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# Freight Transport by Vans in Switzerland: Operational Profiles, Challenges and Options for Action

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**Abstract**

Compared to overall freight transport, freight transport with light commercial vehicles in Switzerland is growing more rapidly. We analyse the relevance of various light vehicle types in commercial traffic, identify and assess operational profiles for freight and service traffic segments, identify main conflict fields, estimate future developments and their impact on the use of light commercial vehicles and derive and assess measures for different directions of action. Our analysis demonstrates that van use varies by logistics market, type of cargo and industry. The main challenges for commercial traffic with light vehicles are congestion, lack of space for loading and unloading as well as parking, safety concerns and emissions. The number of stops and the mileage of light commercial vehicles will increase substantially while the impacts of different identified trends are limited. Tackling challenges in freight and service transport with light commercial vehicles requires differentiated measures targeting the respective segments. We identify seven directions of action and propose tangible measures to improve the situation of freight and service traffic.



*Keywords:* Urban Freight; City Logistics; Freight Trips; Service Trips; Operational Profiles; Van Transport; Commercial traffic

## 1. Introduction

Compared to overall freight transport, freight transport with light commercial vehicles in Switzerland is growing more dynamically. Between 2000 and 2020, the number of light commercial vehicles increased by 78% whereas the number of heavy commercial vehicles only increased by 4.5% (BFS 2021). Moreover, the mileage of light commercial

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vehicles in Switzerland increased between 2000 and 2020 by 62% compared to a decrease for heavy commercial vehicles (-3.1%). Main drivers for this development are general economic growth, fast growing e-commerce businesses and the reduction of storage with just-in-time deliveries. It is predicted that the mileage of light commercial vehicles will further increase by 53% until 2050 (ARE, 2021b), with the segment of courier, express and parcel services (CEP) even by 143%.

Another finding concerns the share of the commercial transport segments among delivery vans. Subjectively, most people believe that light commercial vehicle traffic is dominated by freight traffic (e.g. Holguín-Veras et al., 2017; Wigan et al., 2002). In the case of delivery vans, only about 30% of the mileage is cargo traffic (main purpose: transport of goods, ARE, 2021a). Just under 50% of the mileage is service traffic with and without goods (including e.g. craftsmen traffic). The remaining 20% of van mileage is passenger and private transport. For the design of measures, and the political debate on the development of light commercial vehicle traffic and targeted policy making these facts and conditions need to be considered.

Environmental, infrastructure, space and safety conflicts in connection with light commercial vehicles were identified earlier (Ruesch et al., 2013, 2016). They intensified as growth in the segments progressed. From today's perspective, the following problems in connection with delivery van traffic are in the foreground:

- Intensification of capacity bottlenecks on the road network, especially in the morning peak period (but mainly caused by passenger car traffic).
- Inefficiencies in the use of light commercial vehicles (e.g. low payloads)
- High environmental pollution (air pollutant emissions, noise, greenhouse gas emissions) and high energy consumption of light commercial vehicles, only a slow changeover to alternative drive technologies.
- Extensive use of public space and conflicts with public transport, pedestrians and cyclists.
- Strain on traffic routes during loading and unloading (e.g. loading and unloading in 2nd row, occupation of parking spaces or cycle paths) and resulting obstructions.

Based on the before mentioned project on vans (Ruesch et al. 2013) a follow up project was launched in 2021 and financed by the Swiss Federal Roads Office in 2021 with the following objectives (Ruesch et al. 2023):

- Pointing out and specifying the segmentation of traffic with light commercial vehicles and adjacent segments.
- Enrichment of the segmentation with quantitative and qualitative empirical data, creation of operational profiles for key segments.
- Identification of trends, developments, challenges and possible development paths (quantitative and qualitative) related to light commercial vehicles.
- Identification and analysis of options for action to influence the segments and operational profiles in relevant fields of action.
- Synthesis and compilation of the findings.

## 2. Research Design and Methods

To address the project objectives the approach includes the research design and methods shown in Table 1.

