been anonymized in this report.

During the interviews the following subjects were discussed (see annex J for the exact interview format):

1 **Description of logistic process and supply chain:** typical deployment of the vehicle, load and capacity utilization, deployment according to location and time, number of journeys and stops, (motivation for) type of vehicle and body;
2 **Quantitative information on the use of vans:** number of kilometers on an annual basis, fuel consumption, average age, license information, transportation data;
3 **Developments or potential improvements in van use:** most important trends on the market, urgent problems/challenges in relation to use, use optimization, innovative initiatives.

In addition to their specific use, businesses were also asked about any trends and developments they have identified concerning vans. For this section representatives of industry organizations were also interviewed. They were specifically asked about the importance of the van for their members and target group, and the most important trends and developments they have identified in their sector. Additionally, manufacturers of vans were also interviewed. They were mainly asked about the decision-making behavior of their customers (which vehicle and why) and the most important developments in the market.

The interviews were analyzed by schematically summarizing the discussions on each subject. The results of this analysis were used as input for this study.

In the following chapters the interview results have been used to further elucidate or illustrate the conclusions that resulted from the database (see section 2.1). As such they add depth and show why, for example, certain types of vehicles are used and for what purpose. This will be clarified in the following section. Because only a limited number of interviews were conducted with parties from various industries, the results are not necessarily representative of the sector in question.

2.3 Added value of databases and interviews

The compiled project database contains information gathered about the entire fleet of vans in the Netherlands, the characteristics of this fleet, and data concerning owners and users. Additionally, analyses of van use were carried out using data from an ongoing CBS survey and license plate scans. The interviews conducted for this study provide an insight into the logistic deployment of vans and the considerations and choices of businesses. The database and user data, combined with interviews with companies from different sectors, can be used to answer knowledge-, policy- and strategy-related questions. These questions may be linked to a sector (for example the use of vans in the 'construction', 'trade', or 'industry' sectors), a theme (for example opportunities for adopting new technologies) or even specific issues for a location or region. Moreover, the information is used to assess a number of 'myths' surrounding the deployment and use of vans.

Combining information from the project database with knowledge and experience from the field obtained through interviews offers added value when it comes to providing answers. The survey data and interviews offer practical clarification of the 'hard data' from the database. Besides potentially clarifying these data, the interviews also add certain nuances that are not evident from the data analysis.

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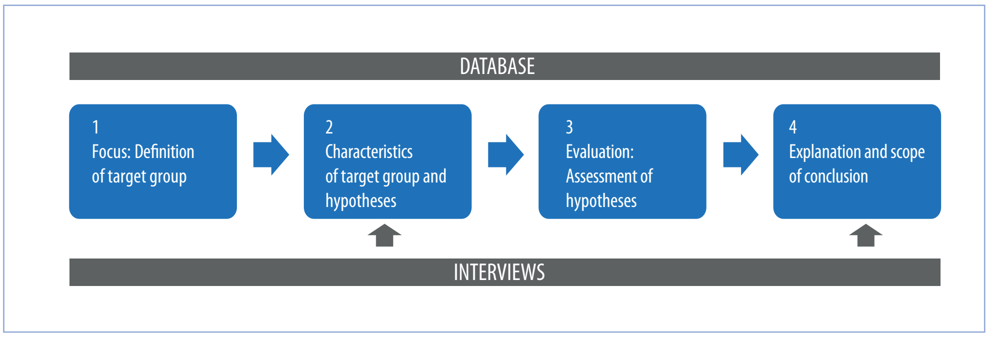
Figure 6 shows how this interaction between the project database and interviews has been structured as part of the approach to this study.

Figure 6:
Interaction between database and interviews



3 Myths surrounding the delivery van

During the project, multiple van users and industry representatives were interviewed. These discussions revealed various preconceptions about the deployment and use of vans. A selection of these is presented below. The preconceptions were posited as 'myths' and subsequently confirmed or debunked. The reliability with which these myths can be confirmed or debunked varies. In some cases a judgement follows from the data that was gathered for this project, while in others the data does not provide a final answer and the judgement is based on the interviews or an expert opinion by the researchers. A further explanation of (the argumentation behind) the myths is included in chapters 4 and 5.

The following myths were assessed:

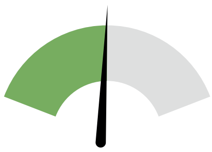
1 Vans are used mainly for logistic activities
2 The total number of registered vans is increasing
3 Old vans are the biggest polluters in the city
4 Environmental zones for vans mainly affect small entrepreneurs
5 On average, vans are increasing in size
6 The growth of e-commerce has doubled the number of vans

Myth 1 — Vans are used mainly for logistic activities

In order to assess this myth, goods logistics was defined as the commercial use of vans for the transport of goods, materials and parts (including construction materials). Vans that are mainly deployed for other activities, such as the transport of tools, generators, machines and other resources, fall outside the definition of goods transport.

Based on the CBS survey (see section 4.6.3) we can conclude that 22% of vans are used for postal and goods transport. Additionally, 53% are deployed for construction and servicing activities, for which it can be assumed that 25%-50% also participate in goods logistics (see annex N). Thus, the total share of vans deployed for goods logistics comes out at 35%-50%. Other uses of vans are mainly service-related (27%-40%) or concern passenger transport or private use (approximately 24%).

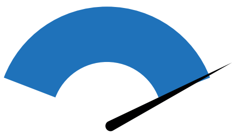
Within the above classification goods logistics accounts for the largest share.



Based on the data, this myth is therefore partly confirmed

Myth 2 — The total number of registered vans is increasing

After years of decline, the number of vans has been rising again since 2015. This decline was caused by, among other things, the repealing of the fiscal advantages of a 'grey license plate' (which granted private individuals a discount on purchase and vehicle tax) and the economic recession after 2009. Recent economic growth has seen the number of newly registered vans rise markedly (e.g. due to catch-up investments). The total size of the van fleet has therefore increased accordingly. From the interviews conducted it appears, among other things, that professional road transporters are increasingly using vans for reasons linked to costs, flexibility and the availability of drivers (license B is sufficient).



Based on the data and interviews, this myth is therefore confirmed

Myth 3

Old vans are the biggest polluters in the city

Motor vehicles emit various air pollutants, such as nitrogen oxides (NO_x) and particulates (PM_{10}). Key parameters that determine air-polluting emissions are:

- **Age:** the emission requirements set for new vehicles are becoming increasingly strict. Partly as a result of this, particulate emissions of modern vehicles are considerably lower than those of comparable older vehicles. The reduction of NO_x emissions is lagging behind, however, particularly in the case of cars and vans.
- **Fuel type:** diesel vehicles typically emit more air pollutants than petrol or gas vehicles.
- **Weight**: heavy vehicles generally emit more than equivalent lighter vehicles.
- **The number of kilometers driven in the city:** vehicles that are frequently on the road contribute more.

Generally speaking, heavy older diesel vehicles with high mileage therefore emit relatively more pollutants.
As shown in Table 3, vans are responsible for about 12% of the driven kilometers and contribute disproportionately to air pollution, accounting for 24% and 34% of NO_x- and particulate emissions (from exhausts) respectively. Taken together, cars cause more air pollution, but also drive much further distances than vans. Per driven kilometer, emissions from cars are therefore significantly lower.

Trucks are responsible for just a small proportion of the kilometers driven in the city. The average emissions per driven kilometer are, however, significantly higher than those of vans, which means their contribution to air pollution is also disproportionately large.
In the case of modern (Euro VI) heavy goods vehicles, however, emissions per driven kilometer are comparable with those of modern vans. This is explained in more detail in section 4.4.5.

Based on the data, this myth is therefore partly confirmed

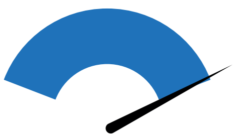
Table 3:
Contribution of different vehicle categories to driven kilometers and air-polluting emissions in the city.

	Kilometers driven	NO_x-emissions	PM_{10}-emissions
Car	85%	36%	45%
Van	12%	24%	34%
Truck	2%	29%	11%
Other	1%	11%	10%

Myth 4:

Environmental zones for vans mainly affect small entrepreneurs

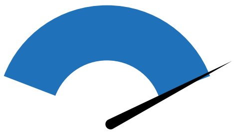
Small entrepreneurs drive relatively older vehicles in comparison with larger businesses (section 4.4.2). As environmental zones are used to bar old vehicles from a certain geographical area (e.g. inner cities), a relatively large proportion of small entrepreneurs are affected. For example, 46% of vans belonging to small businesses (1 employee) fall within the Euro 3 or an older category (a typical minimum requirement for an environmental zone). For large businesses (>100 employees) that share is only 13%.



Based on the data, this myth is therefore confirmed

Myth 5: On average, vans are increasing in size

The number of vans increased in 2015 and 2016 due to a rise in new sales. In the annual publication 'Mobiliteit in cijfers' (or 'Mobility quantified') by the RAI Association, the total van fleet is divided into City Vans (compact vans), Standard Vans and Large Vans. Next to it, pick-Ups and PC Vans (Jeeps) are categorized separately. Between 2012 and 2016, the number of City Vans rose by 0.9%, the number of Standard Vans by 3.3% and the number of Large Vans by 8.3%. However, the number of Pick-Ups increased the most, by over 36% between 2012 and 2016. These pick-up trucks are used by landscapers and roadworkers, but also by utility companies and public authorities for inspection activities that involve driving on unpaved ground.



Based on the data, this myth is therefore confirmed

Myth 6: The growth of e-commerce has doubled the number of vans

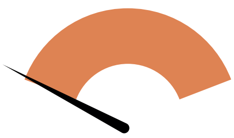
The number of vans deployed for internet deliveries was determined using two different methods:

- **top-down:** how many vehicles have been registered with CBS by companies involved in the delivery of parcels?
- **bottom-up:** how many vans are needed to deliver the 208 million orders that were placed in 2015 according to ACM?

Both analyses reveal that approximately 15,000 to 25,000 vans are currently involved in the delivery of parcels (see section 6.4 for more information). This is approximately 1.8% to 3.2% of the total number of vans registered in the Netherlands. The two largest parcel delivery companies (PostNL and DHL) collectively own around 3,300 vans, or 11% to 22% of the vans deployed for parcel deliveries.

Additionally, analysis has shown that the average annual mileage of these vehicles is around 50% higher than the average of all vans. Their share in the kilometers driven by vans therefore amounts to 2.6% to 4.6%.

In recent years, the online ordering of products has grown by 15% to 20% per year in the Netherlands. This has resulted in a gradual increase in the number of vans deployed for deliveries, although this growth does not even represent a whole percentage point of the entire van fleet per year. A doubling of e-commerce activities therefore will not lead to an exponential increase in the number of registered vans, nor in the number of kilometers driven.



Based on the data, this myth is therefore debunked

4 Delivery vans in the Netherlands

At the start of 2016, there were around 876,000 vans in the Netherlands, of which roughly 48,000 were registered as stock-in-trade. This amounts to 828,000 active vans. After an earlier decline, the number of vans has clearly increased from 2015 onwards. In 2016, over 70,000 vans were sold in the Netherlands, while only around 56,000 were sold in 2015. This 20% increase in van sales in 2016 was the highest in the European Union. Vans account for a 14% share of the emissions of Dutch road traffic as a whole and a 33% share of the CO2 emissions of logistic traffic in the Netherlands[1].

Around 30% of vans are owned by companies with one employee. These vans have a higher average age and therefore a lower Euro class. Around 46% of vans owned by small companies (one employee) and 71% of vans owned by private individuals fall within Euro class 3 or older.

The emission of air pollutants such as NO_x and particulates (PM_{10}) depends on the Euro class of the van. De PM_{10}-emissions have been reduced by more than a factor of 9 since the introduction of the Euro 1 norm in 1994. NO_x-emissions of vans have not decreased substantially, despite the tightening of emissions requirements. On the other hand, NO_x-emissions of trucks have fallen sharply following the implementation of the Euro VI legislation.

Vans are deployed in various sectors. More than half of vans (around 54%) are used by companies in the 'construction' and 'trade' sectors. License plate scans reveal that vans are mostly driven during the early-morning or early-evening rush hour.

The surveys conducted for this study reveal that vans are clearly also used for purposes other than goods transport, construction transport and the transportation of mail and parcels. A large number of kilometers are also driven for servicing activities (around 35%) and private purposes (around 20%). The load factor (in weight, not volume) of vans varies, but is generally higher for larger vans. On average, vans are mainly used for regional and local deliveries and activities.

4.1Scope of the chapter

This chapter provides an overview of the total van fleet in the Netherlands. This fleet is described in terms of the number of vans, average kilometers driven and CO_2-emissions. The purpose of this chapter is to offer an insight into how the current van fleet is used in the Netherlands, on the basis of these terms, and to describe relevant developments. The chapter begins with a section in which the size and development of the fleet is described and the van is placed in the broader context of road traffic. It will then move on to analyze the following aspects of vans:

- Description of the fleet;
- Ownership and users of vans;
- Logistic characteristics of vans.

[1] *Van traffic and goods transport by road, rail and inland shipping. Shipping by sea and air are not included.*

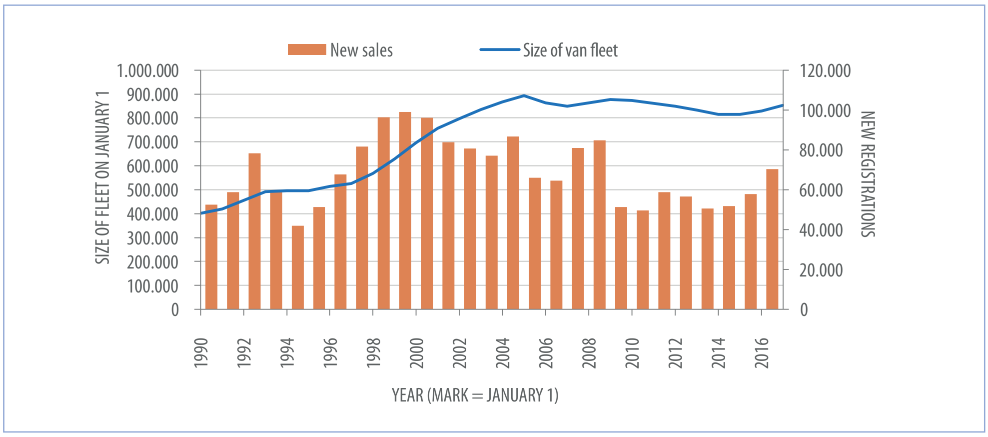
The analyses in this chapter are based on the compiled project database and interviews, as explained in the previous chapter. In addition to these data, CBS-Statline and BOVAG-RAI data have been used to illustrate developments within the fleet.

4.2 Size of the delivery van fleet

The number of registered vans increased considerably over the 1997-2005 period from around 500,000 to almost 900,000 (see Figure 7). This is largely due to the 100,000 or so new vans that were registered each year between 1998 and 2000. After 2004, the 'grey license plate' was discontinued, along with the associated fiscal advantages for private individuals (discount on purchase and vehicle tax). To continue to benefit from these advantages, many new vans were registered in 2004. In 2005, the number of new registrations therefore declined sharply, leading to stagnation in the total number of vans.

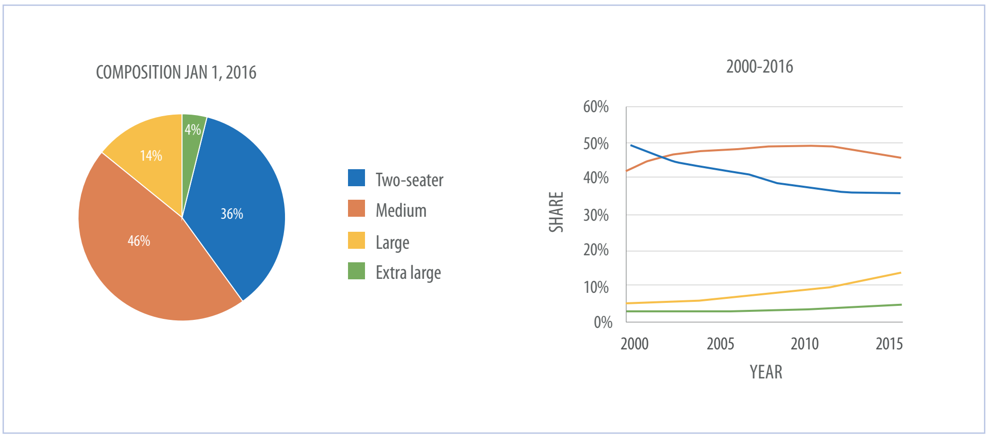
In 2007 and 2008 this effect had waned and the market for new vans improved again. During the economic crisis (2009 to 2014), the number of new registrations was so low that the fleet even shrank slightly. Since 2015, however, the number of vans has been rising again and the van fleet experienced considerable growth in 2016, increasing by 24,000 active vehicles (CBS-Statline).

Figure 7:
Development of the number of vans registered in the Netherlands during the 1990-2016 period - source: Statline, supplemented with older CBS data from 'Mobiliteit in Cijfers Auto's 2016 - 2017' ('Mobility Quantified for Cars 2016-2017'),Stichting BOVAG-RAI Mobiliteit



The van fleet is dominated by two-seaters (36%) and medium-sized vans (46%) (see Figure 8). Large vans (14%) and extra large vans (4%) account for a smaller share, although this has increased considerably over the last couple of years, while the share of two-seaters and medium-sized vans has decreased. The number of large vans has increased by a factor of three over the 2000-2016 period and the number of extra large vans by a factor of 2.

Figure 8:
Composition of Dutch van fleet on January 1, 2016 - source: project database and Statline



4.3 The contribution of vans to traffic, logistics and emissions

Dutch vans account for 9% of the total Dutch vehicle fleet. In 2015, these vans drove almost 16.6 billion kilometers in total (source: CBS), or 13% of the road-vehicle kilometers driven in the Netherlands.

They emitted around 14% of the CO_2 emissions from road vehicles (see Figure 9A). The share of NO_x and particulate emissions (from exhausts) was considerably higher at 22% and 39% respectively.

Vans are therefore driven slightly more than the average road vehicle and have roughly the average CO_2 emissions per driven kilometer. NO_x and particulate emissions per driven kilometer are relatively high.

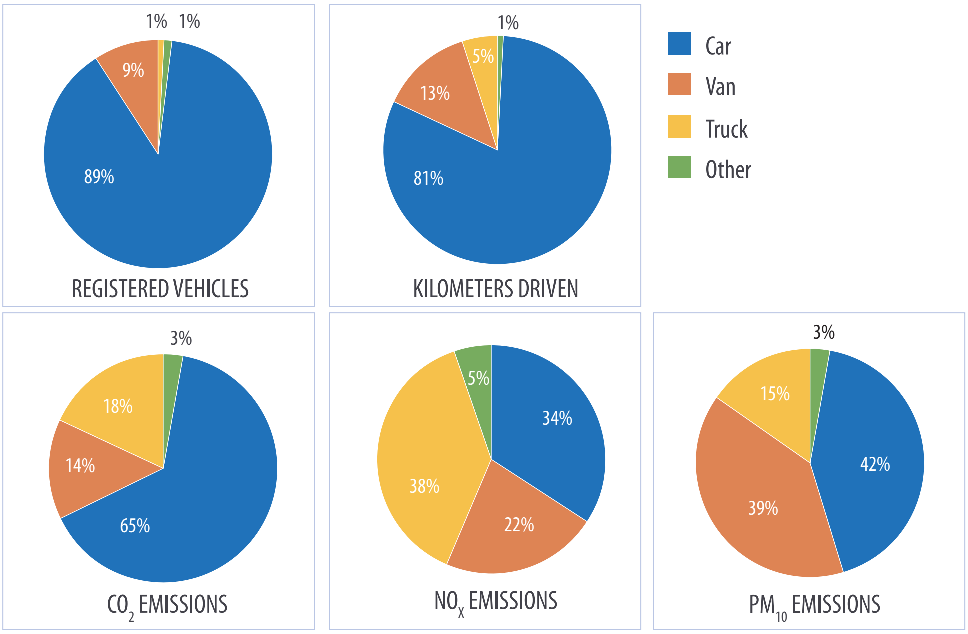


Figure 9B:
Share of delivery vans in road traffic CO_2 emission in the Netherlands in 2015 - source CBS Statline/TNO

Vans deployed for business purposes (excluding private individuals) emit approximately 3,650 tons of CO_2 per year (CE Delft 2016)[2]. These emissions amount to 33% of the CO_2 emissions of domestic logistic transport[3] (see Figure 9B). Servicing and other van activities are also considered to be part of logistic transport, in addition to goods transport.

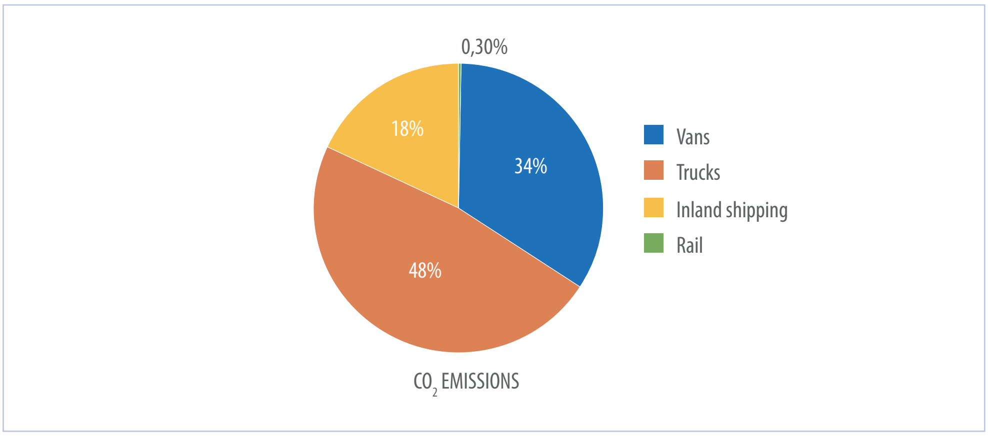


Figure 9B:
Share of vans in the CO_2 emissions of road and logistic transport in the Netherlands in 2015 - source: Share of road transport: CBS-Statline, Share of logistic transport: CE Delft 2016[2]

[2] *Segmentation of CO_2 emissions of goods transport in the Netherlands, CE Delft 2016; private vans (approximately 10%) are not included.*

[3] *Van traffic and goods transport by road, rail and inland shipping. Shipping by sea and air are not included.*

4.4 Technical characteristics of the delivery van fleet

In this section the fleet is described on the basis of a number of technical characteristics known to RDW. These are the fuel type, weight, age, mileage and CO_2-emissions.

4.4.1 Types of fuel

The vast majority of all vans in the Netherlands (96%) run on diesel. Petrol (2%) and LPG (1%) account for the second and third largest shares. The share of CNG (0.2%), electricity (<0.1%) and other fuels is currently extremely limited. Vehicles more than 40 years old mainly run on petrol and to a lesser extent LPG. Moreover, petrol vans are mostly found in the two-seater category, where they represent a share of 6%, while LPG vans are relatively more common in the large (3.3% of large vans) and extra large (6% of scaled-down vans) van categories.

4.4.2 Vehicle weight and load capacity

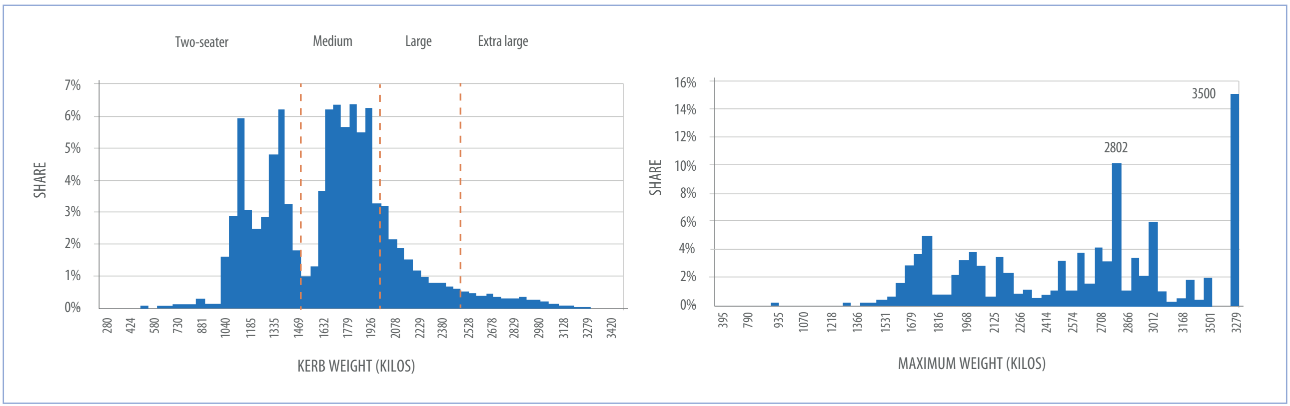
Kerb weight

Figure 10 (left) shows that the kerb weight of vans varies between 700 and 3,300 kilograms. Two-seaters (up to 1,500 kilograms) form a clearly demarcated group when it comes to kerb weight, while there is no clear demarcation for medium-sized (1,500-2,000 kilograms), large (2,000-2,500 kilograms) and extra large vans (>2,500 kilograms). As described earlier, medium-sized vans account for a large share of the fleet, especially those with kerb weights between 1,600 and 2,000 kilograms. In the case of two-seaters, peaks can be observed for vans with weights around 1,130 kilograms and 1,370 kilograms.

Maximum permitted weight

The maximum permitted weight of the vehicle is the sum of the kerb weight and the maximum load. The histogram of the maximum weight (grouped into 50 kilograms categories) reveals that the weight mainly varies between 1,500 and 3,500 kilograms (the maximum weight for a van). In the histogram peaks can be seen at 2,800 kilograms and 3,500 kilograms. Many vans are probably aligned to 2,800 kilograms because this is the maximum weight up to which no tachograph is required in Germany[4]. The other peak (130,000 vehicles) can be seen at the maximum permitted weight for vans.

Figure 10:
Technical characteristics of the van fleet - source: project database

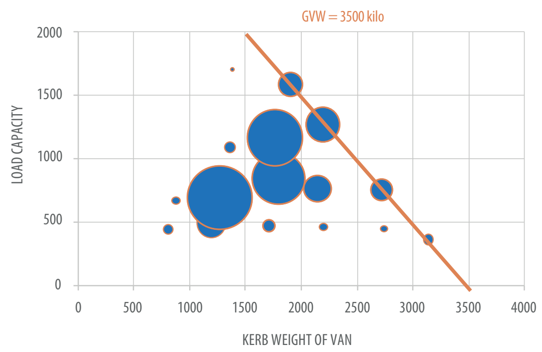


[4] *www.evo.nl/site/bestelauto-en-de-tachograaf*

Relationship between kerb weight and load capacity

Figure 11 provides an overview of the combinations of kerb weight and load capacity for vans. It clearly shows that many different combinations are possible. For the two-seater (<1,500 kilograms kerb weight), the load capacity is largely between 500 and 1,000 kilograms (average 700). There are no two-seaters for which the load capacity is limited by the 3,500 kilograms maximum permitted weight limit for vans (see red line: kerb weight + load capacity = 3,500 kilograms). However, this is limited in the case of larger vans and the share to which this applies predictably increases as kerb weight increases. The load capacity (in kilograms) decreases for extra large vans.

Figure 11: Number of vehicles by kerb weight and load capacity (the size of the circle indicates the number of vehicles grouped per 500 kilograms on the basis of load capacity and kerb weight) - source: project database



From the interviews it appears that there is a correlation between the type of van and its use. Two examples:

- From interviews with parcel transporters it appears that the time of deployment and load volume in particular are limiting factors, especially in urban areas. The available weight generally plays a secondary role. Extra large vans are therefore often used in parcel distribution;
- Load capacity is important for vans in the construction sector. In their interviews builders said that because of the need to transport tools, consumables and so forth, and the specific design of the loading space, the load capacity is often fully utilized. Medium-sized and large vans therefore account for a large share within the construction sector.

4.4.3 Age

The histogram on the right below indicates the share within the van fleet for each one-year age class (based on the composition of the fleet as at January 1, 2016). Vehicles from 0 to 12 years old are strongly represented within the fleet. On average the share of older age categories is decreasing slightly (with the exception of some outliers representing popular years of manufacture). From the age of 12 up to around 20 the share declines more sharply. The total share of vehicles older than 25 years is around 3%.

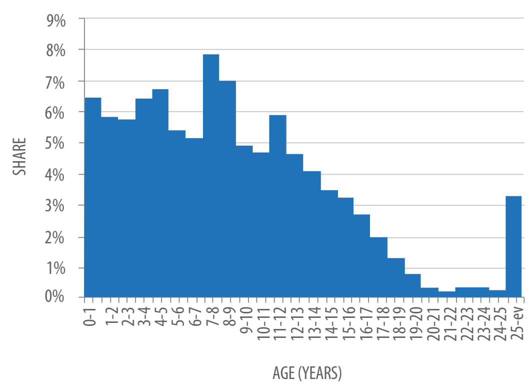
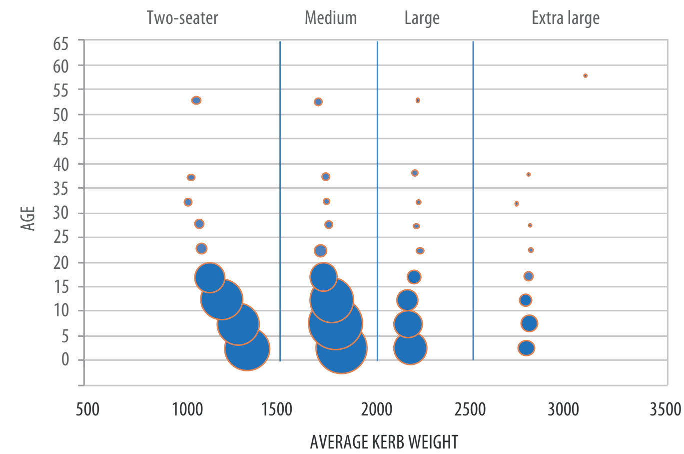


Figure 12 shows an overview of the van fleet by age class (intervals of 5 years) and size class. It reveals that the average weight of two-seaters has increased over the years. This trend is comparable with that in the area of cars. In the case of heavier vans the average weight is roughly the same for the various age classes.

Figure 12:
Composition by age class and size class - source: project database



The difference in age between the van categories is limited; two-seaters and extra large vehicles are on average slightly older (10 years) than medium-sized (9 years) and large (8 years) vans (see Figure 15 in the following section).

4.4.4 Annual mileage

The average mileage of vans is around 20,800 kilometers per year. However, vans are deployed in various ways, resulting in a considerable spread between vans (see Figure 13). For example, a group comprising 25% of vans with low annual mileage covers the same distance as the 3.2% of vans that are most frequently on the road. 1% of vans drive more than 65,000 km/year, or 250 kilometers per working day. These frequent road users are generally small to medium-sized, new vehicles (<3 years). Vans with such high annual mileage are used in different business sectors, although the 'transport and storage' sector is significantly overrepresented.

Figure 13:
Spread of annual mileage and contribution to total van mileage - source: project database

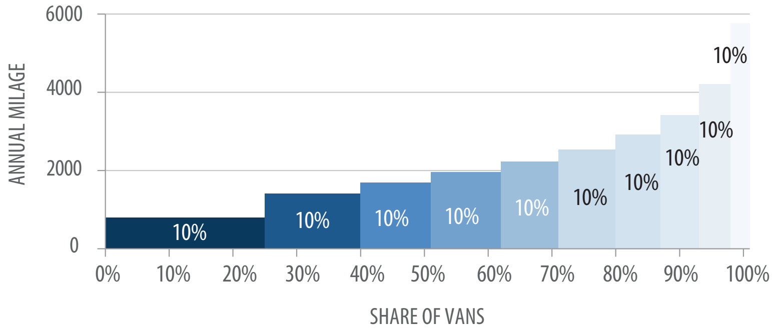
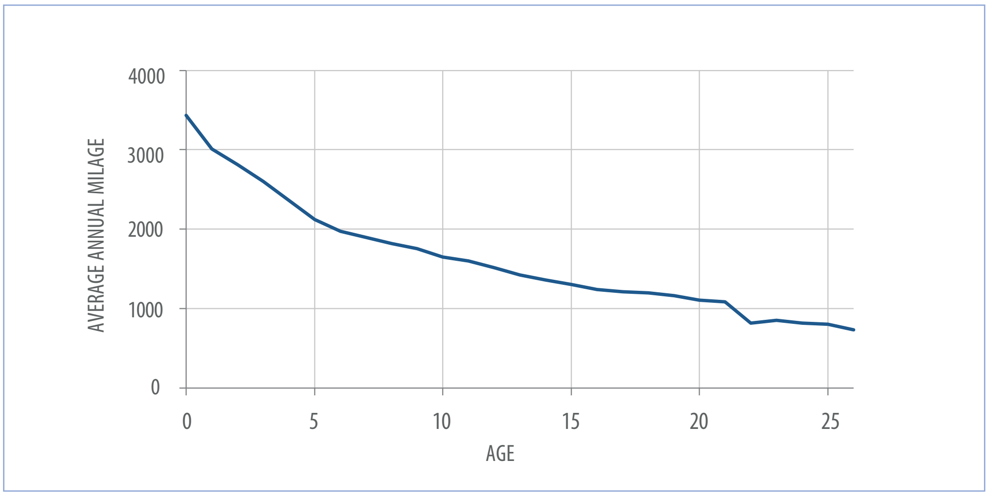


Figure 14 shows the relationship between age and annual mileage. The annual mileage of very new vehicles is relatively high and on average lies at around 35,000 kilometers per year. As the age of the vehicles increases, the annual mileage quickly declines. 5-year-old vehicles have an average annual mileage of 20,000 kilometers per year. For vehicles older than 5 years, the annual mileage declines more gradually. When vans reach 20 years, they drive on average only 11,000 kilometers per year.

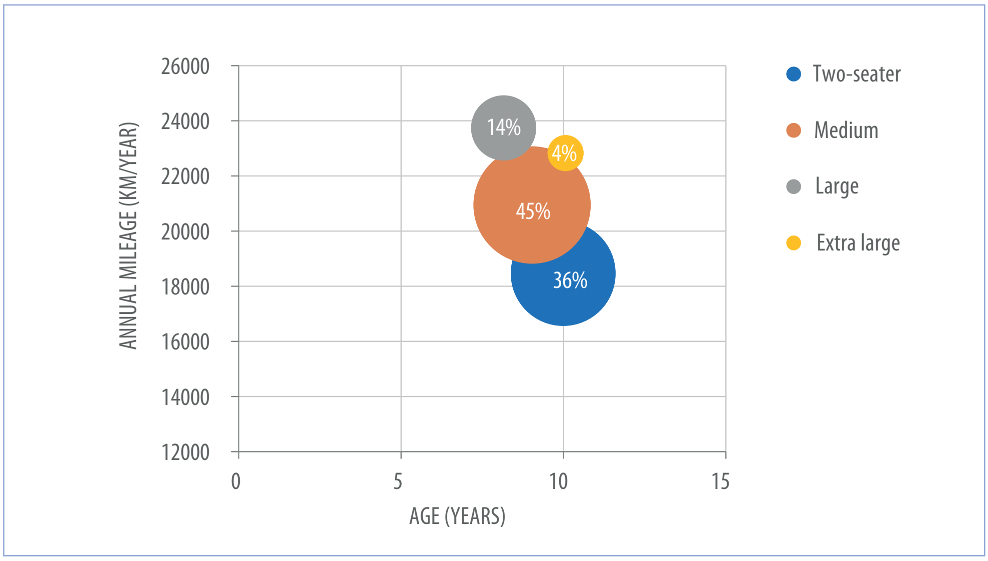
Figure 14:
Correlation between age and annual mileage (Source: project database)



Size class and annual mileage

Analysis of the distance covered annually by vans also reveals that the annual mileage increases slightly with the size class. Only in the case of extra large vans is the annual mileage somewhat lower, being roughly the same as that of large vans. On average, large vans cover 30% more kilometers than two-seaters.

Figure 15:
Average annual mileage and age per type of van - source: project database



As explained above, there is a significant spread in terms of annual mileage. This is also true within the different van categories. The greatest spread is seen within the categories of large and extra-large vans. Further analysis shows that large and extra large vans are deployed by diverse user groups.

Two examples:

- From interviews with logistics services providers it appears that the annual mileage of large vans often amounts to around 50,000 km. Outliers of up to 75,000 km are regularly encountered. Logistics services providers increasingly have a fleet of vans alongside their truck fleet. Vans offer added value for the (national) distribution of smaller consignments;
- Large vans used by parcel transporters often cover fewer kilometers per year. The increase in sorting hubs means that fewer 'last mile' kilometers need to be driven. Short inter-drop distances (distance between two consecutive stops) also result in a reduction in kilometers traveled. The parcel transporters interviewed indicate annual mileages of between 10,000 and 15,000 km.

4.4.5 Emissions

CO_2 emissions

The CO_2 emission factor of vans varies from 120 to 400 grams per kilometer. The pattern in the histogram is similar to that for kerb weight. This is because there is a correlation between CO_2 emissions and kerb weight.

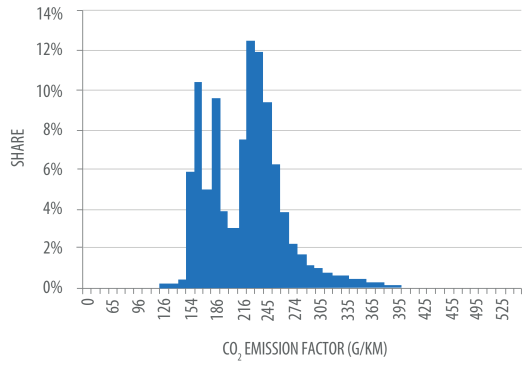
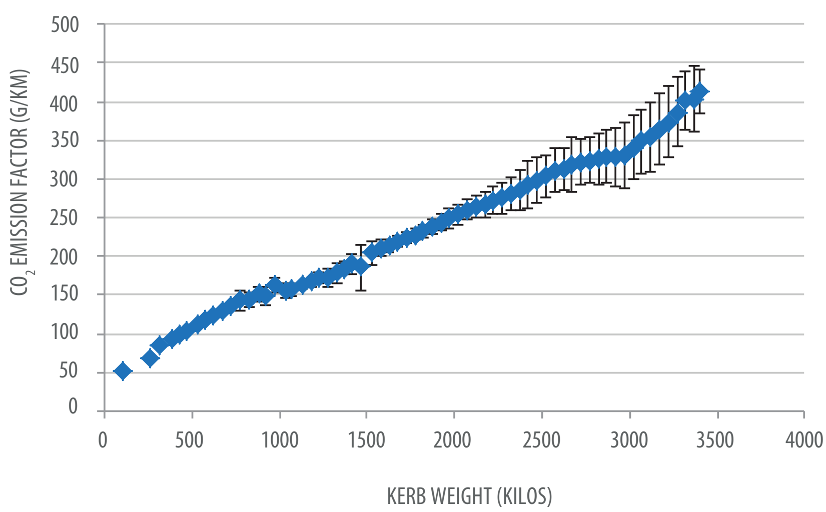


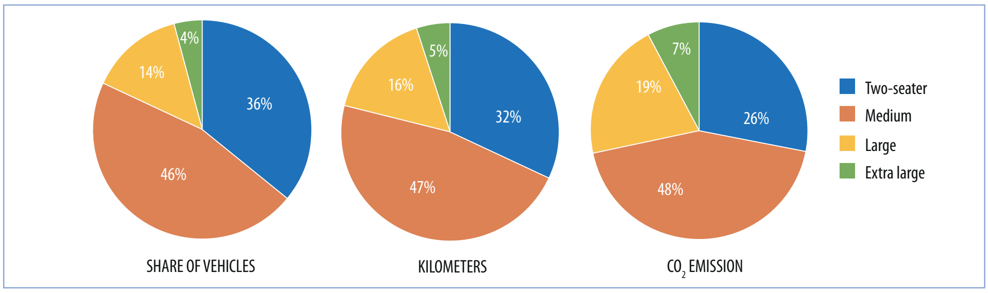
Figure 16 reveals a strong correlation between the kerb weight and CO_2 emissions of vans. However, as kerb weight increases, so too does the variation in CO_2 emissions. This can be explained by, among other things, the differences in height and design that apply to heavier vehicles.

Figure 16:
Correlation between CO_2 emissions and kerb weight (bandwidth indicates standard deviation) - source: project database



The consequence of the difference in CO_2 emissions is that two-seaters, which represent 36% of the fleet, account for 26% of CO_2 emissions. Large and extra-large vans represent 18% of the fleet, but are responsible for 26% of CO_2 emissions as well. This is illustrated in Figure 17.

Figure 17:
Share in vehicle numbers, kilometers and CO_2 emissions by class size



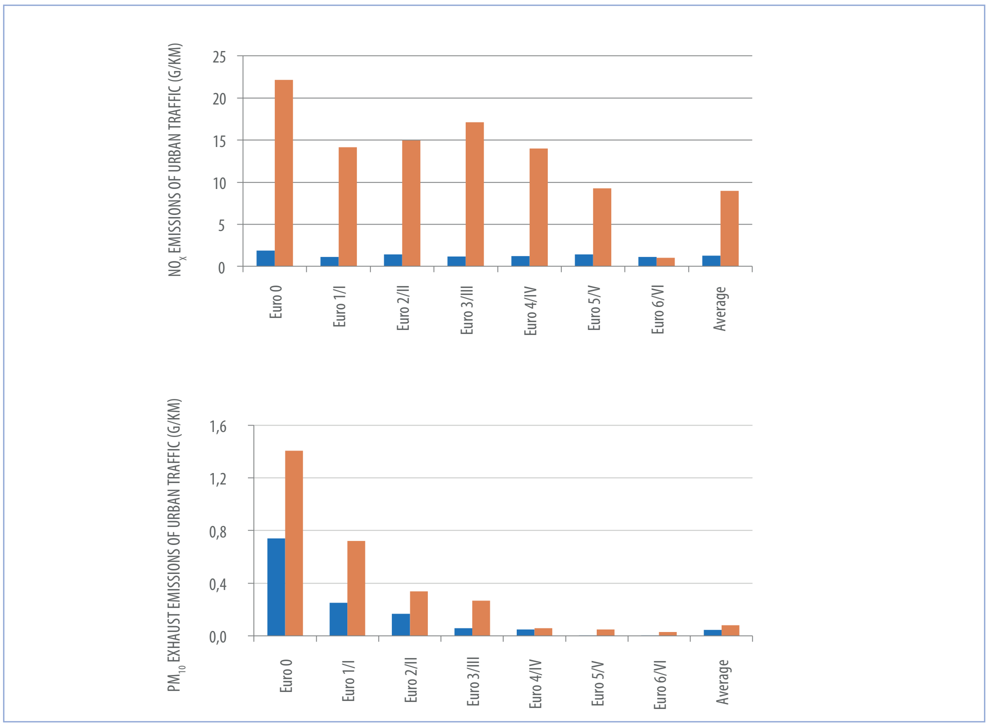
Air-polluting emissions and Euro class (age)

The emission of air pollutants such as NO_x and particulates (PM_{10}) is mainly a problem in urban areas. This analysis therefore focused on these areas.

Since the early 90s, the emission norms (also called Euro norms) for new vans have been tightened on several occasions (Euro 0 is old, Euro 6 is new). The figure below shows that the PM_{10} exhaust emissions per kilometer for new vehicles have decreased by more than 95% since the introduction of the Euro 1 norm in 1994. A similar development can be seen in other vehicle categories, such as heavy goods vehicles.

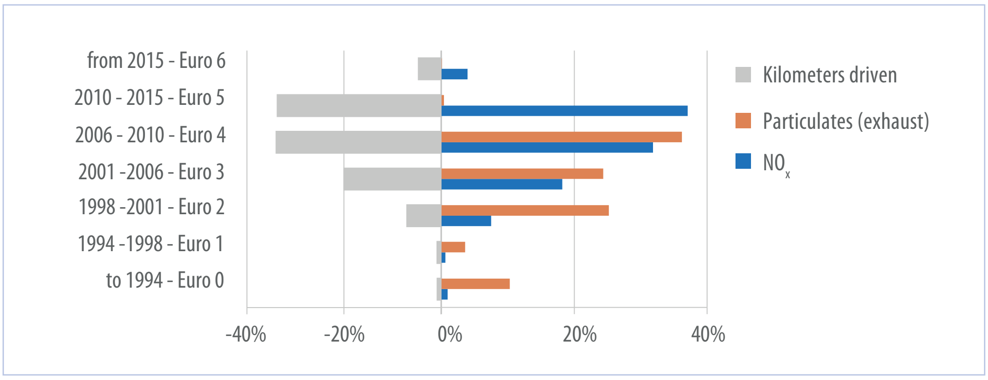
The NO_x emissions of vans have not declined significantly, despite the tightening of emission requirements. The same applies to cars with diesel engines. On the other hand, the NO_x emissions of trucks have decreased by more than 90% following the introduction of Euro VI legislation. As a result, the NO_x emissions of modern trucks and vans are almost the same per kilometer driven.

Figure 18:
average NO_x and PM_{10} exhaust emissions of vans and heavy goods vehicles for different Euro classes - source: TNO



Most of the kilometers driven within built-up areas are currently accounted for by Euro 4 and Euro 5 vans, both of which have a 34% share. However, due to the application of soot filters, among other things, the contribution of Euro 5 vans to total PM_{10} exhaust emissions is negligible, while that of Euro 4 vans is 36%. Vans older than Euro 4 in particular contribute disproportionately to PM_{10} exhaust emissions. For example, Euro 0 and Euro 2 vans only cover 8.2% of the kilometers, but are responsible for around 39% of the PM_{10} exhaust emissions (see table below). The relative contributions to NO_x emissions of the different Euro classes follow the classes' contributions to driven kilometers, because there is almost no difference in the emission factors.

Figure 19:
Contribution of vans of different Euro classes to the NO_x and PM_{10} emissions of vans in Dutch cities - source: TNO



	Share of kilometers driven	Share of NO_x emissions	Share of PM_{10} emissions
Euro 0	0,6%	0,9%	10%
Euro 1	0,7%	0,6%	3,6%
Euro 2	6,9%	7,5%	25%
Euro 3	19,9%	18%	24%
Euro 4	33,8%	32%	36%
Euro 5	33,6%	37%	0,4%
Euro 6	4,5%	3,9%	0,0%

4.5 Ownership and users of vans

This section describes the characteristics of owners and users of vans and provides insights in the number of vans, kilometers driven and CO_2 emissions.