Table 1. Overview of methods

| Step | Objective | Methods |
|---|---|---|
| 1 | Specifying the segmentation of traffic with light commercial vehicles and adjacent segments (trucks below 7.5t total weight) | Data analysis, Desk research |
| 2 | Enrichment of the segmentation with quantitative and qualitative empirical data, creation of operational profiles for key segments | Primary survey with vehicle holders, Escorting of trips, Expert Interviews |
| 3 | Identification of trends, developments, challenges and possible development paths (quantitative and qualitative) related to light commercial vehicles | Expert interviews, Literature analysis, quantitative forecasts |
| 4 | Identification and analysis of options for action to influence the segments and operational profiles in relevant fields of action | Catalogue of measures, Good practice analysis, Workshop |
| 5 | Synthesis and compilation of the findings | Answering the research questions, Res. Report |

Three methods are used in the empirical phase of the project. The focus is on a representative online survey in which 1853 van owners participated (first quarter in 2022). In addition to this quantitative survey, two qualitative surveys

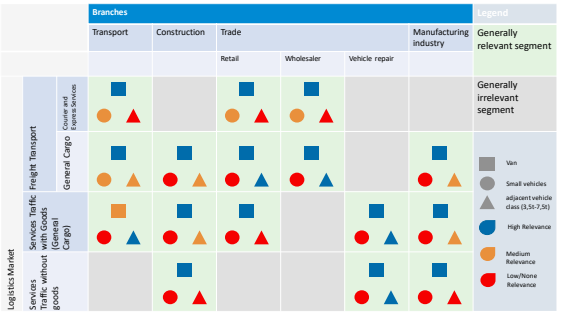
were conducted with the aim of linking quantified results of the survey to concrete observations under real-life conditions to get a better impression of conflict situations. Therefore, first, we accompanied van drivers during a half-day trip and second, we interviewed 15 stakeholders on various topics related to the current and future importance of vans (company representatives, association representatives and employees of public administrations). For both methods we aimed to study different segments of van transport. The trips took place in different parts of the country and in different settlement contexts in spring 2022.

## 3. Results

### *3.1. Segmentation of delivery traffic*

The following segmentation is developed based on available statistics and expert assessment. The data and literature analysis resulted in three main segmentation variables: logistics market, industries and type of cargo.

Table 2. Segmentation of delivery traffic




Relevant for light commercial vehicles are the markets freight transport, service traffic with goods as well as without goods. For the latter two markets only general cargo is relevant, in freight transport we distinguish between CEP and general cargo. Branches in which light commercial vehicles are used include transport, construction, trade and manufacturing. Table 2 shows this segmentation and further evaluates the relevance of different vehicle types per segment. Vans are highly relevant in all segments, small vehicles like cargo bikes or electrical rickshas have a relevance in the transport sector especially when transporting CEP. We also include the adjacent vehicle class of trucks between 3.5 and 7.5t to assess cross influences between classes. They have a relevance for freight transport with general cargo, and partially also in service traffic with goods. We further use this segmentation to analyse the use and operation of light commercial vehicles. The main factors to decide on the vehicle size and type used are consignment sizes and structure, the economic efficiency and regulatory framework conditions (e.g. access restrictions). In the CEP market the van is usually the most efficient vehicle type regarding distribution performance.

### *3.2. Share of mileage by sectors*

The construction industry accounts for the largest share of mileage by vans (see Fig. 1), half of the mileage by vans in Switzerland is produced in this sector.

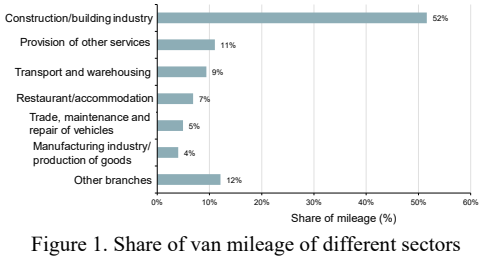



Figure 1. Share of van mileage of different sectors

"Provision of other services" accounts, as a residual category, for a relatively large share of 11 percent. "Transport and storage", which includes especially parcel delivery services accounts for only nine percent. "Hotels and restaurants" (belongs to general cargo and CEP in the transport branch according to Table 2) make up for significant seven percent, only five per cent are caused by the trade sector, half of which is attributable to wholesale trade (not shown).