4.5.1 Influence of the lease market

Of the 876,000 vans that were included in the analysis, 16% (140,000) were leased ('Autoleasemarkt in cijfers 2015' ('Vehicle lease market quantified 2015'), VNA 2016). On average, these vans are leased for 4 years and have an average age of 2.5 years. Based on this information, we can assume that there are hardly any lease vans older than 5 years. This means that around half of 1 to 5-year-old vans are leased. The lease market thus has a significant influence on the renewal of the fleet.

4.5.2 Users of vans

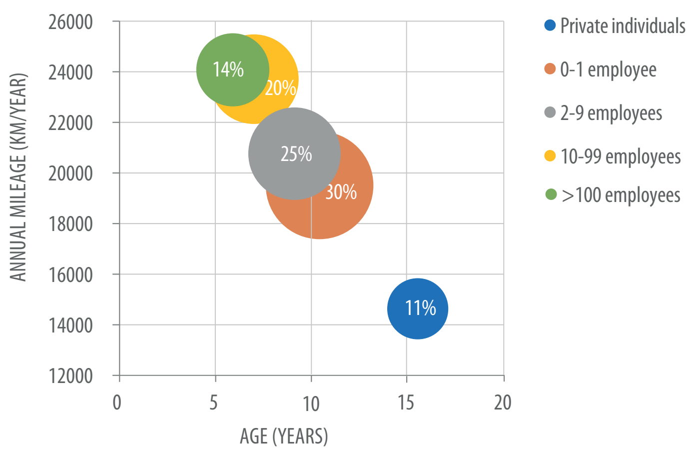
There are a number of different options when it comes to analyzing van users. This report differentiates between:

- Company size (number of employees)
- Company form (sole trader, general partnership, etc.)
- Main activity of the company (SBI)

Company size and share in Euro class

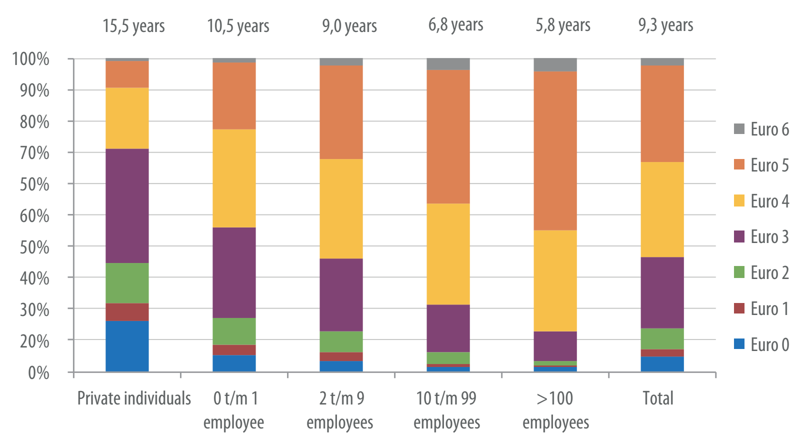
Many vans are used by small companies: 30% are used by companies with 1 employee (e.g. self- employed), 25% are used by companies with 2 to 9 employees (see Figure 20) and 11% are used by private individuals. On average, the vans of larger companies are newer and cover a relatively high number of kilometers per year. The vans used by private individuals tend to be old and cover relatively few kilometers per year.

Figure 20:
Breakdown of the number of vans by age, annual mileage and company size. The size of the circle indicates the share in the total - source: project database and CBS custom research



The average age is also reflected in the composition by Euro class (Figure 21). Private individuals and small companies in particular have a large number of vans in lower (older) Euro classes. 71% of vans used by private individuals and 45% of vans used by small companies (1 employee) fall into the Euro 3 class or older. For large companies (>100 employees) the corresponding share is only 13%.

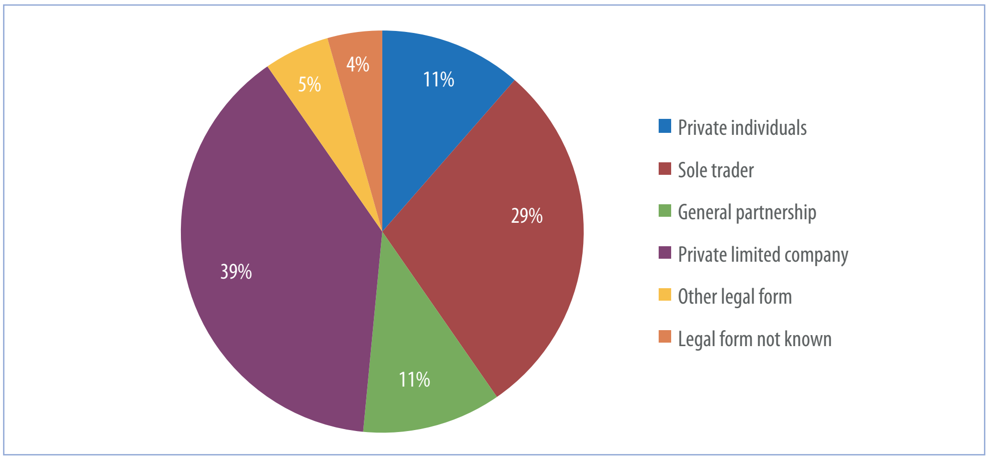
Figure 21:
Share of Euro class and average age by company size



Company form

Figure 22 provides an overview of the number of vans by company form, including private individuals. Most vans are owned by sole traders (29%) or private limited companies (39%). Private individuals also account for a large share (11%). The other legal forms together represent 20% of van usage.

Figure 22: Breakdown of vans by company form -source: CBS custom research



Main activity of the company (SBI)

The total number of vans is specified in the diagram below (Figure 23), specified for each sector. More than half of vans (approximately 54%) are deployed for 'construction' and 'trade'. The number of vans in other sectors is significantly lower. Because of this dominance, chapter 5 will analyze the deployment of vans for 'construction' and 'trade' in more detail.

Figure 23: Number of vans by SBI-1 coding - source: project database and CBS custom research

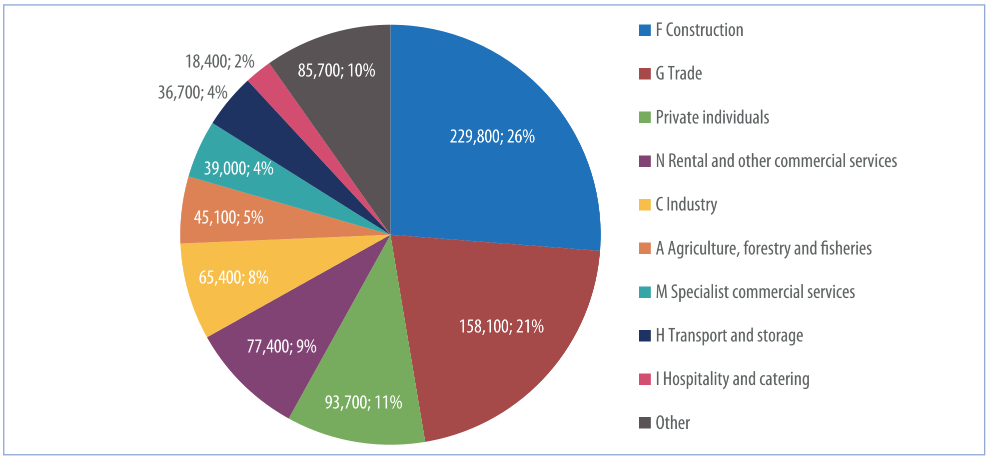
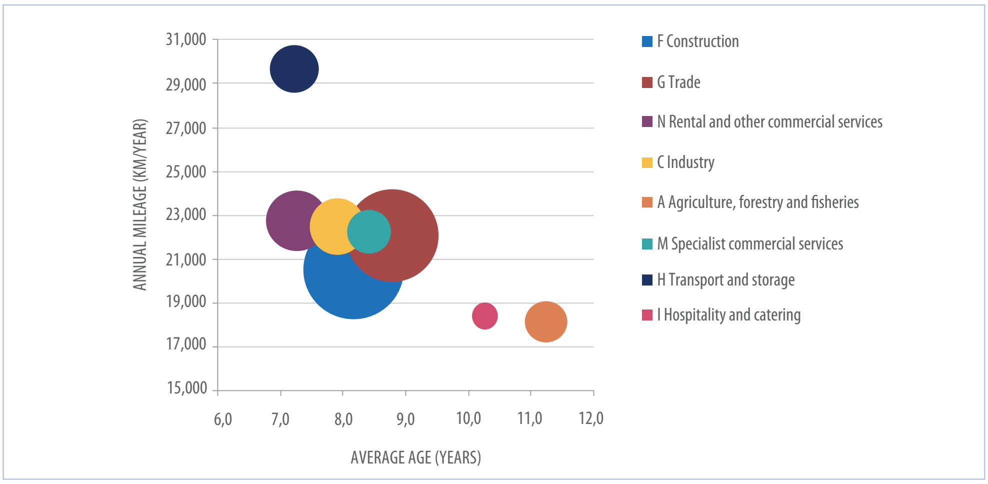


Figure 24 shows the differences between the average age and annual mileage of vans for the sectors that are the biggest van users. One notable point is that the average annual mileage in the 'transport and storage' sector is much higher (by a factor of 1.5) than in other sectors. The average age is also relatively low. On the other hand, vans in 'agriculture, forestry and fisheries' and 'hospitality and catering' are relatively old and have a lower annual mileage. It is also clear that the 'construction' and 'trade' sectors contribute most to the number of kilometers driven by vans.

Figure 24:
Average age and annual mileage of vans in sectors with the most vans (size of circle indicates the share in total kilometers)



4.6 Logistic characteristics / Use of delivery vans

4.6.1 Location and time of use

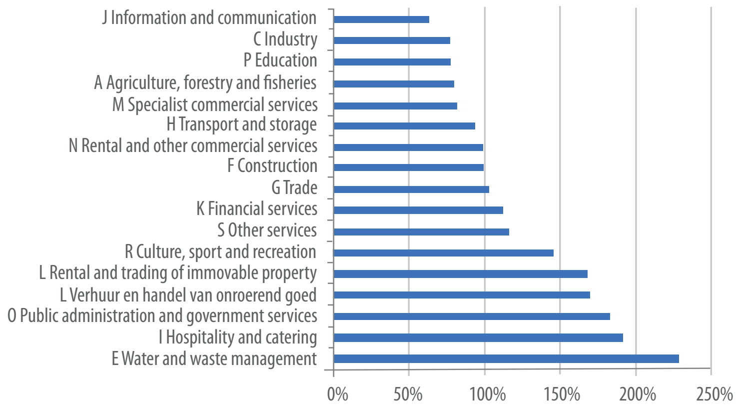
Vans cover a relatively large number of kilometers within built-up areas. According to research by the Dutch pollutant release and transfer register, however, the share of kilometers driven within built-up areas is 16%[5], which is confirmed by recent license plate scans. The survey answers reveal that 36% of kilometers are driven within built-up areas. It is possible that the interviewees overestimated the number of kilometers driven within built-up areas because of the long time they spend there (due to the lower driving speed). On the other hand, the license plate scan method may have underestimated the traffic present in built-up areas.

The CBS survey also provides an insight into the differences between provinces in the Randstad (the most densely populated area of the Netherlands) and other provinces. The share of kilometers driven within built-up areas in provinces such as Drenthe, Flevoland, Friesland and Zeeland is around 25% lower than the national average, while it is approximately 15% higher in the Randstad and Limburg. The latter contain relatively large urban areas in which vans cover a substantial number of kilometers.

There are significant differences between respondents from different sectors. Respondents from the 'public administration', 'hospitality and catering' and 'water and waste management' sectors clearly drive more within built-up areas than average (80-130% more, see Figure 25). It is indicated that 30-50% of the journeys within these sectors take place entirely within built-up areas. The share of kilometers driven within built-up areas by the 'construction', 'trade' and 'transport and storage' sectors corresponds to the average.

[5] *Methods report for calculating the emissions of transport in the Netherlands, version 2016*

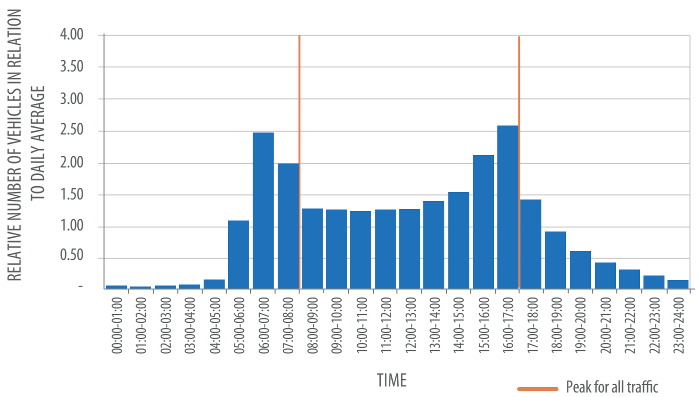
Figure 25:
Relative number of kilometers driven within built-up areas by sector in relation to the survey average



Time of use

The license plate scans show that vans are mainly active on Dutch roads between 05:00 and 19:00. Clear peaks can be observed in the early morning rush hour (06:00 - 07:00) and early evening rush hour (16:00 - 17:00) (Figure 26). At peak times there are 2.5 times as many vans on the roads as there are on average over a day. Approximately 30% of van activity takes place in only four hours (between 06:00 and 08:00 and between 16:00 and 18:00).

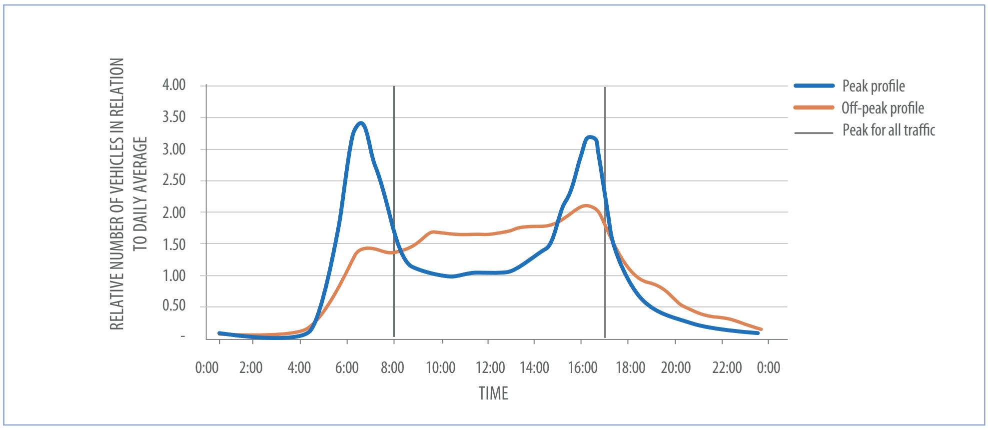
Figure 26:
Relative traffic intensity of van traffic on Dutch roads (average) - source: TNO license plate scans



There are significant differences between sectors in terms of the times when vans are driven. Certain sectors drive more during the rush hour (peak profile), while in others van use is spread more evenly throughout the day (off-peak profile). Figure 27 shows these two profiles. In this figure the data from the license plate scans has been divided between sectors with a 'peak profile' and an 'off-peak profile'.

How often vans are active seems to correlate with the activities for which they are used. For example, a van used in construction or consultancy and research will often be driven from home or the company to the working location with materials or tools and return home at the end of the working day. As an be expected, these vehicles are a lot on the road during rush hour. It also seems logical that the sectors in which vans are often deployed for goods transport (see section 4.6.3) use their vans throughout the day.

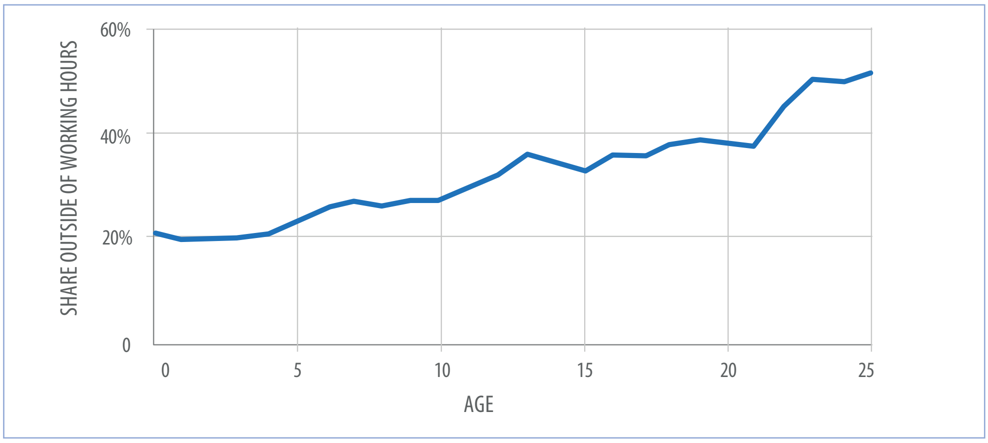
Figure 27:
Relative traffic intensity in relation to the daily average (per profile) for the sectors, splitted up to peak and off-peak profiles



Peak profile	Off-peak profile
Industry	Agriculture, forestry and fisheries
Water and waste management	Energy supply
Construction	Trade
Financial services	Transport and storage
Rental and trading of immovable property	Hospitality and catering
Consultancy, research and other specialist commercial services	Information and communication
Rental and other commercial services	Public administration and government services
	Education
	Healthcare and welfare
	Culture, sport and recreation
	Other services

The CBS survey confirms the differences outlined above. In the survey only 'agriculture, forestry and fisheries' had a higher share of rush-hour activity than was evident from the license plate scans. It is possible that the movements of the vehicles in this sector were underestimated slightly in the license plate scans, as at peak times they drive on roads that were underrepresented in the scans.
Another notable finding is that, old vans are used a relative great deal outside of working hours. As Figure 28 shows, new vans only spend 20% of their time on the roads outside of working hours, compared with 40% for 20-year-old vans. Even older vehicles are driven outside of working hours half of the time. Older vans are especially active at weekends, relatively speaking. One possible explanation for this is that they are more often owned by private individuals or the self-employed, who also use their van for purposes other than work.

Figure 28:
Share of kilometers driven outside of working hours by age

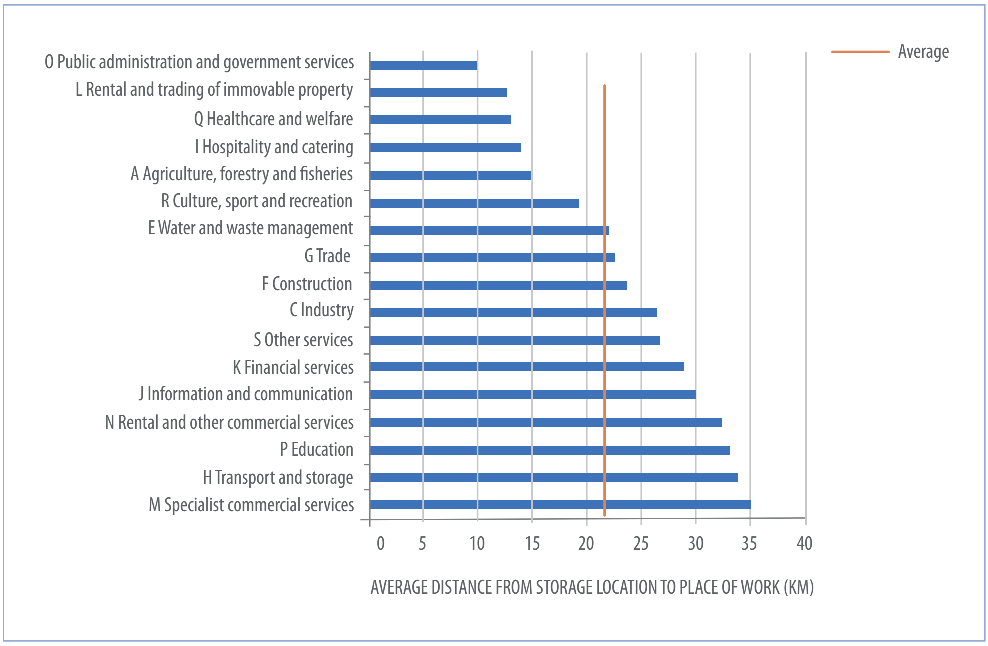


4.6.2 Working area

The CBS survey reveals that the average distance between the vehicle's storage location and working area is 21 kilometers.

Figure 29 shows the average distance between the storage location and working area for different sectors. This figure indicates that in most sectors vans work in their local area (<22 km). The average distance from the van storage location to the main working area is the highest within the 'specialist business services' sector, at 35 kilometers.

Figure 29:
Average distance from storage location to working area.
- source: CBS survey[6]



4.6.3 Activities

Some of the questions in the CBS survey concerned the main activity for which the van was deployed during the day or days on which the survey was conducted. The interviewees were asked to differentiate between the following activities:

- Servicing: transport of materials and equipment for installation, maintenance and construction activities
- Goods
- Mail
- People - business: transportation services
- People - private: private transportation

Figure 30 shows to what extent (on the basis of mileage) the van is deployed for the activities mentioned above. It is notable that 'servicing' accounts for the largest share, with 35% of driven kilometers. Interviewees also indicated that 24% of kilometers are driven for the transportation of people (business and private).

[6] *Averages are based on 50 (education) to 3,900 (construction) answers to the survey.*

__Figure 30:__
Share of kilometers driven for the reported main activity of the van in the survey period

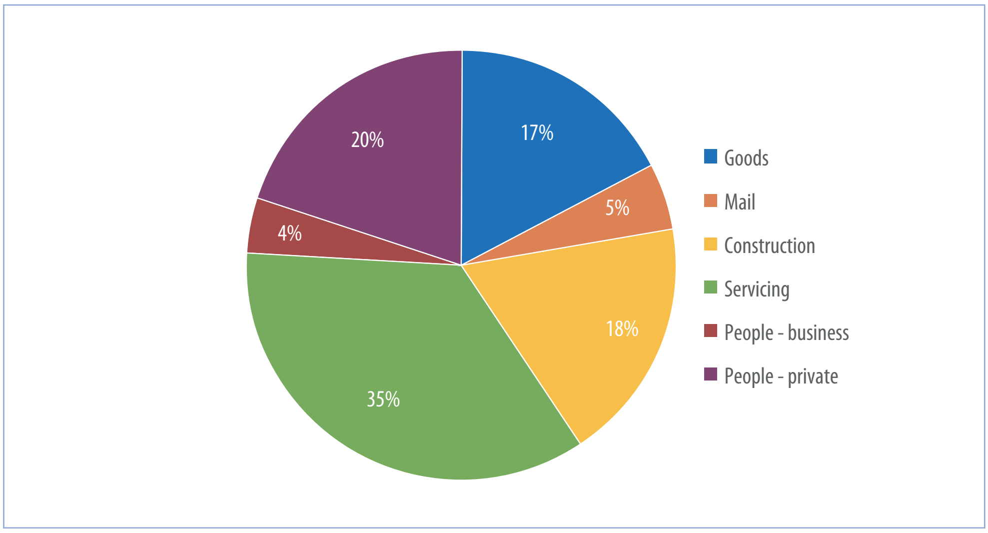
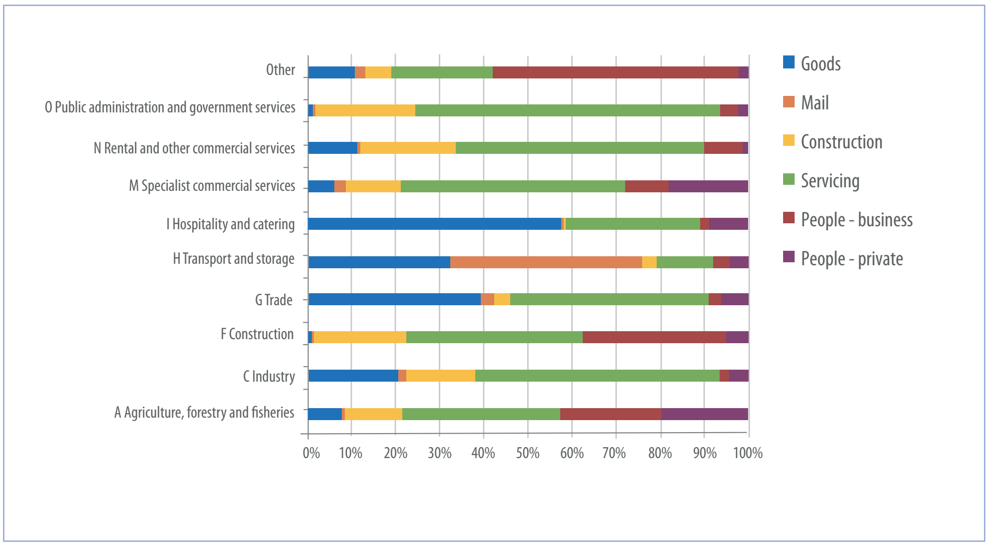


Figure 31 indicates how the main activities relate to each other for each main sector. In most sectors the van is deployed for servicing activities on 30%-60% of days. 'Transport and storage' is an exception, with a low percentage of 13%, as might be expected.

The main activity 'mail' is mostly mentioned in the 'transport and storage' sector. The main activity 'construction' is mentioned in many sectors other than the construction sector and accounts for a share of 10%-20% in numerous sectors. 'Goods transport' has its largest share within 'hospitality and catering', 'transport and storage' and 'trade'. All in all, it is clear from the survey data that vans are used a great deal for other purposes than those that would be expected based on the SBI classification. It can therefore be concluded that vans fulfill a wide variety of functions within the business community.

__Figure 31:__
Share of deployment for the reported main activity per sector during the survey period - source: CBS survey: sectors with more than 100 responses concerning the main activity are shown separately



4.6.4 Weight load of vans

In the CBS survey information was collected on the vehicles' load for the different main activities. A distinction was made between the definitions of 'load' for mail and goods on the one hand and construction and servicing on the other. Those who had mail and goods as their main activity were asked for the total quantity of goods carried per journey, whilse those who had construction and servicing as their main activity were asked for the average quantity carried during the day was requested.

For goods transport within the 'transport and storage' sector an average of 418 kilograms is carried per journey (see Table 4). However, many goods are also transported in other sectors, especially in the retail and wholesale sectors, industry and hospitality and catering. The weight of the load carried by vans in these sectors is 185 kilograms per journey and therefore less than half of that in 'transport and storage'.

For the main activity 'mail' within the 'transport and storage' sector (mainly couriers) an average of 360 kilograms is carried per journey. Other sectors also indicated 'mail' as a main activity. However, the average load for these journeys is much lower (134 kilograms) and in some cases is only a few kilograms. Here we are probably talking about a large number of occasional mail deliveries and deliveries for pharmacies, for example.

Vans that transport construction materials or tools carry an average of 398 kilograms of construction materials and tools throughout the day. On average 34% of the weight is accounted for by construction materials and 66% by tools. The vast majority of the respondents who reported 'construction' as a main activity naturally come from the construction sector (70%). Other important sectors with this main activity are industry (6%), wholesale and retail (5%) and movable property rental and other commercial services (11%). The latter sector mainly concerns lease vehicles, but also vehicles from the landscaping/gardening subsector.

Vans with the main activity 'servicing' have an average load of 362 kilograms in the van throughout the day. Of this, 43% is materials and 57% tools. The respondents with the main activity 'servicing' mainly come from the 'industry' (11%), 'construction' (23%), 'wholesale and retail' (24%) and 'movable property rental' and 'other commercial services' sectors. Apart from lease vans, the latter also concerns vans for 'interior furnishing' (7%) and 'landscaping/gardening' (12%).

Table 4:
Average load and load factor by activity - source: CBS survey

***Note:** For 'construction' and 'servicing' the load indicates the average load throughout the day. For 'post' 'mail' and 'goods' it indicates the quantity carried (load and load factor at time of departure)*

	Average load	Average load capacity	Sample size	Share of materials
Goods (transport and storage)	418	973	248	
Goods (other)	185	908	2.232	
Delivery (transport and storage)	360	928	194	
Delivery (other)	134	830	125	
Construction	398	967	2.168	34%
Servicing	362	934	3.606	43%

The survey reveals that the average quantity carried (in weight) increases from two-seaters up to large vans. However, the average quantity carried in extra large vans is often lower (comparable with medium-sized vans). This observation is in keeping with the finding from interviews that extra large vans are mainly used for volume transport.

5 The use of vans in the 'construction' and 'trade' sectors

As indicated in section 4.5.2, 'construction' and 'trade' deploy the most vans of all sectors. These two sectors together account for 54% of the vans registered in the Netherlands. In this chapter the use of vans in these sectors will be explored and clarified further.

The chapter is divided into two sections. Section 5.1. describes the deployment and use of vans in 'construction' and paragraph 5.2. the deployment and use of vans in 'trade'. Within these sections the following aspects will be explained in greater detail:

- use of vans per sector;
- characteristics of vans;
- deployment of vans;
- most important developments and trends.

5.1 Vans in the construction sector

In this section the deployment of vans in the construction sector is analyzed. For this analysis the project database and data obtained from interviews with nine companies (see Table 5) and the industry organization Bouwend Nederland (see annex K) is used.

Table 5:
Overview of interviews by type of company within the 'construction' sector

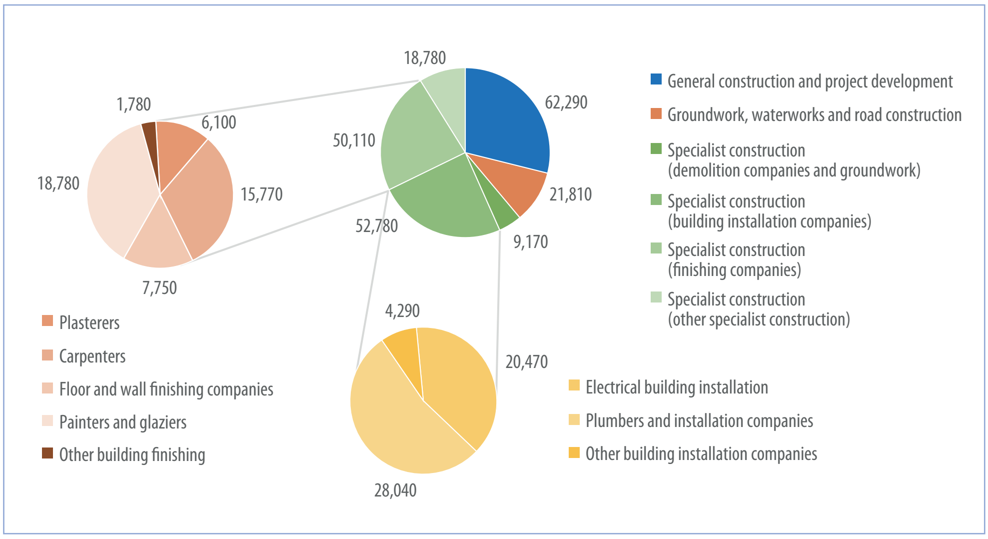
Company type / size (number of employees)	0-1	2-9	10-100	>100	Total
General construction and project development				2	2
Groundwork, road construction and waterworks				1	1
Plasterers		1			1
Carpenters	2	1			3
Plumbers and installation companies	2				2
Total	**4**	**2**	**-**	**3**	**9**

5.1.1 Vans used for different business activities within the construction sector

Over 30% of the vans that are registered at companies (around 230,000) are used by companies active in the construction sector. Figure 32 differentiates between types of construction companies and reveals that three types of construction companies together own 77% of the vans within the 'construction' sector:

1. **General civil and utility construction companies and project development companies:** mainly general construction companies;
2. **Building installation companies:** mainly plumbers and installation companies;
3. **Finishing companies:** mainly carpenters, painters and glaziers.

Figure 32:
Distribution of vans within 'construction'[7] (source: CBS)



5.1.2 Fleet distribution by company size

Figure 33 shows a breakdown of the number of vans by company size. Within the construction sector, 41% of vans are owned by small sole traders (up to one employee). This is a larger share than in the van fleet as a whole and may be explained by the relatively high number of self-employed people working in construction. According to CBS, there were 211,000[8] self-employed workers active in construction, of whom 112,000 were classed as self-employed persons without staff. This amounts to 41% and 22% of employees in construction respectively.

Figure 33:
Share of registered vans by company size based on number of employees - source: CBS

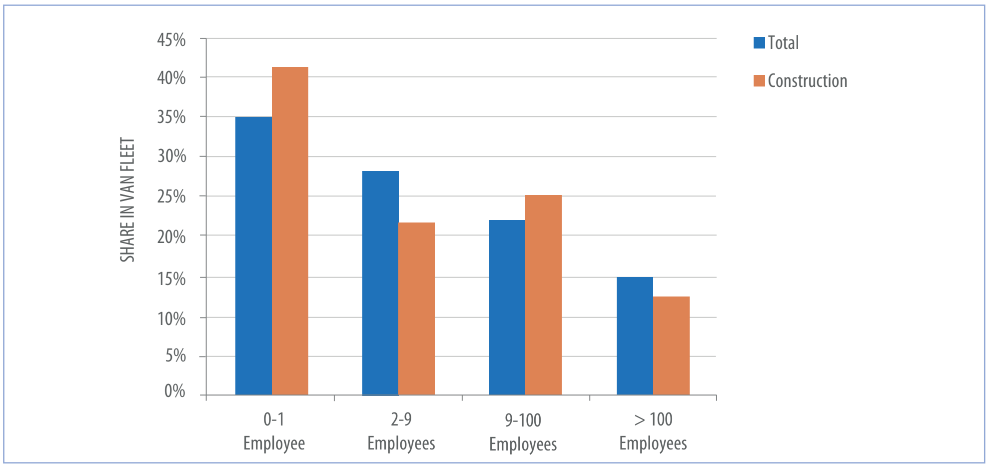


Figure 34 shows the distribution of vans and the number of employees by business activity (as in Figure 32). From this, it can be concluded that the number of vans per employee in the 'groundworks, waterworks and road construction' subsector is considerably lower than in 'general construction' and 'specialized construction'. In specialized constructionmainly plumbers, painters and carpenters are active. On average, these companies are smaller and have a higher average number of vans per employee.

[7] *NB: due to rounding to the nearest ten, the total may not always add up exactly.*
[8] *EIB 2015, 'Monitor zzp'ers Bouw 2015' ('Monitor of self-employed persons in construction 2015'), second six months*

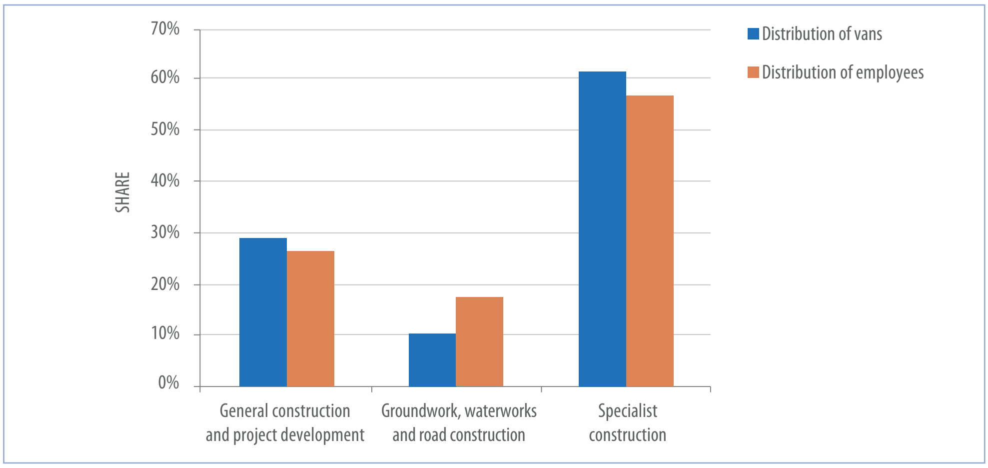


Figure 34:
Share of registered vans and employees by business activity - source: CBS

5.1.3 Vehicle characteristics

Usage and load

Based on the data obtained from the interviews, we can gain an impression of the average deployment of a van in the construction sector. Vans are mainly used for commuting and the transportation of materials and tools to the place of work. The CBS survey shows that vans are also sometimes (approximately 10%) used for private purposes. Transportation from the supplier to the construction site often does not fall within the 'construction' category in the SBI classification, as this is done by suppliers, who belong to the 'trade' category (see section 5.2). The number of stops per day for each van depends on the size of the jobs. In the construction sector this varies, but is still limited to a maximum of around ten jobs per day. According to the CBS survey, the average number of stops in construction is around 5.3. Construction mainly involves large jobs that require a person to work at one location for the entire day. At most, one extra stop may be made at the worker's own company or at a wholesaler to pick up materials.

Sometimes a van is deployed for the transportation of multiple passengers to increase efficiency and to save on possible parking costs in the city. There are opportunities to further increase the capacity utilization of vans in the city by coordinating logistical streams more efficiently, not only within building projects but also in particular through coordination between projects (this requires cooperation between competitors). Some large construction companies are leading the way in this field by setting up 'building hubs', but progress is slow.

A van's load is made up of supporting materials and tools. Often the vans are equipped with standardized units (for example wooden crates) for the storage of these materials and tools. For a limited number of companies the maximum weight plays a role. When this is the case, attention is paid to limiting weight when the van is fitted out. Weight may be saved by leaving off a roof rack or towing hook. The use of synthetic or aluminum fittings is also an option.

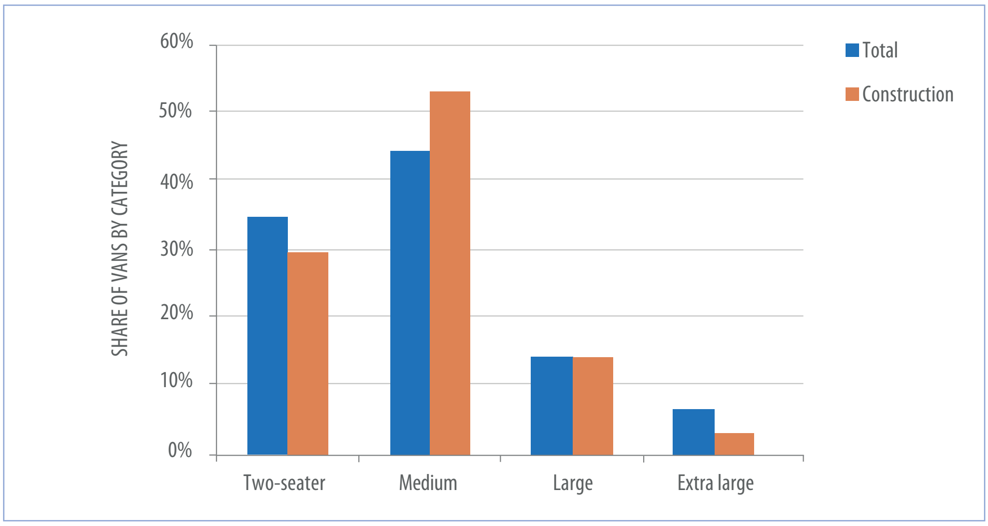
Several of the interviewed companies indicated that they equip vans with Track & Trace software that can also be used to monitor driving behavior and fuel consumption. Increasing attention is being paid to the environment and finances. Economical driving is sometimes encouraged with the help of Eco-Drive systems. If the Rounds Per Minute (RPM) are too high, a piercing beeping sound is heard to encourage the driver to lower it. The maximum speed can also be limited (dynamically) using an Eco-Drive, e.g. to a standard maximum speed of 130 km/h and a maximum of 100 km/h when a trailer is attached.

Building Information Modeling (BIM) is increasingly used in construction. New construction projects are often managed by large construction companies, with the work carried out by smaller subcontractors. The application of BIM is therefore often imposed on subcontractors. These models contain an increasing amount of information to ensure the optimal planning of transport movements, in terms of both space and time. Software for optimizing and planning logistic flows is also being used more and more often. Large construction companies in particular are taking the lead here, and small and medium-sized firms will follow as soon as the software is available on the market as a standard solution.

Load capacity

Figure 35 shows that the construction sector uses a relatively small number of two-seaters and extra-large vans. On the other hand, medium-sized vehicles are strongly represented in construction. One possible explanation for this is that these vehicles offer a high degree of flexibility, relatively speaking. They have a significant load capacity and volume, while at the same time having a lower mass than that of larger vehicles, which reduces the vehicle tax and fuel costs.

Figure 35:
Distribution of vans in the 'construction' sector by size class - source: CBS



Acquisition criteria

The interviews reveal that, apart from load capacity, several other criteria play an important role when it comes to deciding what type of van to buy. These criteria largely correspond with those in other sectors. A number of specific criteria are listed below:

- A characteristic of construction is that trailers areused more often in this sector than in other sectors. Towing capacity is therefore a more important acquisition criterion in this sector.
- Another important factor is where the van will be parked overnight. In construction it is often parked at the employee's home. In such cases the maximum dimensions need to be taken into account. The van cannot be longer than 6 meters and higher than 2.4 meters.
- A current trend is to keep a larger local stock of materials on construction sites. This means that smaller vehicles are sufficient, because less needs to be transported. As a direct consequence of this, the number of two-seaters is rising. On the other hand, medium-sized to large vans are more flexible (greater towing and load capacity), which is why companies sometimes explicitly opt for these larger vehicles.

Average age of vans used in construction

Based on the information obtained from CBS, the average age of vans used in construction can be determined. Despite the relatively large number of small companies active in construction, who use relatively older vehicles, the average age of vans in construction (8 years) is a little less than that of the total number of vans (9 years) (see Figure 36).

Figure 36:
Ages of vans by company size in 'construction' and of the total - source: CBS

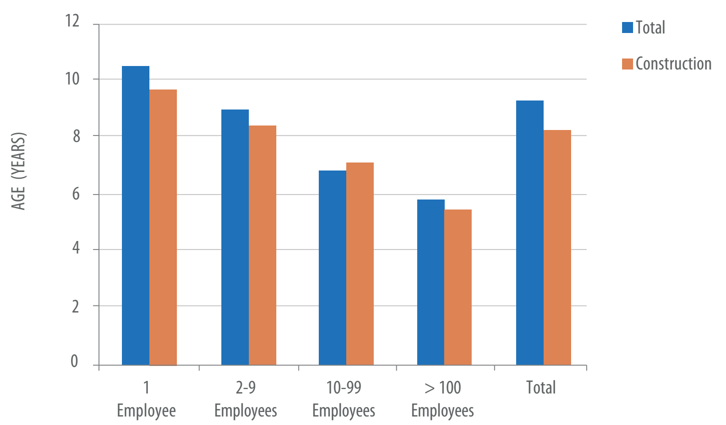


Table 6:
Age comparison = van fleet in 'construction' sector and total

	New: =< 2 years	New - medium: >2 - =<5 jaar	Medium/old: >5 - =<15 jaar	> 15 years
Construction	13%	20%	56%	11%
Total	12%	19%	53%	15%

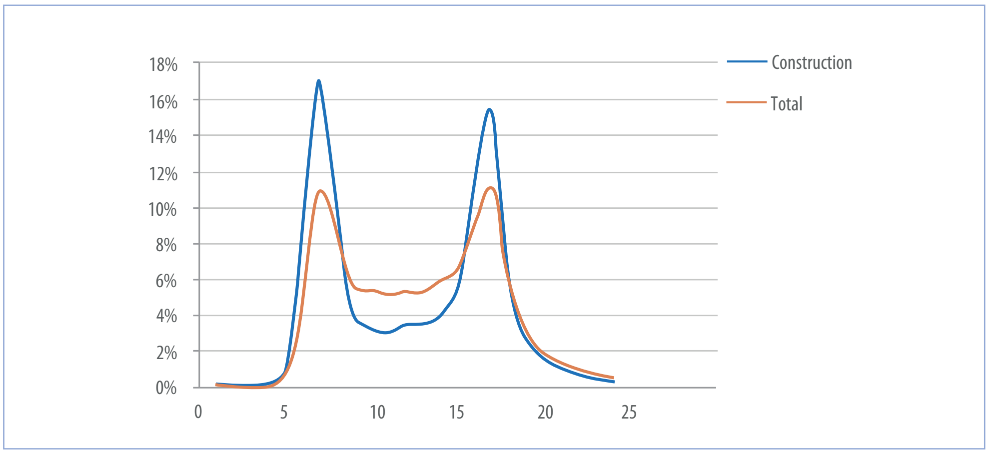
5.1.4 Logistic characteristics

This section will deal with where and when vans are deployed in construction and what kind of emissions this causes.

Location and time of use (determined using license plate scans)

As can be seen in Figure 37 below, vans used in construction are relatively more often driven during the rush hour and less during off-peak hours. Approximately 32% of vehicle movements take place in only two hours (between 06:00 and 07:00 and between 16:00 and 17:00). These times are also confirmed in the interviews, in cases where vans are deployed for one job a day.

Figure 37:
Share of vans per hour for working days



The interview data also show that the region in which the vans are deployed is related to the size of the company. Smaller companies (small and medium-sized companies/ self-employed) are mainly active locally or in their region, while larger companies have a national reach. However, most construction sites are in the urban Randstad area. As a result, mainly smaller construction companies based outside of the Randstad drive towards the Randstad on a daily basis. There is also a trend towards working on larger jobs on construction sites located further away.