### *3.3. Operational profiles by segment*

Table 3 shows the operational profiles of vans based on various key figures on usage. The usage profiles of the four most relevant segments are listed, as well as a comparison with the average usage profile of a van in Switzerland, which is based on the data of all van owners in the data set. The relevant segments have been derived from the results of the online survey (share of the segments). The profiles differ substantially between each other. Especially the difference in usage intensity for actual transport differs between the segments, although the vans are used in the same industries.

Table 3. Operational profiles of delivery vans

| **Key figures operational profile** | Service traffic with goods – construction industry | Service traffic without goods - construction industry | Freight transport general cargo - construction industry | Freight transport CEP - transport industry | All vans |
|---|---|---|---|---|---|
| n | 310 | 225 | 194 | 46 | 1853 |
| Average number of vans per company | 12.7 | 14.0 | 12.3 | 36.6 | 11.30 |
| Utilization on the reporting date | | | | | |
| KM driven | 57.4 | 74.0 | 77.1 | 118.4 | 86.8 |
| h used (time from first to last run) | 9.9 | 10.1 | 9.8 | 9.6 | 9.5 |
| En route time in h | 2.0 | 1.9 | 2.3 | 5.5 | 2.5 |
| KM / h driven | 29.4 | 40.0 | 33.6 | 21.6 | 35.3 |
| % Proportion of time spent on the road | 20% | 18% | 23% | 57% | 26% |
| % Share of total time spent on the road from 6 a.m. to 10 a.m. | 48% | 51% | 49% | 47% | 49% |
| % Share of total time spent on the road from 4 to 7 p.m. | 45% | 49% | 51% | 27% | 41% |
| % Share of total time spent on the road from 10 p.m. to 5 a.m. | 1% | 0% | 0% | 2% | 0% |
| % Share of remaining en route time in total en route time | 6% | 0% | 0% | 24% | 9% |
| % Share of congestion (incl. slow-moving traffic) in total time spent on the road | 17% | 20% | 22% | 29% | 19% |
| % Share with min. 5 stops | 47% | 20% | 29% | 97% | 45% |
| % Share with min. 50% capacity utilization | 37% | - | 56% | 64% | 51% |
| % Share with min. 50% delivery time appointments | 37% | 45% | 21% | 62% | 43% |
| % Share with min. 1 access restriction | 11% | 8% | 5% | 25% | 11% |

- On average, delivery vans in Switzerland are in use for around 9 to 10 hours a day (time span between the start of the first journey and the end of the last journey).
- Delivery vans in CEP freight transport are on the road for almost 60% of this time span and cover an average of almost 120km per day. They are on the road throughout the day, although most frequently in the morning between 6 and 10 am (47 %). CEP freight transport is also characterized by an above-average frequency (29 % of daily travel time) in traffic jams. Almost all vans in this segment make more than five stops per day (97%).
- The remaining three segments have a similar operating profile, which differs in various ways from that of CEP freight transport. For example, delivery vans in service transport without or with goods in the construction industry as well as the delivery vans with general cargo transport in freight transport are on the road for significantly less time than delivery vans in CEP freight transport (between 1.9 and 2.3 h compared to 5.5 h).
- The operating times are distributed less throughout the day and are concentrated even more strongly than in CEP freight transport on the rush hours in the morning (6 to 10 a.m., 48 to 51 percent) and in the afternoon/evening (4 to 7 p.m., 45 to 51 percent).
- Congestion times are lower for all three segments than for CEP freight transport vans. While almost half of the delivery vans in service transport with goods in the construction sector make more than 5 stops per day, this

proportion is only 20 and 29 percent respectively for service transport without goods in the construction sector and for general cargo freight transport.