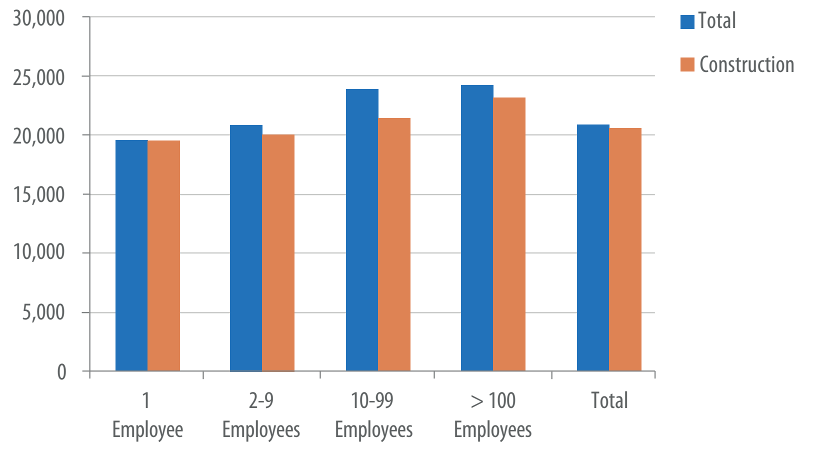
Annual mileage and CO_2 emissions

The CO_2 emissions of vehicles in construction are comparable with those of the total van fleet. Furthermore, the average annual mileage of vans in construction (20,500 km/year) is comparable with that of the van fleet as a whole (see Figure 38). Of all the vans in the Netherlands, around 26% are active in the construction sector. The contribution to CO_2 emissions of vans in construction can therefore be considered proportional.

In construction a relatively large proportion of vans is registered to small companies. This means the share of these companies in CO_2 emissions is higher than that of the total van fleet.

Since the share of medium-sized vehicles in construction is also relatively large, their relative contribution to CO_2 emissions is also largeter than in the total van fleet.

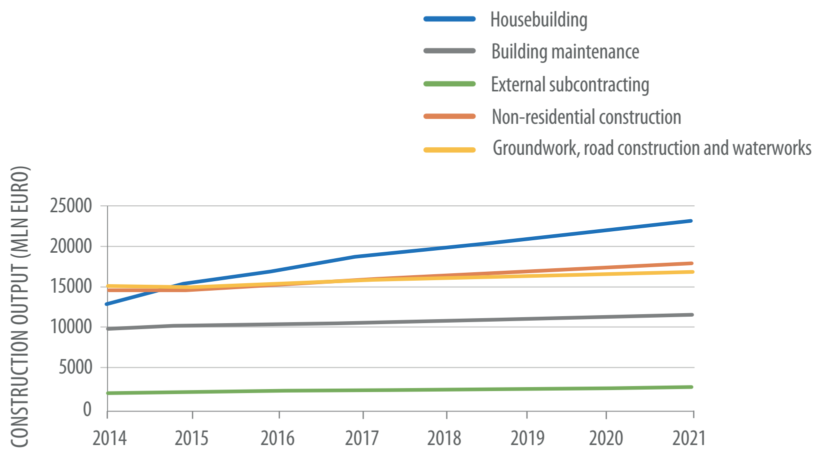
Figure 38:
Annual mileage compared to the average for vans



5.1.5 Developments and trends

Activity in the construction sector is expected to continue to grow over the coming years[9]. This applies in particular to the construction of new homes (see Figure 39).

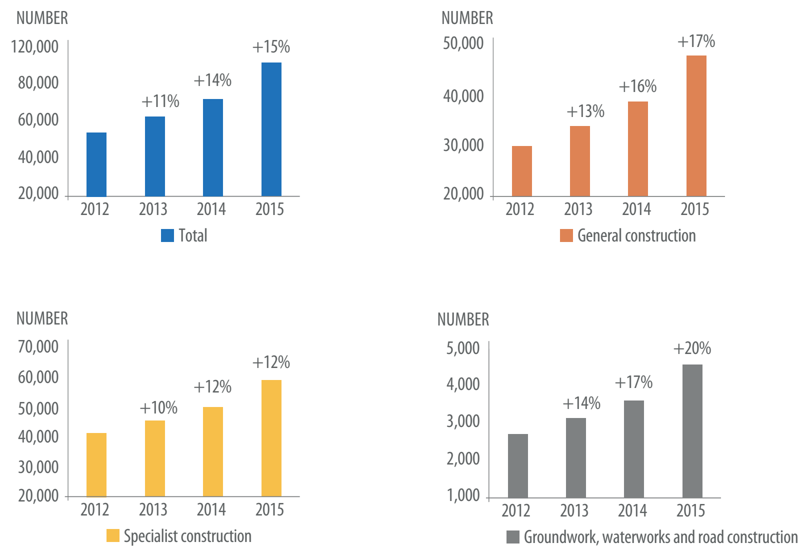
Figure 39:
Estimate of construction output - source: 'Verwachtingen bouwproductie en werkgelegenheid' ('Expectations for construction output and employment')



From Figure 40, it appears that the number of self-employed workers in construction has risen sharply with about 46% compared to 2012. Comparable growth can be seen in all construction-related activities. Many self-employed workers have their own van. It is therefore likely that for this reason the number of vans will also increase.

[9] *EBI 2016: 'Verwachtingen bouwproductie en werkgelegenheid' ('Expectations for construction output and employment')*

Figure 40:
Development of the number of self-employed persons in the construction sector - source: 'Monitor zzp'ers Bouw 2015' ('Monitor of self-employed persons in construction 2015') second six months)



The interviews reveal that the adoption of electric vehicles is not progressing quickly within construction. Leaving aside the limitations associated with these vehicles, such as their range, the image of electric vans also appears to play a role here.

5.2 Vans in the 'trade' sector

5.2.1 The 'trade' sector in perspective

In this section an analysis is made of the 'trade' sector. This sector consists of three subsectors: 'automotive trade', 'retail' and 'wholesale'. For the analysis the project database and the data derived from the interviews has been used, as well as a financial costs analysis. In total, twelve parties from the 'trade' sector were interviewed, including three relevant industry organizations (EVO, TLN and Thuiswinkel.org) and nine companies (see annex K). Table 7 indicates the type of companies that were interviewed for this analysis.

Table 7:
Overview of interviews by type of company in the 'trade' sector

Type of company / size (number of employees)	0-1	2-9	10-100	>100	Total
Retail	1	1	-	4	6
Wholesale	-	-	-	3	3
Automotive trade	-	-	-	-	-
Total	**1**	**1**	**-**	**7**	**9**

In this section, the following hypotheses are tested:
Hypothesis 1: Vans in the 'trade' sector must have the capacity to transport a large quantity of goods and must offer a large volume; load capacity in terms of kilograms is less important.
Hypothesis 2: Vans in the 'trade' sector have a higher average age than those in other sectors, partly because they travel fewer kilometers per year.
Hypothesis 3: Vans in retail mostly stay within built-up areas/the city.

The central thread in the analysis of the 'trade' sector is the distinction between companies in wholesale and retail. Less attention is paid to the deployment of vans within the automotive trade, as a large share of the fleet in this sector is stock-in-trade and is not actively deployed. Specific attention is also paid to the differences between larger and smaller companies in terms of the van fleet and the deployment of vans.

As was explained in section 4.5.2, 24% of the vans used by companies are active in 'trade'. After the 'construction' sector (30%), this means the 'trade' sector has the largest share of vans in use of all the sectors in the Netherlands.

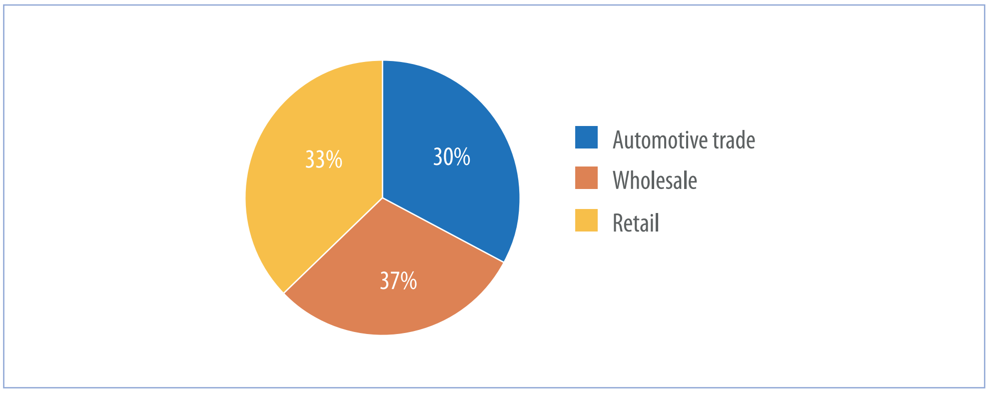
An important development within the 'trade' sector is the growth in the transported volume of goods ordered through online shops and e-commerce. This is generating more business-to-consumer (B2C) movements, resulting in more parcel deliveries and outsourcing of transportation to logistics services providers such as PostNL and DHL[10]. The volume transported by logistics services providers does not usually fall under the 'trade' sector, but under the 'transport and storage' sector.

This section focuses on companies that are active in the 'trade' sector and own their own vans. Outsourced transportation is not included in the analysis. In the 'trade' sector a total of 13% of all vans are stock-in-trade. These vans are not actively deployed. They will either be deployed in the near future or scrapped, and thus are not actively deployed by the companies in the sector for their daily operational activities.

5.2.2 Vans used for different business activities within the trade sector

The 'trade' sector is divided into three activities: automotive trade, wholesale and retail. The vans within the 'trade' sector are spread evenly over these more specific activities, as is shown in Figure 41. Each of the activities account for around a third of the total.

Figure 41:
Distribution of the active fleet by business activity within 'trade' (150,000 vans)



[10] *Research by CE Delft shows that approximately 100 million vehicle kilometers are driven per year for the transportation of parcels in the Netherlands. This is less than 2% of the total number of kilometers driven by vans in the Netherlands.*

5.2.3 Fleet distribution by company size

In total 94% of companies in the 'trade' sector have fewer than 10 employees (small companies) and 6% have more than 10 employees (medium-sized and large companies) (source: CBS). Within 'trade', 71% of vans are owned by companies with fewer than 10 employees (total 106,500 vans) and almost 30% are owned by medium-sized and large companies. In comparison with other sectors, such as construction, more vans are owned by medium-sized and large companies. The interviews with large companies also reveal that they own a relatively large van fleet.

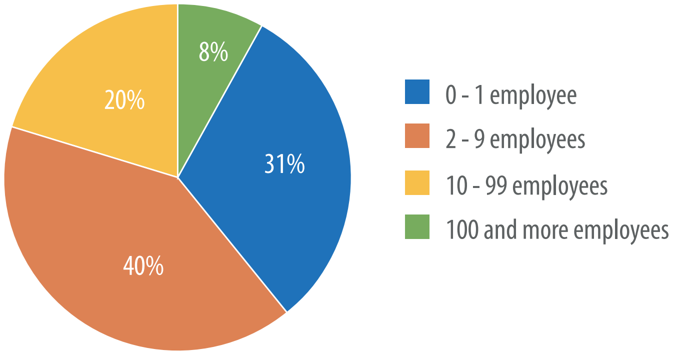


Figure 42:
Distribution of the active fleet by company size for the 'trade' sector

Findings from the interviews:

- Larger companies in the 'trade' sector, such as a car-parts wholesaler, a supplier of medical aids or a national supermarket chain, have hundreds of vans in their fleet. For all of the interviewed parties, these were mainly leased vehicles owned by companies in the financial sector.
- Small trading companies and organizations, such as a market vendor, a franchise construction retailer or a food bank, have one or several vans, sometimes owned and sometimes leased. The food bank also has a vehicle that was made available by a sponsor.

The following section will describe the vehicle characteristics of vans in the 'trade' sector. In the section after that the emphasis is placed on how the vehicles are deployed in the logistic process. The main focus here is on companies that are active in wholesale or retail, because for these activities differences in logistical deployment are expected, which means there may be possibilities for logistic optimization. The chapter concludes with a section detailing the developments and trends in relation to vehicle characteristics and logistic deployment.

5.2.4 Vehicle characteristics

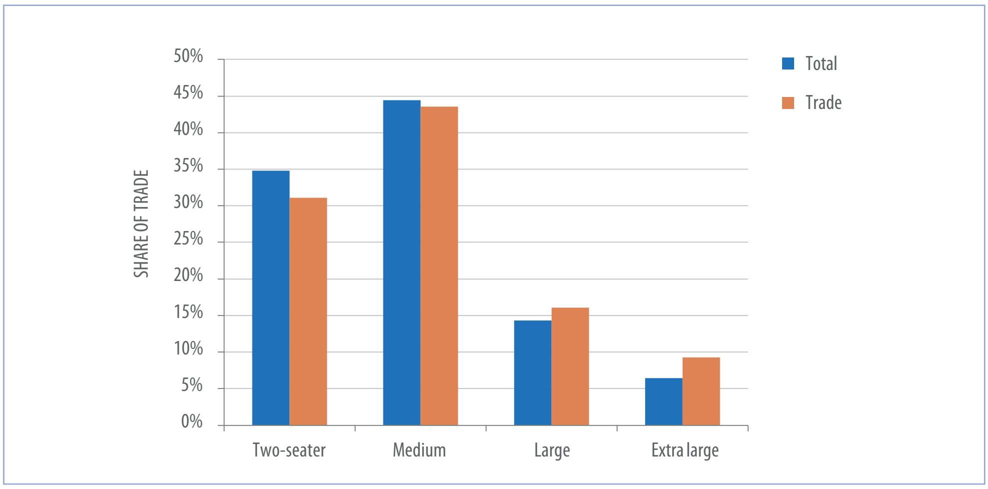
This section focuses on the different characteristics of vans used in wholesale and retail. It deals with the type of van, the load capacity, the average age of the vehicle, the purchasing decision and the body of the vehicles.

Type of van and load capacity

On average, trade companies own slightly fewer smaller and medium-sized types of vans and relatively more large vans. The extra large vans used are heavier and larger vehicles. For the vans cosnidered there is a maximum total weight of 3,500 kilograms. They are therefore characterized by a relatively large load volume and a lower load capacity (in kilograms), as the kerb weight is higher.

A relatively high proportion of vans in the trade sector have a large load volume. This can be seen in Figure 43: there is a relatively large number of vehicles in the categories 'large' and 'extra large' within the 'trade' sector.

Figure 43:
Share of 'trade' within 'total', by type of van



The answer to Hypothesis 1 'Vans in the 'trade' sector must offer a large volume; load capacity in terms of kilograms is less important' is as follows: Based on the figure above, it can be concluded that this hypothesis is true. In recent years a relatively high proportion of larger vehicles has been deployed in the trade sector, especially in the large and extra large categories. On average, vans in the trade sector thus have a high load capacity in terms of volume and a relatively lower load capacity in kilograms.

If we compare the choice of vehicles between the 'wholesale' and 'retail' sectors, there are clear differences between the types of van that are used. Table 8 shows the distribution of the types of vehicle for wholesale companies. Wholesale companies mainly deploy medium-sized and large vans. Extra large vans are mostly found at large companies (100 or more employees). In the interviews, large companies indicated that they often choose these large vehicles because of the load volume they require.

Table 8:
Distribution of vans by company size and type of vehicle in 'wholesale' for age groups 0-4 years

***Note:** based on RDW database for vehicles 0-4 years old (it should be noted that no information was available for 15% of the vehicles in this age category)*

	Two-seater	Medium sized van	Large van	Extra large van	Total
1 employee	31%	37%	30%	2%	2.260
2 - 9 employees	28%	37%	31%	4%	5.692
10 - 99 employees	27%	37%	32%	4%	4.958
100 or more employees	33%	33%	27%	8%	425
Total	**29%**	**36%**	**31%**	**4%**	**13.335**

The retail sector mostly deploys medium-sized vans and two-seaters (see Table 9). The two-seater is mainly used by medium-sized companies with 10-99 employees (39%). Small companies choose medium-sized vans, while large vans are mainly used by large companies (100 or more employees). The available volume is the most important reason for choosing large and extra-large vans, according to the interview results.

Table 9: *distribution of vans by company size and type of vehicle in 'retail' for age groups 0-4 years*

Note: *based on RDW database for vehicles 0-4 years old (it should be noted that no information was available for 15% of the vehicles in this age category)*

	Class				
	Two-seater	Medium sized van	Large van	Extra large van	Total number of vans
1 employee	30%	44%	25%	2%	1.402
2 - 9 employees	30%	42%	24%	3%	4.837
10 - 99 employees	39%	33%	22%	7%	1.933
100 or more employees	22%	17%	47%	13%	166
Total	**32%**	**40%**	**24%**	**4%**	**8.338**

The large companies that were interviewed consciously opt for a varied van fleet so that they can choose the optimal van for each journey. Moreover, they have a relatively large proportion of box trucks, sometimes with a tailgate, for the transportation of larger volumes.

Findings from the interviews:

- From the interviews it appears that the large companies have a varied fleet of small vans, large vans and box trucks (with or without a tailgate). The most important criterion when choosing a vehicle is the volume, which is why these companies prefer to deploy box trucks. Smaller vehicles are used for smaller volumes or for reasons of accessibility.
- For small companies the interviews reveal that the choice of vehicle depends on various reasons. For example, the market vendor uses a van with a double cabin, as it is a strong and solid vehicle and the flat loading floor is suitable for transportation. Of its three vehicles, the food bank mainly deploys its electric van, because it is sponsored and therefore the cheapest to run.

Age of the van fleet

The age structure of the van fleet in the 'trade' sector is comparable to that of the total van fleet in the Netherlands (see Table 4). The average age of the van fleet in the trade sector is 8.8 years, compared with an average of 9.3 for the total van fleet. Table 10 shows that in total 66% of the vehicles in this sector are older than 5 years. The corresponding percentage for all vans in the Netherlands is 68%.

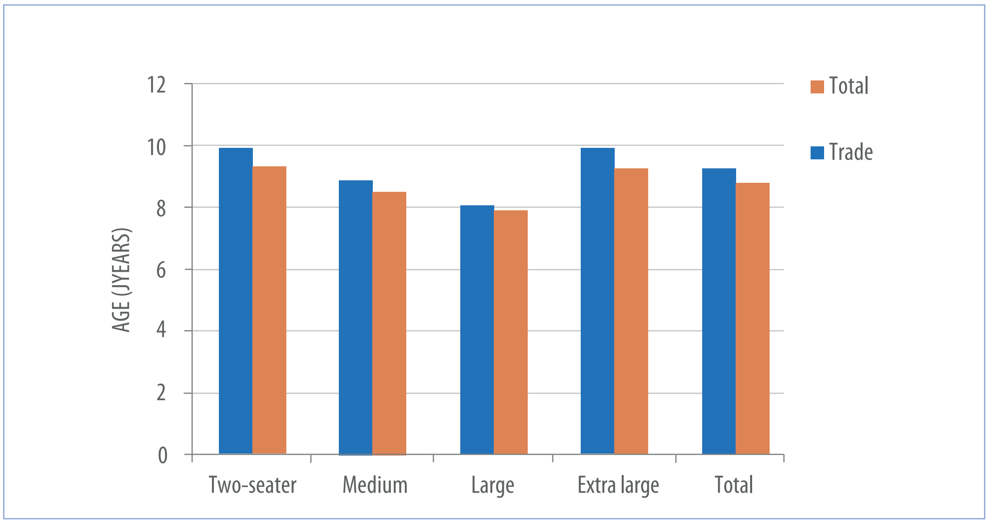


Table 10:
Age comparison = van fleet in 'trade' sector and total

	New: =< 2 years	New - medium: >2 - =<5 years	Medium/old: >5 - =<15 years	> 15 years
Trade	13%	20%	52%	14%
Total	12%	19%	53%	15%

The answer to Hypothesis 2 ' Vans in the 'trade' sector have a higher average age than those in other sectors' is as follows: From the above table, it appears that this hypothesis is false. The age structure of the van fleet in the trade sector is almost identical to the age structure of the total van fleet. In fact the average age of the van fleet in the trade sector is a little bit lower, at 8.8 years, than the figure of 9.3 years for the total Dutch van fleet.

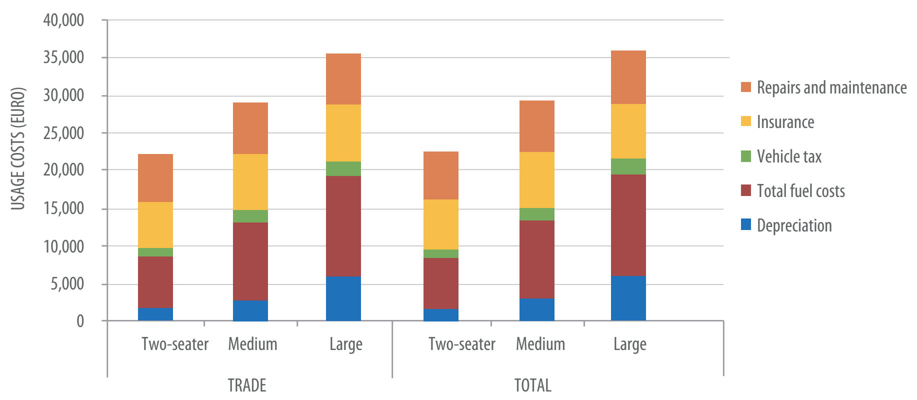
With the available data it is not possible to make a comparison to be made between wholesale and retail companies or between large and small companies. However, from the interviews can be deduced that wholesalers use a newer fleet of vans. The findings from the interviews further show that:

- Wholesale companies use vans with an average age of to 2 to 5 years. These companies mainly lease their vehicles and many contracts expire within this period, after which new vehicles are acquired. The number of vans in retail in the 5-to-15-year category is increasing.

Purchasing decision for entrepreneurs

Figure 44 shows the composition of the usage costs for vans in the 'trade' sector and for the total of all sectors. This figure clearly reveals that larger vehicles have higher usage costs than smaller vehicles. The difference between larger and smaller vehicles is mainly explained by the higher depreciation charges and fuel costs for larger vans.

Figure 44:
Composition of usage costs for the 'trade' sector and total



The 'trade' sector uses relatively large vehicles. These vehicles have a shorter depreciation period and higher depreciation charges (see also section 6.3). The fuel costs can be explained, on the one hand, by the annual mileage, which is considerably higher trade than other sectors. On the other hand, these costs can also be explained by consumption. A more detailed explanation of the usage costs of vans and depreciation can be found in section 6.3.

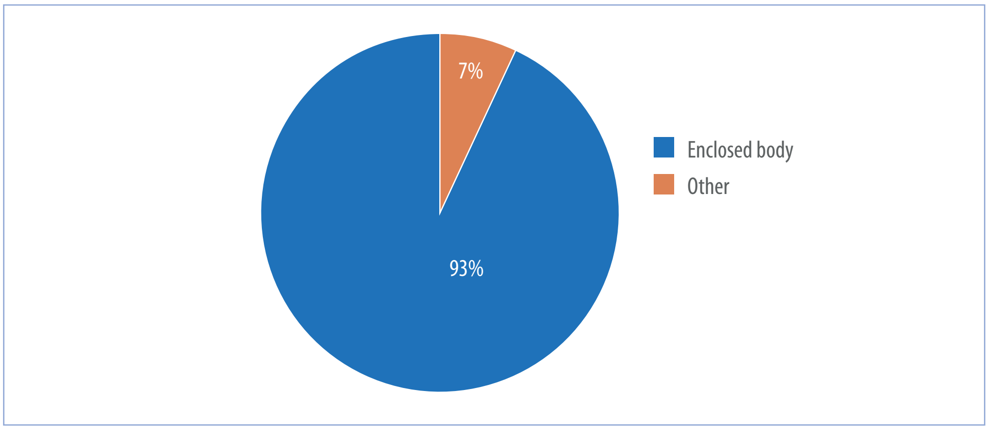
Because of the higher vehicle tax and fuel costs for wholesalers, there is greater pressure to ensure vehicles are deployed optimally. It is partly for this reason that larger companies opt for a varied vehicle fleet (see above). For companies working in retail, the flexibility offered by a large van is an important motivation for choosing such a vehicle. On the other hand, fuel costs are relatively low because of the lower mileage. A characteristic of this group of users is that the choice of vehicle is not only based on rational considerations related to cost; the vehicle also needs to be suitable for all possible jobs. The interviews revealed the following:

- For small companies the choice of vehicle is mainly based on the acquisition cost and reliability. It seems there is a preference for older, sturdy vehicles, but also for vehicles that are acquired through sponsoring. Moreover, 'sufficient loading space' and a 'flat loading floor' are given as reasons for choosing a certain vehicle. Larger companies in retail and wholesale have access to a varied van fleet, allowing them to choose the optimal vehicle for each journey. The most important reason for choosing a specific vehicle is therefore the available volume.

Body of the vehicle

Most vans (up to 4 years old) in wholesale and retail have an enclosed body (see Figure 45). This is to be expected, as the vans are used mainly for the transportation of goods. The 'other' category includes temperature-controlled vans, which are mostly deployed for the transportation of fresh products.er.

Figure 45: Distribution of van bodies in 'wholesale' and 'retail' together (for age groups up to 4 years old)



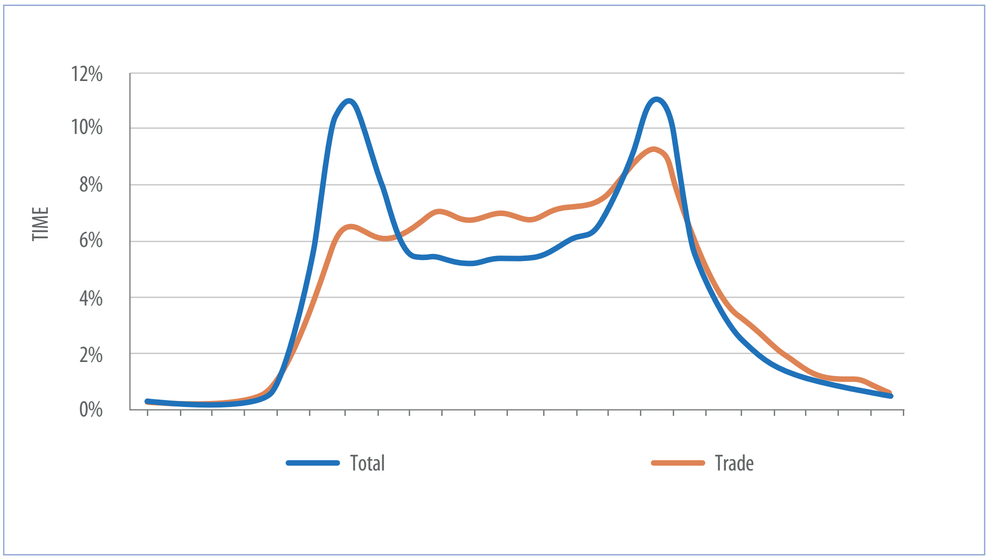
5.2.5 Logistic characteristics

Logistic deployment and mileage

In the 'trade' sector, vans are mainly used for supplying sales outlets from the company's own depot or warehouse, for purchasing goods and for making deliveries to customers. Journeys to supply sales outlets and make deliveries to customers using the company's own vans mostly take place between 08:00 and 18:00. The use of vans in the 'trade' sector mainly corresponds with the off-peak profile (see also Figure 27 on page 36).

Figure 46 below shows the usage of vans within the 'trade' sector throughout the day:

Figure 46: Usage of vans within the 'trade' sector by time - source: TNO license plate scans

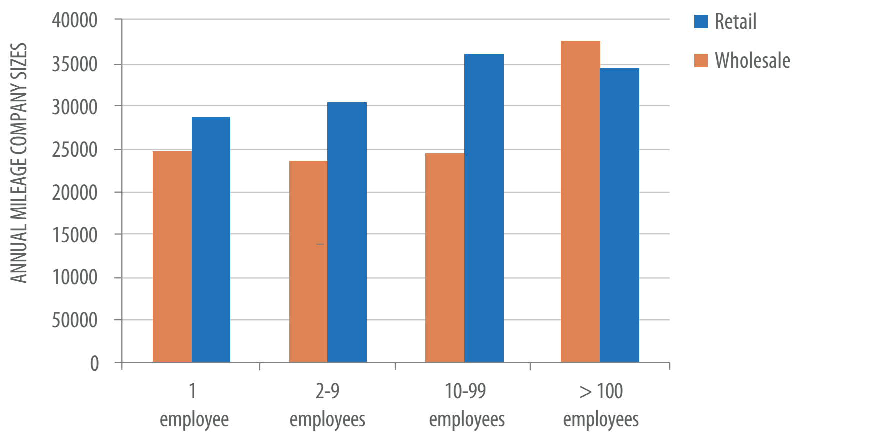


The findings from the interviews were as follows:

- Based on the interviews, it appears that the larger companies use their vans for more than 8 hours a day on average. These companies aim to achieve the optimal deployment of their vehicles.
- The interviews also reveal that the smaller companies use their vans for fewer hours on average throughout the day. The vans are mainly deployed in the morning.
- Within the 'trade' sector there is a significant difference between larger companies operating nationwide and smaller local companies. The larger retailers and wholesalers maintain a national network of warehouses and sales outlets where they deploy vans as well as larger vehicles. For these large companies there is also a difference between the logistic characteristics of vans used to supply sales outlets and those used to make deliveries to customers.

Figure 47 shows the average annual mileage for retail and wholesale by company size. These data were sourced from RDW and concern vehicles in the 0-4 year age category. From the available data it appears that small and medium-sized companies in retail (0-100 employees) drive an average of 30,000 km per year with a van. Large companies in retail (>100 employees) drive considerably more kilometers (40,000 km per year). For wholesale companies the annual mileage generally increases with company size, with the exception of the largest companies in this sector.

Figure 47:
Jaarkilometrage voor detailhandel en groothandel naar bedrijfsgrootte voor voertuigen tot 4 jaar oud - bron: RDW, 2017



The figure also shows that the annual mileage is higher for wholesale than for retail companies. The largest companies (more than 100 employees) are an exception here. The annual mileage for wholesale companies in this group is lower than the annual mileage in retail. One reason for this could be that large wholesale companies outsource their transportation more to logistic specialists. Another reason may be that the logistic network for vans is better optimized at the largest wholesale companies. This means that distances traveled by vans between the DC and the customer, or between the company's own supply points, can reduced.

The findings from the interviews were as follows:

- The large companies that were interviewed indicated that vans drive an average of 25,000-40,000 kilometers per year for deliveries. Next to this, these large companies often deploy larger box trucks (see section 5.2.4, which cover each around 100,000 kilometers annually.
- Average annual mileage is relatively low for smaller companies in particular. From the interviews with smaller companies it appears that vans drive an average of 15,000 to 20,000 kilometers per year. Vans are mainly deployed for local and regional transport. They are also on the roads for much less time per day (as indicated above).
- With regard to annual mileage in the 'trade' sector, the drop density (number of stops per driven kilometer) is an important factor; the higher the drop density, the lower the annual mileage. From the interviews it appears that the drop density varies considerably between companies. This is related to the sector in which a company is active (e.g. medical products or technical products) and the ordering behavior of the customer.
- From the interviews it appears that there are considerable variations in deployment. The journey characteristics vary from a single journey (100 kilometers) per day, during which 40 deliveries (stops) are made, up to 10-12 journeys per day with an average of 2-3 deliveries per journey. A fleet-management system is used to optimize journeys.

The interviews also reveal that, on average, companies in the 'trade' sector are more active within built-up areas than outside of built-up areas and on highways. The overview below contains a breakdown of deployment (as a percentage of total deployment time) by location:

Table 11: *Deployment of vans by ocation (based on deployment time) - source: BCI/Districon, 2017*

	Within a built-up area	Outside a built-up area/ Highway
Wholesale 1 - Deliveries	60%	40%
Wholesale 2 - Supply	30%	70%
Wholesale 2 - Deliveries	40%	60%
Wholesale 3	-	-
Retail 1	75%	25%
Retail 2	70%	30%
Retail 3	90%	10%

However, during this research just nine interviews in total were conducted with parties from the 'trade' sector, which means the interviews only give a limited impression of the sector. The hypothesis that vans in retail mostly stay within built-up areas/the city therefore cannot be proven.

The answer to Hypothesis 3 'Vans in retail mostly stay within built-up areas/the city' is as follows: The interviews reveal that companies in the trade sector drive more kilometers within built-up areas. However, the total number of interviews is limited (#9) and only reflects a small section of the sector. Based on this observation, the hypothesis cannot be proven with any certainty.

Fuel/CO_2 emissions

A total of 5.05 billion kilometers are driven annually within the 'trade' sector. The 'trade' sector therefore has a 22% share in the total distance traveled per year by vans. The average annual mileage is 5% higher than that of the total van fleet.
The total fuel consumption of the sector is approximately 280 million liters (average of 1,500 liters per vehicle per year). The total consumption per vehicle in the 'trade' sector is a fraction higher (+6%) than the average consumption per vehicle for the total van fleet (1,415 liters per year). This higher fuel consumption can be explained by the annual mileage (see above). In addition, consumption per kilometer is higher due to the deployment of larger vehicles in the sector.

Table 12: *Characteristics of fuel consumption and CO_2 emissions for vans in the 'trade' sector*

	Fuel consumption (l/100 km)	CO_2 emissions (g/km)
Two-seater < 1,500 kilograms	6,6	174
Medium-sized 1,500-2,000 kilograms	8,8	231
Large 2,000-2,500 kilograms	10,2	268
Extra large > 2,500 kilograms	12,1	320
Average for total van fleet	**8,5**	**224**

The total CO_2 emissions of the 'trade' sector attributable to van traffic amount to around 1.1 million tons per year. The average emissions per vehicle kilometer are 224 g/km and are thus 2% higher than the average CO_2 emissions of the total van fleet.

5.2.6 Developments and trends

Conclusions from the sector analysis, vehicle characteristics and logistic deployment

Within the two activities 'retail' and 'wholesale' a total of 129,500 vans are active. The most important characteristic of the vehicles in this sector is the relatively high load volume, which is needed to ensure the flexibility of delivery or supply activities. That is why the fleet contains a larger than average share of large and extra-large vehicles. Large vehicles are mainly chosen when goods with a large volume need to be transported.

The average age of a van in 'trade' is approximately 10 years, which corresponds to that of the total van fleet. The composition of the vehicles on the basis of age segment is also virtually identical to the composition of the total van fleet: 65% of vehicles is more than 5 years old.

Around 30% of all vehicles are owned by medium-sized and large companies (>10 employees) and 70% are owned by small entrepreneurs (1-9 employees). As regards logistic operations, large and small companies have different characteristics, challenges and opportunities:

- Large companies are focused on logistic optimization. The most important challenges are: customers' ordering behavior/journey optimization and limitations with regard to load volume.
- Small companies deploy their vehicles less efficiently, driving fewer kilometers and with less of a focus on logistic efficiency. These small entrepreneurs have their own vehicle for reasons of flexibility. The downside of this is the relatively high cost of the van.

Trends, opportunities and initiatives in the sector

The interviews reveal that large companies in the 'trade' sector generally succeed in optimizing the logistic deployment of their vehicles. These large companies have a large fleet of vans, most of which are leased, and operate within a national network of supply points and sales outlets.

Opportunities and challenges for larger companies

Customers are ordering more frequently, which reduces the volume per drop. There is also no incentive for the customer to consolidate orders. The ordering behavior of the customer results in multiple journeys with a lower volume. This may prompt parties in the 'trade' sector to switch over to smaller vehicles, creating opportunities for electric vehicles. Moreover, new opportunities are being created in the labor market, in terms of hiring new drivers.

An important challenge for large companies is journey optimization, the aim of which is to increase the drop density and lower the number of kilometers driven (ideal for electric vehicles). This means that opportunities are arising in relation to the implementation of advanced journey optimization systems and track & trace systems.

Opportunities and challenges for small businesses

For the smaller companies within the sector logistic optimization does not seem to be a consideration. The vehicles are mainly deployed for daily transportation from and to the outlet (retail). These journeys often take place during the rush hour and increasingly within built-up areas. There are a number of significant developments at smaller companies:

- Thanks to the development of online-shop and B2C deliveries, small and medium-sized companies are outsourcing more of their transport. This is creating opportunities by reducing transport costs for these entrepreneurs, as well as risks and personnel costs, and enabling them to deploy their own staff more efficiently.
- Cities are becoming less attractive places for deliveries, due to the permits required and higher parking costs.

For small and medium-sized companies vans provide flexibility, but bring with them relatively high costs, especially when one considers the number of hours per day for which a van is deployed for logistics and the need to plan journeys throughout the day. It is possible that a company's dependence on its own vehicles will decrease due to the outsourcing of transport, but costs will increase due to access restrictions and permits. For small companies, finding the balance between the required flexibility and the costs of running their own vehicles is a challenge. The opportunities for small companies thus lie primarily in the choice of vehicle and in gaining an insight into its cost.

Alternative opportunities for the vans submarket may arise from the shared use of vehicles:

- IT solutions could speed up the development of submarkets for company vehicles.
- To gain a better insight into the opportunities presented by car sharing, an analysis could be made of possible products/sectors within which car sharing might take place (types of goods, transport conditions, etc.).

6 Trends and developments

This chapter describes three trends and developments linked to the deployment and use of vans:
- **Load capacity: the need expressed by several types of van users to increase the maximum load capacity.**
- **Electric vans: considerations when purchasing and main target groups.**
- **Influence of costs: deployment of vans from a TCO (total cost of ownership) perspective.**
- **Use of vans for e-commerce**

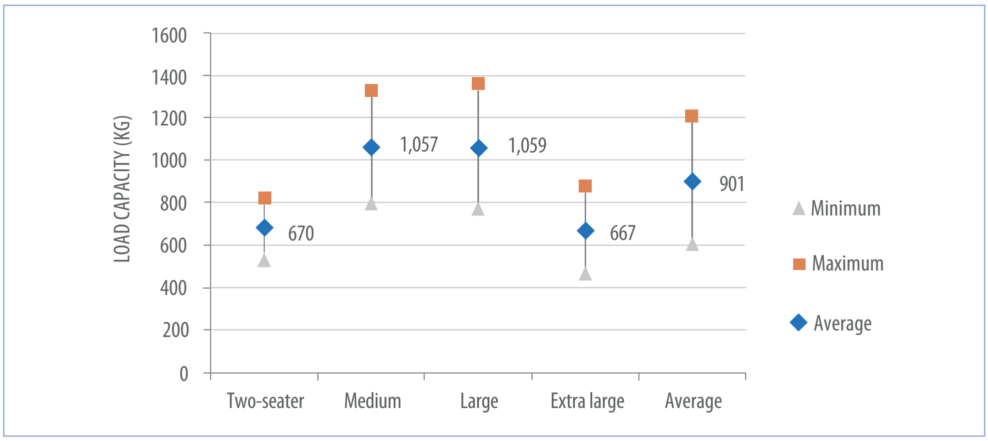
6.1 Load capacity of vans

Vans in the Netherlands have to comply with a maximum authorized mass.

1 To drive a van with a driving- license B, the total weight of the vehicle (i.e. the mass of the empty vehicle plus the load capacity) cannot exceed 3,500 kilograms.
2 The weight cannot exceed the technical maximum mass determined by the manufacturer. For smaller vans in particular, the kerb weight plus load capacity is therefore often lower than 3,500 kilograms.

The remaining load capacity is thus dependent on the kerb weight, the technical maximum mass and the maximum authorized mass in the Netherlands. Because medium-sized vans have a high maximum weight and a limited kerb weight they have on average the highest load capacity. Larger vans often have a higher kerb weight, which means there is a smaller load capacity.

Figure 48:
Average load capacity per van category and distribution



Despite their relatively limited load capacity, extra large vans are attractive because of their substantial load volume. As described in section 5.2, these vans are deployed in the 'trade' sector, for example, where the load volume is often more important than the loading weight. Another familiar example is the use of extra large vans to distribute large-volume parcels.

From the interviews with several market parties it appears that the limit of 3,500 kilograms is a limiting factor when it comes to the efficient planning of journeys (instead of 'volume' or 'maximum working time' as limiting factors). In particular logistics services providers mention this point. Increasingly they have a fleet of vans in addition to their larger vehicles (such as box trucks and tractors with trailers). A possible increase in the total weight of vans would result in fewer and/or more efficient journeys. A technical wholesaler indicated that 75% of its van journeys are restricted by this limit of 3,500 kilograms. Such parties would benefit from an increase in the maximum authorized mass.

A nationwide importer of vans confirms this and refers to neighboring countries such as Germany and France, where vans with a higher total weight are allowed to be driven with a license B.

When it comes to the deployment of electric vans the load capacity is also important. The kerb weight of these vans is higher because of the battery's mass, which reduces the load capacity. From 2010 until the end of 2015 several pilots were conducted in which (hybrid) electric vans were used for goods transport with a maximum authorized mass of up to 7,500 kilograms. These vehicles were allowed to be driven with a license B instead of a license C. These pilots have now ended and have yielded new knowledge and experience that can be drawn on for the further development and rollout of electric vehicles.

The Ministry of Infrastructure and the Environment is currently setting up a new pilot in which fully electric vehicles will have a permitted weight of up to 4,250 kilograms. In Germany this is already possible, but the Netherlands is still waiting for approval from the Europenion Union.

The market for electrically powered vehicles has seen significant growth over the last five years. One of the conclusions drawn following the pilots is that electric vehicles are able to fulfill the required functionality for specific kinds of deployment, such as distribution. See also the specific theme described in section 6.2.

6.2 Electric vans

The number of electric vans in the Netherlands has grown slowly but steadily in recent years. On January 1, 2017, there were 1,628 electric vans on Dutch roads. Three years ago there were only 669. The number of electric vans in the Netherlands has therefore more than doubled in the space of just three years, although it should be noted that the increase was smaller in 2015 and 2016 than in the peak year of 2014. This is because more generous fiscal advantages applied to electric vehicles purchased in 2014 compared with 2015 and 2016. In 2016, just under 200 new electric vans were sold, out of a total of over 70,000 new vans sold across the country. The use of electric vans in the Netherlands has thus grown in recent years, although we cannot yet talk about a genuine breakthrough. In 2016, 0.3% of all vans sold were electric.

Table 13: Growth in the number of electric vehicles in the Netherlands (2014 - 2017) - source: RVO, 2017

Number per vehicle type	1-jan-14	1-jan-15	1-jan-16	1-jan-17
Private car (FEV)	4.161	6.825	9.368	13.105
Private car (E-REV, PHEV)	24.512	36.937	78.163	98.903
Private car (FCEV)				30
Van < 3,500	669	1.258	1.460	1.628
Van > 3,500	39	46	50	66
Bus*	73	80	94	168
Quadricycles (formerly 3-wheelers)	632	769	872	1.007
Motorbike	125	196	268	316
Total on the roads	**30.211**	**46.111**	**90.275**	**115.223**

The two main types of electric vans used as per January 1, 2017 are the Renault Kangoo Z.E., with 678 vehicles, and the Nissan E-NV200, with 675 vehicles. This means that 83% of all electric vans in the Netherlands are a Renault Kangoo or a Nissan E-NV200. The Renault Kangoo Z.E. has a load capacity of 650 kilograms and a range of around 200 km in practice and can be charged in 6-9 hours. The purchase price of the Renault Kangoo Z.E. was around 22,000 euros at the beginning of 2017. The Nissan E-NV200 has a load capacity of 800 kilograms and a range of around 150 km in practice and was the bestselling electric van in Europe in 2016 with 4,319 vehicles sold. The purchase price of the Nissan E-NV200 was around 25,000 euros at the beginning of 2017.

6.3 The influence of costs on the usage of vans

6.3.1 Introduction

One of the determining factors that influences the ownership and use of a van are the costs. It is not just the acquisition cost that is important here. Fuel costs, taxes (such as vehicle tax or the additional tax payable for private use), and maintenance, repair and insurance costs all play a significant role. An additional cost advantage of vans is that an ordinary license B is sufficient to drive them and a tachograph is not required. On the other hand, one of the disadvantages of vans is that they can transport fewer goods and thus have to make more journeys.

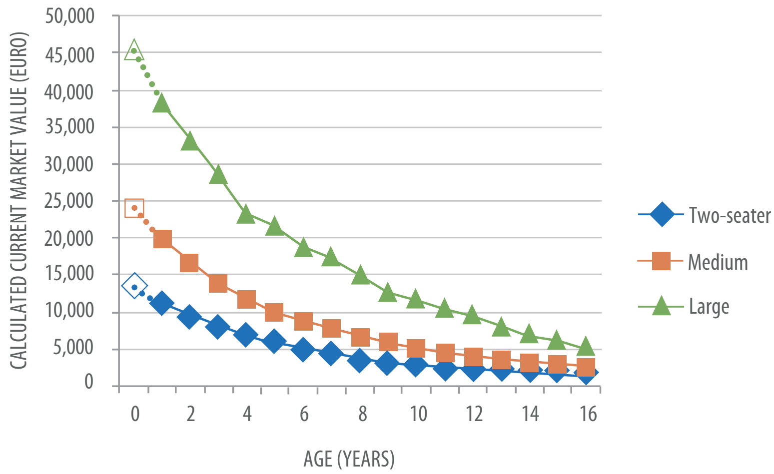
Whether or not a van is used also depends on less visible costs and benefits, such as the make and comfort of a van. One of the considerations might be that a more spacious van is desired. This category of costs is difficult to analyze and is therefore not considered in this study.

This chapter identifies several important cost components affecting the ownership and use of vans. It also examines the extent to which these costs differ between two-seaters, medium-sized and large vans, and between the sectors 'construction', 'trade', and 'transport and storage'.

6.3.2 Age and depreciation

The depreciation of a vehicle is generally one of the most important cost items for a user. The rate of depreciation varies over time. When a new vehicle is first purchased, the depreciation is much higher per year than for vehicles that are already several years old. The figure below shows the depreciation curves for three weight classes of vans[11]. It is clear that the current market value decreases most during the first few years, especially for large vans, which depreciate fastest of all. The estimated new price (age 0 years) is subject to much uncertainty and is therefore indicated with a dotted line.

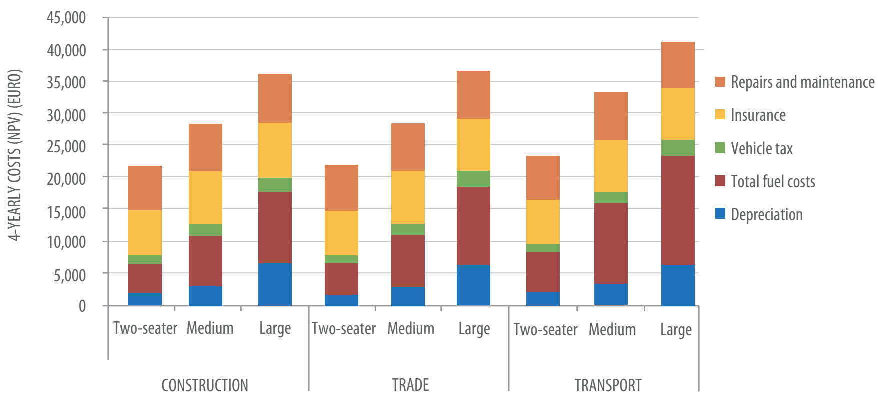
Figure 49:
Development of current market value by age of van



6.3.3 Spotlight on certain cost items

With the depreciation curves and other information on costs , the most important cost items for van users of three van categories can be presented. Figure 50 shows the costs for a usage period of 4 years.