### *3.4. Conflict fields*

Table 4 shows the frequency of problems and conflicts on the reporting date, both for all delivery vehicles and differentiated by individual segments according to the survey. The most prominently raised issue is the unsuccessful search for loading or unloading and parking space when delivering to customers or providing services. Around a third of the surveyed van owners reported the problem of not being able to find a parking space at times on the reporting date. Only one segment does not report this issue prominently. For general cargo in the construction sector this issue was only mentioned by 9 percent of the respondents, potentially because most traffic is related to construction sites which offer parking to delivery vehicles.

Table 4. Problems and conflicts on the reporting date (the three most frequent mentions in each case)

| | |
|---|---|
| **All vans** | |
| No parking space found | 33% |
| Conflicts with other drivers of motor vehicles | 14% |
| Conflicts with bicycle, e-bike or vehicle-like vehicle riders. | 13% |
| **Trade in services with goods construction industry** | |
| No parking space found | 37% |
| Conflicts with bicycle, e-bike or vehicle-like vehicle riders. | 15% |
| Conflicts with other drivers of motor vehicles | 14% |
| **Trade in services excluding goods Construction** | |
| No parking space found | 38% |
| Conflicts with bicycle, e-bike or vehicle-like vehicle riders. | 15% |
| Conflicts with other drivers of motor vehicles | 14% |
| **Freight transport General cargo Construction industry** | |
| Conflicts with other drivers of motor vehicles | 23% |
| Conflicts with bicycle, e-bike or vehicle-like vehicle riders. | 21% |
| No parking space found | 9% |
| **Freight transport CEP Transport industry** | |
| No parking space found | 55% |
| No delivery of the shipment possible (e.g. wrong address, shipment rejected, etc.) | 22% |
| Conflicts with municipal workers or construction workers | 16% |

Other problems or conflicts that occur more frequently are conflicts with drivers of motor vehicles (especially in general cargo transport in the construction industry) as well as conflicts with cyclists, e-bikers or vehicle-like vehicle drivers. In this regard, the supplementary interviews mirror the results of the survey. The interviewees confirmed that conflicts with two-wheeled cyclists have tended to increase in recent times. There are also problems and conflicts at the interface with customers. In the case of courier and express services, 22 percent reported the problem that in some cases no delivery of the consignment was possible on the due date (e.g. wrong address or consignment rejected).

### *3.5. Developments and future use of light commercial vehicles*

By desk research we identify 22 trends which are influencing van use in Switzerland in the future (see Table 5). Furthermore, we estimate the future use of vans in 2040 in terms of mileage and stops utilizing the Swiss national economic forecast (Cretegny & Müller, 2020) and applying the effects of the identified trends. The most important variables are the mileage and the number of stops, as they are directly proportional to the emissions generated and are also related to the conflicts. The methodology for the estimation of the mileage and stops of light commercial vehicles is described in detail in Ruesch, M., Lordieck, J., Haefeli, U., Arnold, T. (2023).

Four scenarios are built to explore potential futures. Business as usual (BAU), assumes no changes in regulation or offer and production (in terms of transport). Market driven change (MDC) assumes changes in offer and production

through market forces, in contrast Regulatory intervention (REI) assumes changes from the regulatory side which influences offer and production. Regulatory and market driven change (RMDC) combines scenarios MDC and REI.

Table 5. Categories and trends identified

| Category | Trends identified[†] |
|---|---|
| Technology | Automation of driving, automation of door delivery, automation of parcel locker delivery, dynamic tour plan-ning, electrification, additive manufacturing, underground door delivery systems, automation in construction |
| Demand | CEP-market growth (stronger than total market growth), growing delivery requirements |
| Offer and production | Two stage delivery in urban areas for CEP, resilience focusing companies, lack of staff, high energy prices, cooperation and concentration in logistics, parcel lockers, construction consolidation hubs |
| Regulation | Delivery time windows, driving bans and environmental zones, stricter driving and rest times, mileage dependent charge for vans |

All scenarios commonly consider technological innovation and a changing demand to more mail ordering and increasing delivery requirements in terms of delivery times and frequency. By assuming a level of diffusion in different segments by 2040 and a theoretical influence potential on mileage and stops we estimate these total values.