Figure 50:
Sum of the most important cost items for van users by size class and sector



[11] *The depreciation rate has been derived separately for this research by compiling a separate database. This involved reading out data from a website that sells second-hand vans. Depreciation curves have been estimated based on the asking prices, age, annual mileage, size category of the van and the make. The level of vehicle tax has been calculated using data sourced from the tax authority*

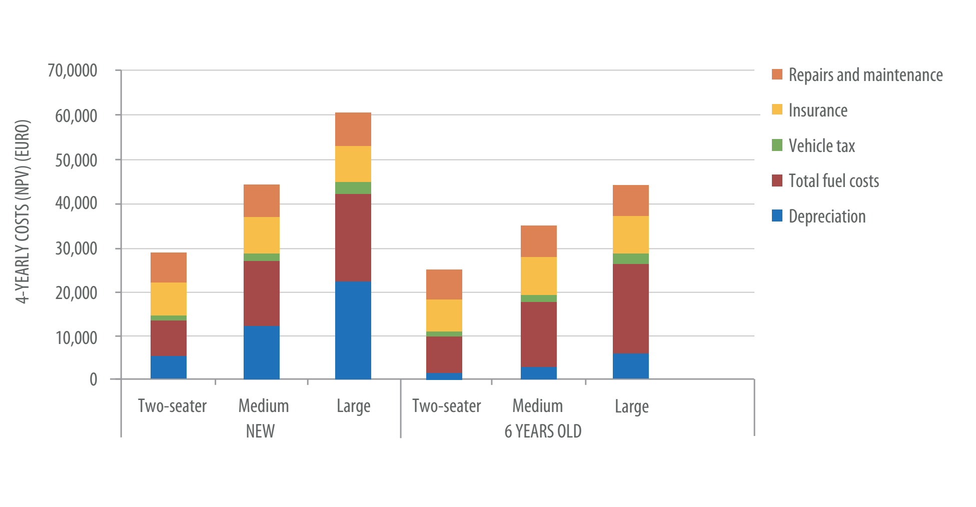
[12] *The level of vehicle tax has been calculated using data sourced from the tax authority (www.belastingdienst.nl). Fuel duties have been taken from www.brandstofprijzen.nl. Together with the data on weight, fuel type, CO_2 emissions and annual mileage recorded in the RDW database, it is possible to determine the fuel costs. Data on repair, maintenance and insurance costs have been obtained from Panteia.*

The first point to note is that there are only slight differences between the three sectors. In other words, the costs shown for a small van in 'construction' are very similar to those of a small van in 'trade' and 'transport and storage'.

It is notable that the depreciation charges account for a rather limited share of the costs shown. This is because the average age of vans in the three sectors is around 5 to 6 years and a large portion of the original value has already been wiped off. In particular, the fuel costs, insurance, and repairs and maintenance are the ones who determine the lion's share of the 4-yearly costs. Vehicle tax also represents only a small portion of the costs shown. It has been assumed here that at least 10% of the kilometers driven by all vans are for business purposes and therefore that no purchase tax is payable.

The depreciation charges in Figure 51are based on the current average age of the vehicle. When a new vehicle is purchased, the depreciation costs are clearly higher (see Figure 52). In that case the depreciation charges for a usage period of four years are similar to the fuel costs.

Figure 51:
Sum of the most important cost items for users of new and 6-year-old vans



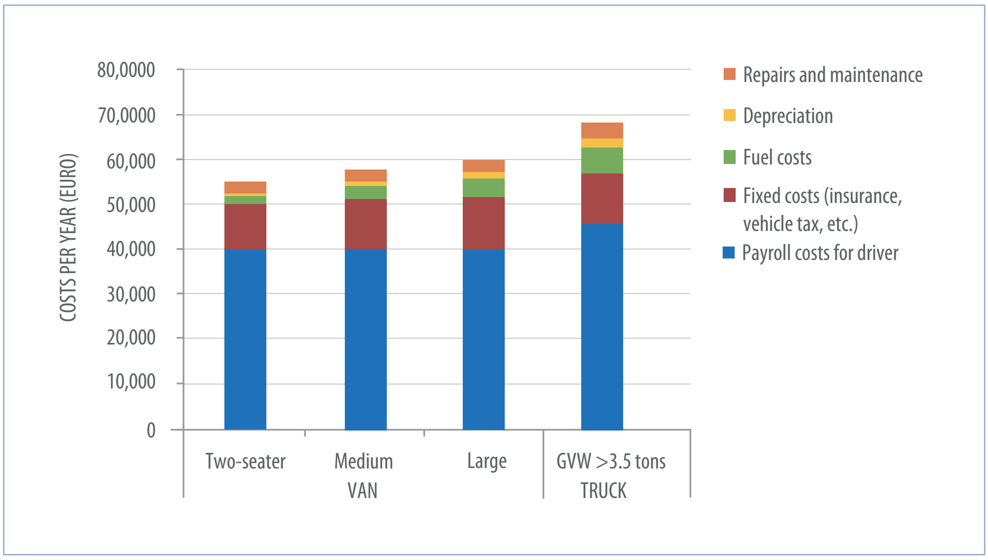
One result that is not surprising is that the costs of smaller vans are considerably lower than those of larger vans. However, this does not necessarily mean that many van users would be better off opting for a smaller van based on cost considerations, as a large van allows more goods to be transported and in theory means that fewer journeys are required. In 'transport and storage' in particular, a segment in which relatively large distances are covered and large volumes are transported, a switch to smaller vans will result in more journeys. The above applies to a lesser extent to the construction sector. A large portion of the vans used in construction are usually medium-sized vehicles that are only partly used for the transportation of goods (see chapter 3 and section 4.1).

In other words, the load capacity of vans in construction is not utilized fully by many users. These users could save on fuel costs by choosing a smaller van, which will also reduce their CO_2 emissions. It should be noted here, however, that the users of these construction vans have their reasons for wanting some extra load capacity. There is a precautionary principle at work: users like the security of being able to use the additional capacity in exceptional cases, as confirmed in the interviews. The interviews did, however, reveal that switching to smaller vans might be possible if stock levels in the vans of service mechanics and the ordering behavior of customers were managed better (see chapter on 'trade'). This could lead to a reduction in costs.

6.3.4 Cost advantage of vans versus small trucks

For some forms of transportation, the decision to choose a van may be motivated by the fact that they have fewer limitations than small trucks. For example, drivers of trucks (gross vehicle weight of more than 3.5 tons) need to have an HGV license and this increases payroll costs. There are also stricter rules on driving and resting times for heavy trucks. Figure 52 compares the costs of vans and light trucks, including payroll costs. It is clear that payroll costs account for a dominant share of the total operational costs. At the same time, the difference between vans and small trucks is not significant. This could mean that vans are used not because of their lower costs, but because they can be deployed flexibly. Interviews with logistics services providers, for example, confirm this. The examples of the flexibility of vans mentioned above are the availability of drivers (compared with a shortage of drivers with an HGV license), the accessibility of delivery locations and a shorter stopping time.

__Figure 52:__
Operational costs: payroll costs and other fixed and variable costs for vans and small trucks - source: Panteia, processed by CE Delft



6.3.5 Conclusions

The age of a van largely determines the current market value and therefore the depreciation charges. The ages of the average vans used in the 'construction', 'trade' and 'transport' sectors hardly differ from each other. That is why the depreciation charges also do not differ significantly between these sectors. Large, more expensive vans lose their value more quickly compared with small, cheaper vans. The depreciation charges are therefore relatively high for companies that use a lot of large vans. Fuel costs are one of the most important cost items for van users. Depreciation charges and road tax account for only a relatively small portion of the costs. The difference in (payroll) costs between vans and small trucks is fairly insignificant. The greater flexibility offered by vans compared with small trucks is probably at least as important as costs when deciding which of the two to use.

6.4 Use of vans for e-commerce deliveries

In the Netherlands, the number of purchases made over the internet increases by approximately 20% every year. In 2016, online orders worth 20.2 billion euros were placed in the Netherlands, an increase of 23% compared to 2015 (source: Thuiswinkel.org). Around half of these orders relate to physical products, while the other half concern services such as travel. The 10 billion euros' worth of products ordered in 2016 are, for the most part, delivered to customers' homes in vans by specialist parcel transporters, such as PostNL, DHL, DPD, Sandd and UPS. These online orders include consumer products, such as clothes, shoes, IT devices and books, but also, to an increasing extent, fresh food.

How many vans are used in the Netherlands to deliver online orders to consumers' doors? Up until now, this has not been calculated. As part of this research, a top-down and bottom-up analysis were used to determine the number of vans deployed for e-commerce in the Netherlands.

Top-down analysis

For the top-down analysis, the number of vans registered per sector was considered. To make this estimate, a selection was made of sectors that potentially carry out e-commerce activities (source: custom data from CBS). For each sector selected the share of e-commerce in a maximum and minimum variant was estimated. No distinction was made between B2B and B2C activities. Based on these data, it can be concluded that 1.8% to 3.2% of vans are deployed for e-commerce, or 15,000 to 28,000 vehicles.

PostNL and DHL own around 1,800[13] and 1,500[14] vans respectively. The two largest parcel distributors thus jointly own around 3,300 vehicles, or 11% to 22% of the vans that are used for e-commerce.

The average annual mileage of this group of vehicles appears to be around 30,000 km/year[15]. That is roughly 50% higher than the average for all vans. These vehicles' share in the number of kilometers driven by vans is therefore also around 50% higher than their share in the total number of registered vehicles, or 2.6%-4.6%.

[13] *https://automotive-management.nl/nieuws/laatste-nieuws/overig/19186-postnl-ruilt-diesels-in-voor-groengas (visited on March 27, 2017).*

[14] *www.nieuwsbladtransport.nl/Nieuws/Article/ArticleID/42001/ArticleName/DHLParcelBeneluxschaft750bestelwagensaan (visited on March 27, 2017)*

[15] *determined on the basis of vehicles for which a KvK number is known to RDW (see also annex E).*

Table 14:
Overview per sector of the number of registered vans - source: CBS, the share of e-commerce - source: expert estimation and the average annual mileage - source: RDW and CBS

Sector	No of vehicles	E-commerce share Min. in %	 Max. in %		Average annual mileage
46421 Wholesale - outer clothing	660	0	10		29.465
46424 Wholesale - shoes	120	0	10		27.005
46425 Wholesale - fashion articles	110	0	10		26.417
46432 Wholesale - household appliances	260	0	10		26.505
46901 Wholesale - consumer goods (general)	1.260	0	10		25.334
4711 Supermarkets	2.340	50	50		20.691
47191 Department stores	80	50	50		20.064
4741 Computer and software stores	360	0	50		21.904
4742 Communication device stores	180	0	50		28.901
47431 Brown good stores	640	0	50		20.452
47432 White and brown good stores	1.000	0	50		19.147
47543 Other household appliance stores	50	0	50		22.680
47761 Flower and plant stores	2.950	0	50%		22.795
4791 Mail-order companies, online shops	3.420	100	100		23.012
49 Transportation over land, other	40	0	50		31.442
4941 Road goods transport (excl. removals)	12.100	0	50		31.988
53201 Local mail	530	100	100		32.768
53202 Couriers	9.930	100	100		44.738
56101 Restaurants	3.780	0	20		18.708
56102 Snackbars, lunchrooms and food stalls	4.500	0	50		18.390
Total vans active for e-commerce	**44.310**	**15.090**	**26.997**		**29.927**
Total vans	**837.140**	**837.140**	**837.140**		
Share of e-commerce		**Min 1,8%**	**Max 3,2%**	**Min 2,6%**	**Max. 4,6%**

Bottom-up analysis

According to ACM, there were 208 million online sales in the Netherlands in 2015[16]. This results in a required number of vans of around 22,000, based on the following assumptions:

- Mail delivered 310 days per year
- 75% delivered at first call
- 40 parcels per van

This is of the same order of magnitude as the figure determined on the basis of the top-down analysis.

Type of vehicles

Most of the vans that are used to deliver parcels fall under the categories of large or extra-large, which means large volumes can be transported per journey.

Expected developments

The number of products ordered online is expected to grow by 10%-20% per year over the coming years. This may lead to a further increase in the number of vans deployed to fulfill e-commerce orders. However, other modes of transport are also being used to an increasing extent to deliver products ordered online. For example, the rapidly growing online supermarket Picnic deploys specially designed electric vehicles that are not officially categorized as vans. Additionally, more and more bicycles are being used to deliver products, especially food, within city centers.

[16] *ACM, 2016. 'Marktscan Pakketten' ('Market scan for parcels'). Final report*

Appendix A Which Dutch term for 'delivery van' is the most appropriate?

In Dutch the terms 'bestelauto' and 'bestelwagen' are both used to refer to a delivery van. Which of these terms is the most appropriate? In operational practice there is no distinction between these two terms and they are used interchangeably on the commercial market and within society. However, in its laws and regulations the government uses the term 'bestelauto' alongside the term 'personenauto' (car). This is because there are tax exemptions for delivery vans that are not available for cars. The government always uses the legally defined term 'bestelauto' in regulations and reports, and the same applies to agencies such as RDW and CBS. Industry associations also use the term 'bestelauto'. The term 'bestelauto' has therefore been used in the Dutch version of this report.

Definition of a delivery van ('bestelauto')

In order to be eligible for certain vehicle tax exemptions, a delivery van must meet the following requirements:

- It must be designed primarily for the carriage of goods.
- The loading area must have a solid, flat loading floor over its entire width and length.
- No seats may be present in the loading area.
- The maximum authorized mass is 3,500 kilograms. The maximum authorized mass is the weight of the van plus the permitted combined weight of passengers and cargo.
- There are also requirements relating to the body and layout, which are different for 5 types of delivery van. For a large type of van the loading floor, for example, must meet various dimension requirements: it must be at least 200 cm long, and the loading area must be at least 130 cm high over at least 200 cm of its length and at least 20 cm of its width. Also, there are detailed rules on the partition between the loading area and the driver's cabin, as well as on the right-hand side window in the loading area. One of the 5 approved types of delivery vans has a double cabin, but this type is only recognized as a delivery van for tax purposes if the vehicle meets specific requirements relating to the body and layout (see also www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/prive/auto_en_vervoer/belastingen_op_auto_en_motor/motorrijtuigenbelasting/soort_motorrijtuig/bestelauto/eisen_aan_ombouw_en_inrichting).

A delivery van is, however, regarded as a car for tax purposes in one or more of the following cases:

- if there is no connection between the use of the delivery van and the intended work;
- if the delivery van is not intended for goods transport;
- if more than 10,000 kilometers are driven in the delivery van for private purposes, in addition to commuting

Appendix B
Technical vehicle information

Subject	Description	% filled
License plate	License plate of the vehicle	100
First registration date	This date indicates when the vehicle was first registered in the Netherlands.	100
First licensing date	This date indicates when the vehicle was first registered (anywhere in the world).	100
Mass of empty vehicle	This is the mass of a vehicle, expressed in kilograms, without passengers and cargo.	100
Maximum mass of vehicle	The legally permitted maximum mass of the vehicle, derived from the vehicle's technically permitted maximum mass. If necessary, this is reduced on the basis of legal provisions or at the request of the applicant of the registration certificate.	100
Brand description	The brand of the van as specified by the manufacturer.	100
Type description of vehicle	he type designation as used by the manufacturer.	100
Design code	Number linked to different vehicle designs.	100
Fuel	National code for the fuel or power source of a vehicle's engine.	100
Removal date	This is the date when the vehicle was removed from the Dutch fleet.	100
Removal status	Description of the reason why the vehicle was removed from the Dutch fleet.	0
Number of changes	The number of times a change in the RDW occurred for this license plate	100
Type of reference	This indicates the type of owner	100

Appendix C
Privacy-sensitive vehicle information

Subject	Description	% filled
Gender	Gender of the owner of the vehicle	22%
Street name	Street name where the vehicle is registered	53%
House number	House number where the vehicle is registered	53%
House number suffix	Any addition to the house number where the vehicle is registered	6%
Numeric postcode	4-digit postcode where the vehicle is registered	53%
Alphanumeric postcode	Complete postcode where the vehicle is registered	53%
Place name	Place where the vehicle is registered	53%
KvK number	If the vehicle is known to belong to a company, the Kamer van Koophandel (Chamber of Commerce) number of that company is given here	38%
Length	Length of the vehicle	53%
Width	Width of the vehicle	53%

Appendix D Kamer van Koophandel (Chamber of Commerce) information

Subject	Description	% filled
Legal form	Legal form of the company to which the vehicle belongs	36%
SBI code	Industry code of the company to which the vehicle belongs	36%
SBI name	Industry name of the company to which the vehicle belongs	36%
Since	Year of foundation of the company to which the vehicle belongs	36%
No. of employees	Number of employees in the company to which the vehicle belongs	35%
Municipality code	Code of the municipality in which the company to which the vehicle belongs is located	36%
Municipality name	Name of the municipality in which the company to which the vehicle belongs is located	36%
Province code	Code of the province in which the company to which the vehicle belongs is located	36%
Province letter	Name of the province in which the company to which the vehicle belongs is located	36%

Appendix E
Consistency of figures between CBS and RDW

Part of this research is based on information from RDW about delivery vans that were present in the Dutch fleet on June 1, 2016. This concerns 932,854 delivery vans. Another part is based on the results requested from CBS. For this purpose CBS made use of, among other things, the RDW database it acquired on January 1, 2015, meaning there is a time difference of one and a half years between the two data sources.

The consortium supplied 836,919 license plates to to obtain figures. The selection criteria for these vehicles were as follows:

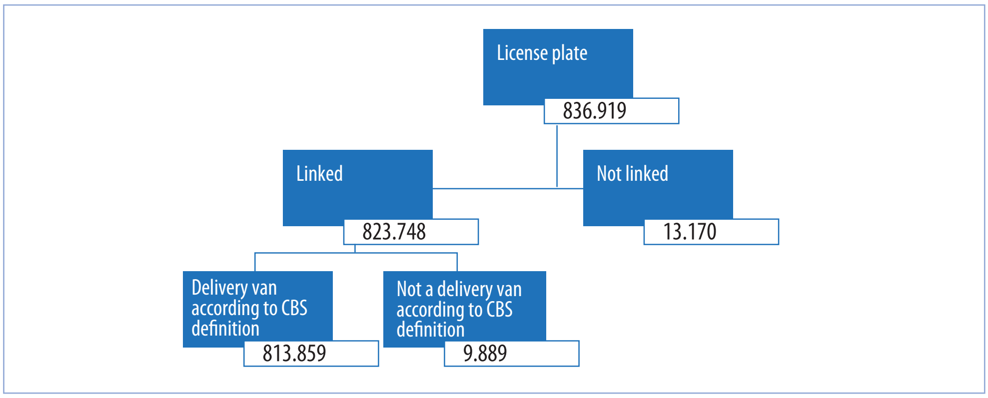
- The vehicles have a first registration date (see Appendix 1) before January 1, 2015.
- The vehicles have a removal date (see Appendix 1) after January 1, 2015.
- Any vehicles identified as special vehicles (on the basis of the design code, see Appendix 1) are not included. Examples of special vehicles are fire engines, hearses and camper vans.

CBS was able to link 823,748 of the license plates to its data (98.42%). This means that 13,170 plates were not linked. One possible reason for this is that over the one and a half year period various dates were changed and that among the 836,919 plates supplied to CBS there were also plates which were not known to RDW on January 1, 2015 and therefore not delivered to CBS. CBS also stated that vans whose liability insurance has expired at the time the data request is made to RDW (in the online vehicle information on the RDW website these vehicles often have an expired APK (periodic motor vehicle test) and are not insured under the Motor Insurance Liability Act (WAM)) disappear from CBS's radar and are not included in the data supplied by RDW, regardless of their status on January 1, 2015.

Finally, CBS stated that 1.2% of the license plates supplied by the consortium did not fall under its definition of a delivery van. CBS's definition of a delivery van is as follows:

A commercial vehicle, designed for the carriage of goods, whose kerb weight plus load capacity (maximum allowed mass) does not exceed 3,500 kilograms. Delivery vans designed and mainly used for goods transport, pick-ups and small trucks with a gross weight not exceeding 3,500 kilograms fall into this category.

Figure 53:
provides a schematic overview of the figures



Appendix F
Clustering of delivery van license plates

For this research results requested from CBS were used. Due to privacy regulations, these results could not be shared with the consortium at license plate level. The plates were therefore clustered and the results supplied for these clusters. A description of how the clustering was performed is provided below.

First of all, only delivery vans that run on diesel were selected (94%). A distinction was then made between vans registered with RDW with an owner who is a Legal person or a Natural person. Finally, any special vehicles (fire engines, hearses, camper vans, etc.) were excluded from the clustering. The K-means cluster algorithm was then applied. For a given number of desired clusters, the algorithm determines the cluster within which a license plate will fall. The clustering was performed on the basis of four parameters: year of construction, kerb weight, load capacity and annual mileage. The common denominator in these parameters is that they contain continuous values. In the K-means cluster algorithm, each cluster is associated with a center (central point), and each point goes to a cluster with the closest center. After all the points have been distributed over the clusters, the centers are recalculated. Based on these new centers, the points are then redistributed so that they are assigned to the cluster whose center is closest to the point.

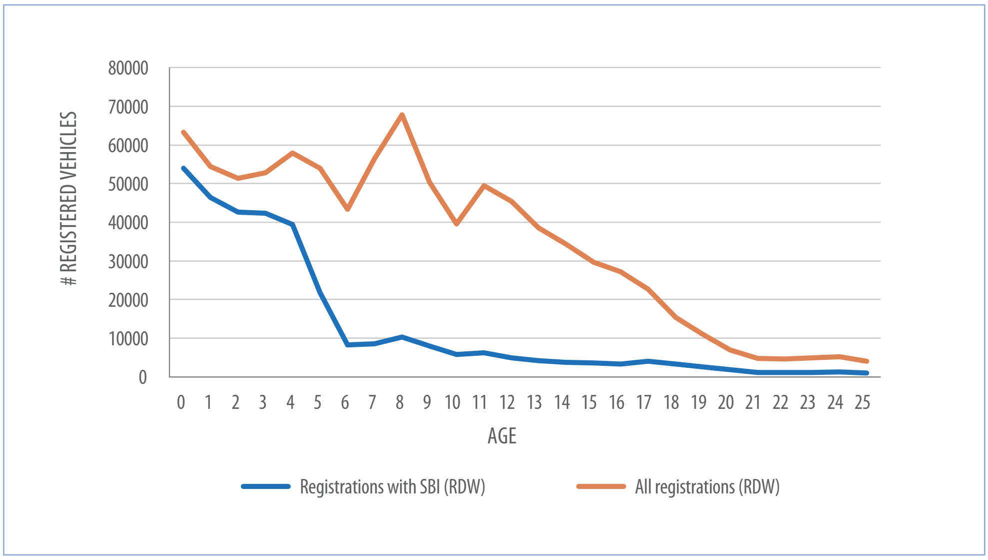
It was agreed in advance with CBS that the data would be divided into 25 clusters. Within *Legal person* and *Natural person* 12 and 10 clusters were chosen respectively. As there was still room for three more clusters, three clusters were added to differentiate between different fuels (Petrol, LPG and CNG).

CBS then shared information about these clusters. The figures shared with the consortium were rounded to the nearest ten.

Appendix G
RDW and KvK data on the age of delivery vans

During the research it was found that the number of vans for which the Kamer van Koophandel (Chamber of Commerce) held data was extremely low for vans older than four years. This is clearly shown in Figure 54.

Figure 54:
Age distribution



One reason for this is that for certain groups RDW does not register a Kamer van Koophandel number. Another explanation is that, after a change is made in the RDW file, no new Kamer van Koophandel number is recorded for the new owner. The selection of vehicles with a Kamer van Koophandel number is therefore not representative in terms of business information (sector, company size, etc.). As a result, it is not possible to draw any conclusions linked to business information based on the RDW database. Instead, use was made of the (clustered) results requested from CBS.

Appendix H
CBS and RDW data on the ownership of delivery vans

RDW distinguishes between three types of owner (Legal person, Natural person and Stock-in-trade), while CBS makes a distinction between companies and private individuals. These groupings do not correspond particularly well, as shown in Figure 55. 'Natural person' not only includes people, but also various company forms. A natural person is a legal form where there is no separation between the assets of the company and the personal assets of its owners. Examples of these types of businesses are sole traders and general partnerships. As a result it is not possible to filter the RDW database on the basis of delivery vans used by private individuals.

36% of delivery vans have a Kamer van Koophandel number, which means it can be said with certainty that these vans are registered to a company. Table 15 shows the share of each form of ownership for license plates for which a Kamer van Koophandel number is known. Legal person accounts for by far the largest share here. However, 1 in 5 companies have been identified as a Natural person.

It could not be determined whether the delivery vans without a Kamer van Koophandel number are owned by companies or private individuals.

Figure 55:
License plates distributed by ownership based on RDW data (left) and CBS data (right)

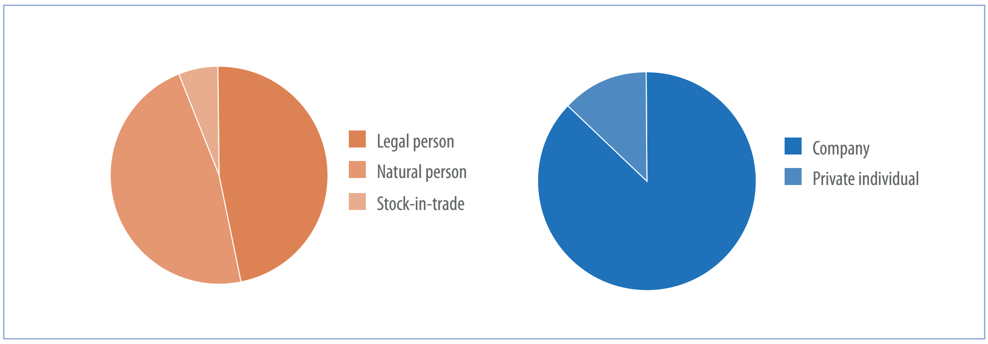


Table 15:
Share of ownership

Ownership	Share
Legal person	75%
Natural person	21%
Stock-in-trade	4%

Appendix I
CBS and RDW data on the leasing of delivery vans

The requested CBS results and the RDW database differ from one another in several respects. One of them is in relation to leasing.

RDW registers the owner of the vehicle (in this case the leasing company), while CBS registers the main user. CBS acquires this information from sources such as the tax authority. As a result, on the basis of the requested CBS results, more detailed statements can be made about who the user of the delivery van is.

Appendix J
Fleet scans

The fleet scans were conducted during the first two weeks of October 2016 (from October 1 to 14, 2016). The locations were chosen in such a way as to represent local situations throughout the Netherlands. The camera locations are shown in Figure 56.

Figure 56:
Locations of fleet scans - source: The fleet composition on the Dutch roads relevant for van emissions - TNO, 2016; Ligterink

	Location
Urban road	Oss, Raadhuislaan in the direction Lievekamplaan Leeuwarden, Keizergracht in the direction Oosterbrug Hengelo, Marskant in the direction Deldenerstraat
Non-urban road	The N18-235k Achterhoek in the direction Groenlo The Alkmaar ring road N9-81k in the direction Heiloo The N381-60k in the direction A28 The N57-57k Zeeland in the direction Serooskerke
Dual carriageway	A1-129k in the direction Hengelo A2-171k in the direction Eindhoven A28-64k in the direction Harderwijk A44-2k2 in the direction Amsterdam

The locations were chosen such that they were distributed across the Netherlands. To minimize the number of cameras, the highway locations were chosen based on the requirement that there were two lanes in both directions. The roads were monitored in one direction. Earlier studies had concluded that, over a whole day, the traffic flow is the same in both directions, as traffic that drives one way in the morning will drive the other way in the evening.

Appendix K
Interviewed parties

The table below contains an overview of the number of interviews per market segment.

Markt segment	No of interviews
Self-employed (builders, gardeners, painters, etc.)	12
Industry and umbrella organizations	7
Construction	4
Parcel distribution & collection	4
Municipality	3
LSP	3
Pharma & healthcare	3
Automotive	2
Food/online food	2
Wholesale/retail	2
OEM	2
Newspapers and magazines	1
Money and valuables logistics	1
Service logistics	1
Eindtotaal	**47**

The defined market segments in the interviews differ from the sectors described in chapter 4. For example, self-employed persons who appear in the table above as a eparate market segment are actually active in the 'construction' or 'trade' sector, for example. The same applies to the Food/Online food market segments ('trade' sector) or to suppliers/wholesalers in automotive parts or medicines.

Some of the parties approached did not wish to cooperate. The main reasons for refusing were: no time, no proper contact persons available and no own delivery vans.

Appendix L
Questionnaire used in interviews with users

1. Logistic process and supply chain description

a. What does the business do?/Typical use of the van in the segment:

b. Delivery van use/transport function:

- *Transporting goods* ________ %
- *Transporting people* ________ %
- *Working at a site* ________ %
- *Inspection/enforcement* ________ %
- *Commuting* ________ %

c. Ownership of delivery van:

☐	Company
☐	Private
☐	Rental/lease company
☐	Other:...

Load and load capacity

d. Type of goods, incl. B2B or B2C characteristics (parcels, consumer goods, fresh/conditioned, construction materials, removals, animal transportation, occasional large items, exhibition materials, etc.):

e. Unit of load (boxes, weight, etc.):

Unit	*Ave. load (number)*	*Ave. load (tons)*
Boxes/parcels		
Pallets		
Roller containers		
Other:		

What is the average load capacity of the loaded journeys?

0% ☐ 0-25% ☐ 25-50% ☐ 50-75% ☐ 75-100% ☐

What is the ratio of loaded to empty kilometers?

Loaded	
Empty	
Total	*100%*

f. Limiting factors in the use of delivery vans (time, volume, weight, etc.):

☐	Time	
☐	Volume	
☐	Weight	
☐	Other:...	

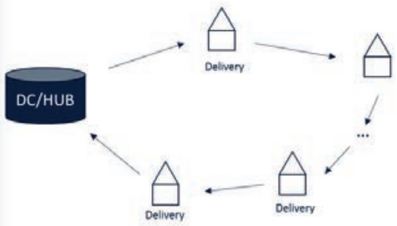
Bijlage L
Questionnaire used in interviews with users

Place and time of use

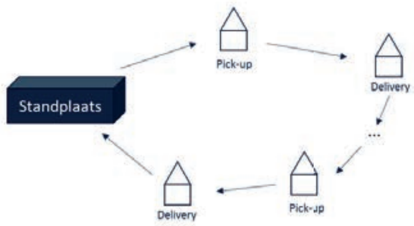
g. Storage location of delivery van: (business, home address, other location)

h. Diagram and description of logistic process/chain:

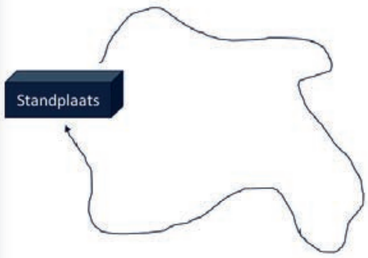
Delivery:



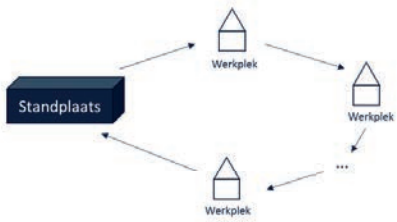
Pick-up & delivery:



Inspection/enforcement:



Working at a site (single stop/multi-stop):



i. Geographical use of delivery van:

☐	Local
☐	Regional (province/city region)
☐	Supra-regional (part of country)
☐	National
☐	International

Appendix L
Questionnaire used in interviews with users

j. *Time (when in use):*

	Morning/afternoon	Evening/night	Rush hour

Are there specific days when the van is used more/less?

Days of the week:

At which times are the vans used (driven)?

0 ☐	4 ☐	8 ☐	12 ☐	16 ☐	20 ☐
1 ☐	5 ☐	9 ☐	13 ☐	17 ☐	21 ☐
2 ☐	6 ☐	10 ☐	14 ☐	18 ☐	22 ☐
3 ☐	7 ☐	11 ☐	15 ☐	19 ☐	23 ☐

Or according to the top-down database:
- Use during rush hour
- Use outside rush hour:

On average, how many hours are they driven per day?

k. *Place (of use):*

Logistical use

l. *Average number of journeys per day:*

m. *Average number of stops per journey:*

n. *Average number of km per day (is that just one journey?):*

o. *Reason for using a particular type of delivery van:*

Type of van and body

p. *Van specifically fitted out for transport (e.g. conditioned transport, dry, combination):*

Appendix L
Questionnaire used in interviews with users

q. *What is the composition of your fleet?*

Bestelauto

Bestelbus

Bestelbus met dubbele cabine

Bakwagen met laadklep

Bakwagen zonder laadklep

Koelwagen

r. *Use of speed limiter*

☐	Always on
☐	On as standard
☐	Can be put on
☐	

s. *Additional rental of delivery vans:*

t. *Servicing – any specific customer requirements affecting the use of delivery vans:*

u. *Use of trailers (How often?):*

Appendix L
Questionnaire used in interviews with users

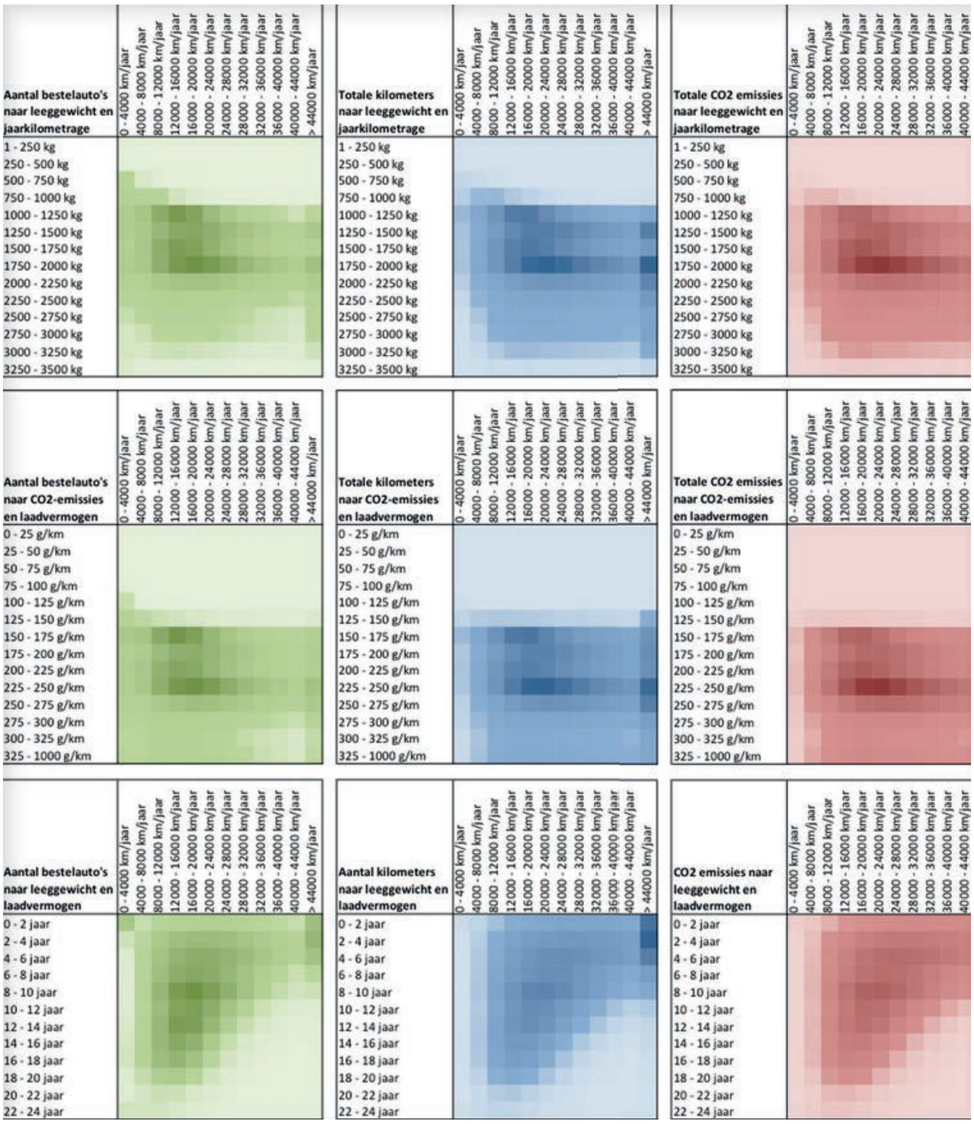
2.	**Qualitative information to complete the matrix segment**
a.	*Total number of km annually:*
b.	*Total number of liters of fuel annually:*
c.	*Total number of tons/m³ transported annually:*
d.	*Average lifetime of delivery van:* 0-2 years ☐ 2-5 years ☐ 5-9 years ☐ >9 years ☐
e.	*License plates available?*
f.	*Transport data to be received?*
g.	*Private use of delivery van (private, commuting, business):*
h.	*Speed limiter (on as standard + speed):*

3.	**Developments/possible improvements in use**
a.	*Most important market trends (e.g. transportation substitutes/pick-up points, use during the night):*
b.	*Urgent problems/challenges relating to use:*
c.	*To what extent is the use of the delivery van optimized?*
d.	*Opportunities resulting from trends/developments:*
e.	*Cross-over with other segments:*
f.	*Innovative initiatives of leading players:*
g.	*Innovative initiatives of respondent:*
h.	*Required commitment to improvement:*

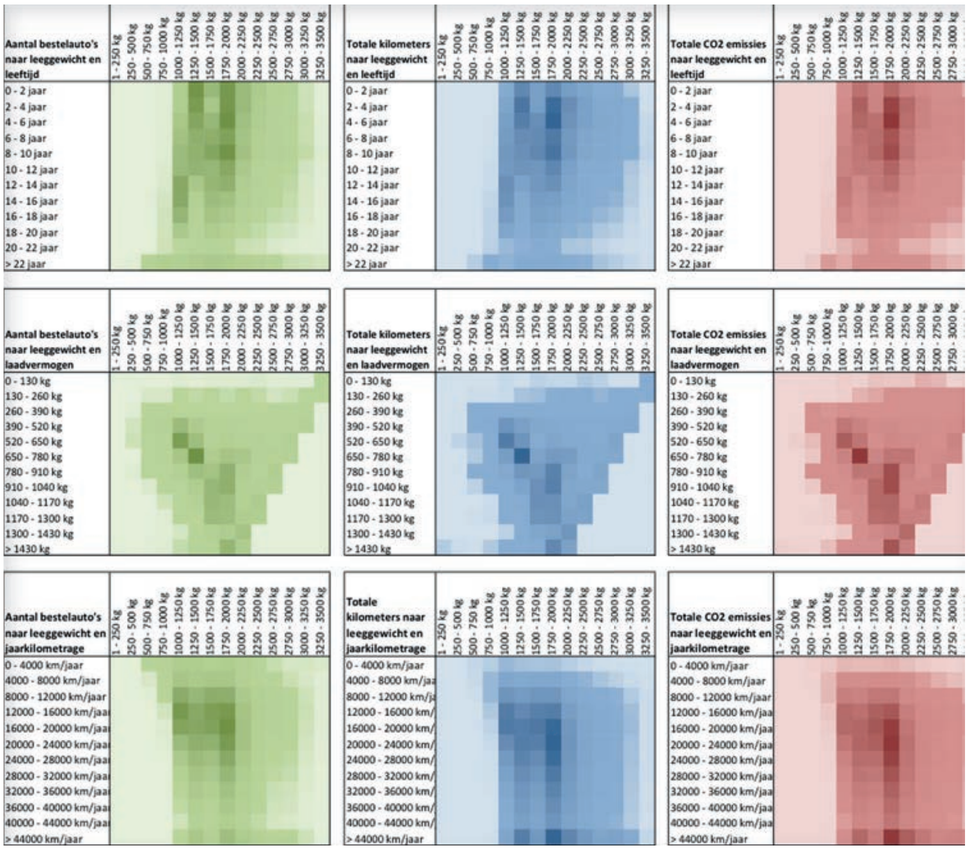
Appendix M
Charts supporting the analysis

This annex contains a number of charts that were used during the analysis phase. These show the distribution of the number of delivery vans (green), kilometers driven (blue) and total CO_2 emissions (red) across different parameters, such as kerb weight, annual mileage, CO_2 emissions and age.

For example, the bottom three charts show the relationship between age and the number of kilometers driven. This reveals that there is a group of new vans that drive more than 44,000 kilometers a year: these blocks are colored dark green. Because these vehicles are driven a lot, relatively speaking, their contribution to the total kilometers driven is even greater (dark blue). They also account for a relatively large proportion of CO_2 emissions (dark red), as a consequence of their high annual mileage. The charts above these provide more information on the CO_2 emissions and mass of this group of new vehicles.



Appendix M
Charts supporting the analysis



Appendix N
Delivery vans used for logistics

The CBS survey reveals that goods transport and mail account for a 22% share of the specified activities performed by delivery vans (see section 4.6.3). Construction and servicing activities together account for 53% of the specified activities. The remaining 24% is accounted for by passenger and private transport. Goods transport and mail can clearly be identified as goods logistics, while passenger and private transport clearly fall outside this category. In the case of construction and servicing activities, some activities are and some are not regarded as goods logistics.

The survey results show that for 25% of the responses that indicate construction and servicing as an activity, the proportion of materials within the total transported weight is more than 90%. In 50% of the responses the proportion of materials is greater than 50%. If we assume that 25%-50% of servicing and construction activities involve goods logistics, goods logistics accounts for a 35%-50% share of the activities carried out by delivery vans.

The analysis was also performed by making an (expert) estimate of the share of goods logistics for each SBI. For sectors with servicing and construction activities the estimate is partly based on the survey results. The share of goods logistics calculated in this way is similar (36%-47%).

Table 16:
Share of goods logistics per sector

	Number of delivery vans	Share of goods logistics (min. estimate)	Share of goods logistics (max. estimate)
F Construction*	229,764	10%	40%
G Trade	185,109	75%	75%
N Rental and other commercial services*	77,404	20%	50%
C Industry	65,349	70%	70%
A Agriculture, forestry and fisheries	45,145	60%	60%
M Specialist commercial services*	39,026	25%	25%
H Transport and storage	36,687	100%	100%
I Hospitality and catering	18,438	50%	50%
R Culture, sport and recreation	14,002	0%	0%
S Other services*	13,608	23%	65%
Q Healthcare and welfare	9,577	30%	30%
O Public administration and overnment services	9,871	0%	0%
J Information and communication	9,025	0%	0%
K Financial services	8,236	0%	0%
L Rental and trading of immovable property	7,707	0%	0%
P Education	5,604	0%	0%
E Water and waste management*	5,077	10%	32%
D Energy supply*	2,602	1%	50%
B Mining	355	50%	50%
Total for businesses	**782,586**	**40%**	**53%**
Total (including private)	**876,333**	**36%**	**47%**

* *The minimum and maximum estimates for these sectors are based on the CBS survey. The minimum estimate is based on the proportion of responses for which materials made up 90% or more of the loaded weight. For the maximum estimate materials made up 50% or more of the loaded weight.*

Manfred Kindt, Panteia:
"E-commerce activities increase the number of delivery vans in cities. However, the impact of E-commerce growth on the number of delivery vans is often overestimated. The current share of e-commerce activities in delivery vans is no greater than 2-3% of the population."

Ronald Schoo, Districon:
"More than 30 % of the registered commercial delivery van's is used by companies who are active in the construction sector. The maximum payload of a van is critical for them. Construction companies told us in interviews that the combination of tools, materials and the modification of the cargo hold often means that the maximum allowable payload is reached. The efficiency of use can be improved by cooperation between competitors. Some large construction companies have taken the lead by setting up "construction hubs" for consolidation."

Kees Verweij van Buck Consultants International (BCI Global):
"The number of electric delivery vans in the Netherlands has grown steadily in recent years.On January 1st 2017 1.628 electric vans were registered in the Netherlands, double the number of 3hree years ago: 669 electric vans. The two leading types of electric vans currently are the Renault Kangoo Z.E. and the Nissan E-NV200. Together they cover 83% of the market. The expectation is that in the next two years new types of electric delivery vans with a higher payload capacity will be introduced. This will probably boost the growth of use of electric vans."

Nico Anten, managing director Connekt:
"Good policy making is based upon facts. The combination of knowledge of 5 consultancies allows us to show details and depth in a diverse and large group of users. And it allows us to test some urban myths on veracity."

Maarten Verbeek, TNO:
"Delivery vans have a much longer lifecycle in the Dutch fleet than other diesel vehicles. Despite the fact that modern delivery vans emit about ten times less dust than those of 25 years ago, the contribution of delivery vans to particulate matter emissions in the city is still high. It is striking that NO_x emissions in that time have hardly decreased: delivery vans emit about as much NO_x per kilometre in the city as large trucks - which can carry much more payload."

Matthijs Otten, CE Delft:
"A delivery van is a vehicle designed for the carriage of goods. However, the study indicates that 50-65% is used for non-freight transport and service-related activities. A part of the use is for private purposes.. In addition, large delivery vans are an attractive alternative for the transport of volumenous goods , compared to a small truck. The purchase price and the cost of the driver are lower. Recent data from Belgium on the increase in the number of delivery cars after the introduction of the kilometer tax for lorries corraborates this observation."

CE Delft | DISTRICON advisory solutions professionals | Topsector Logistiek | Connekt | Panteia Research to Progress | Buck Consultants International | TNO innovation for life

COLOPHON

Topsector Logistics
Programmanagement: Connekt
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Aad van den Engel | Manfred Kindt | Jesper Riske - PANTEIA
Norbert Ligterink | Natasja Sluijk | Jordy Spreen | Maarten Verbeek - TNO