Table 6. Mileage and Stops in 2040

| | | Mileage [Bil. km] by scenario | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Basis 2022** | **Basis 2040** | **MDC** | **REI** | **RMDC** | **BAU** |
| **Vehicle** | **Small vehicle** | 0.2 | 0.4 | 0.5 | 0.6 | 0.7 | 0.4 |
| | **Van** | 6.3 | 9.7 | 9.4 | 9.3 | 9.1 | 9.6 |
| | **Truck (<7.5t)** | 0.3 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 |
| | **Sum** | 6.8 | 10.5 | 10.4 | 10.3 | 10.3 | 10.4 |
| | | **Stops [Mio.] by scenario** | | | | | |
| **Vehicle** | **Small vehicle** | 209.5 | 404.8 | 373.1 | 412.9 | 368.5 | 417.5 |
| | **Van** | 910 | 1593.1 | 1506.9 | 1612.2 | 1494.3 | 1624.8 |
| | **Truck (<7.5t)** | 16.9 | 23.1 | 23.6 | 23.9 | 23.4 | 24.1 |
| | **Sum** | 1136.4 | 2021 | 1903.6 | 2049 | 1886.2 | 2066.4 |

From 2022 to 2040, the number of kilometres travelled by vans will increase by 3.4 billion (Table 6). The inclusion of the trends changes this growth only marginally. The greatest reduction compared to the baseline estimate is achieved with the RMDC scenario, which means that the mileage is 600 million vehicle kilometres below the baseline. Technological developments reduce the mileage by only 100 million vehicle kilometres compared to the baseline. In the period under consideration, the mileage of small vehicles grows much faster. It doubles from 200 to 400 million km. Supply-side and regulatory trends can increase growth by up to 75%. The mileage of trucks grows only slightly in absolute terms, but still by 33% in relative terms. Supply-side trends are particularly causing additional growth for this vehicle type. Compared to the mileage, the number of stops with vans grows even faster than the mileage, by 75%. A similar picture as for mileage emerges for the other two vehicle types. The identified trends make hardly any difference to the expected number of stops. The expected increase in delivery demand also increases the number of stops only slightly.

### *3.6. Options for action*

Considering the frequency of occurring conflicts and the estimated growth of use of light commercial vehicles, action is necessary. We identify seven strategic directions of action as well as 40 tangible measures for each direction (see examples in Table 7). The table was verified by an expert workshop (Ruesch, M., Lordieck, J., Haefeli, U., Arnold,

[†] Sources: (Doormann et al., 2022; Guerlain et al., 2018; Justen et al., 2022; Kässer, 2016) and interviews

T. 2023). The main results of the workshop and assessment of measures are in context of Swiss cities. The effectiveness (low, medium, high) regarding the potential to solve the problems and the feasibility (easy/medium/difficult political, technical, financial feasibility) have been assessed in a qualitative manner. The public as well as the private sector (especially in strategic directions 4 and 5) are able to tackle ongoing and coming challenges with the described measures.

Table 7. Examples of measures by direction of action and their assessment (FT: Freight Traffic, ST: Service Traffic)

| Strategic Direction of Actions and Measures | Main segment addressed | Effectiveness | Feasibility | Main barriers |
|---|---|---|---|---|
| **1. Better consideration of freight and service traffic in planning** | | | | |
| 1.1 Better take into account freight and service traffic in spatial development and parking concepts | FT/ST | medium | easy to medium | other user requirements (traffic, urban planning, etc.) |
| 1.2 Take better account of freight and service traffic in road planning | FT/ST | medium | easy to medium | other user requirements (traffic etc.) |
| 1.3 Take better account of freight and service traffic in area and building planning | FT/ST | medium | easy to medium | other user requirements (land use, etc.) |
| **2. Improved availability of stopping and parking areas for light commercial vehicle traffic** | | | | |
| 2.1 Loading zones for delivery traffic | FT | high | medium | competing space requirements |
| 2.5 Information tools for loading and parking | FT/ST | med. to high | easy | sponsorship |
| **3. Optimization of access conditions for light commercial vehicles** | | | | |
| 3.1 Adjustment of the delivery time windows | FT | medium | medium to difficult | disturbances during the night, acceptance |
| 3.2 Simplification of authorizations/ conditions for service traffic | ST | medium | medium | acceptance of municipalities |
| 3.4 Small vehicles with higher capacity | FT/(ST) | med. to high | easy to med. | acceptance of changes in regulation |
| **4. Reduction of space requirements at the delivery location for loading and unloading by adapting the delivery strategy** | | | | |
| 4.1 Setup Micro Hubs | FT/(ST) | medium | medium | additional costs, acceptance, availability of space |
| 4.5 Differentiated supply formation for logistics services (price, information, etc.) | FT | high | medium to difficult | agreement on content and standards, acceptance of retailers/consumers |
| 4.9 Consolidation platforms for construction sites | FT/(ST) | low to medium | medium to difficult | availability of space |
| 4.13 Cargo Box System (small standardized units) | FT | high | medium to difficult | variety of systems, agreement on a standard |
| **5. Reducing the environmental impact of light commercial vehicles** | | | | |
| 5.1 Electrification of the vehicle fleet | FT/ST | high | easy to medium | investment costs, availability of loading infrastructure |
| 5.2 Provision of charging infrastructure | FT/ST | medium | medium | limited funds, limited availability of green power |
| 5.3 Low-noise operation and handling | FT | medium | easy to medium | passing on costs, availability of technologies |
| **6. Increasing the road safety of light commercial vehicles** | | | | |
| 6.1 Driver training for drivers of light commercial vehicles | FT/ST | medium | easy to medium | changes in regulation, acceptance, costs |
| 6.2 Driving training for drivers of small vehicles | FT/(ST) | medium | medium to difficult | changes in regulation, acceptance, costs |
| **7. Minimization and avoidance of delivery traffic** | | | | |
| 7.1 Information campaign for sharing items and promotion durable products | FT | low to medium | medium to difficult | consumer acceptance |

Based on the assessment promising measures include the better integration of freight in planning activities (M 1.1, 1.2 and 1.3), loading zones for the delivery traffic (M2.1), information tools for loading and parking bays (2.5), adjustments of delivery time windows (M3.1), the simplification of authorizations/ conditions for service traffic (M3.2), the implementation of small vehicles with higher capacities (M3.4), setup Micro Hubs (M4.1), differentiated supply information for logistics services (M4.5), the Cargo Box System (M4.13), the electrification of the vehicle fleet (M 5.1), the provision of charging infrastructure (M5.2), Low-noise operation and handling (M5.3), driver training for light commercial vehicles (M6.1). Various barriers for the implementation of the measures must be considered as user acceptance, additional costs, limited resources and need for space. No measure was identified as the silver bullet, however a mix of measures is assumed to reduce conflicts, emissions and make traffic with light commercial vehicles more efficient if implemented especially in cities.

## 4. Conclusions

The analysis demonstrates that vans are used differently by logistics market, type of cargo and industry. The survey shows that service traffic compared to freight traffic has a higher share of the mileage that is important for the political debate and targeted policy making. On the other hand, freight traffic has a much higher share of stops due to the high number of deliveries in the CEP market. Furthermore, the CEP market develops more dynamically than the service traffic market. The main challenges for the commercial traffic are congested roads (mainly caused by passenger car traffic), the lack of space for loading or unloading and parking, safety concerns with pedestrians and bikers, pollution, noise and greenhouse gas emissions. Moreover, an increasing encroachment of public space can be observed, driven by e-commerce and construction activities.

The trend and scenario analysis shows that the number of stops and the mileage with light commercial vehicles will increase substantially. The main drivers are general economic and e-commerce growth. Other trends have only little influence. Overall, the challenges will get even bigger in the future.

Tackling the identified challenges requires differentiated measures targeting the respective segments. Seven directions of action tangible measures in each are identified. In general, a few options for action with an influence on service traffic with or without goods could be identified. Most of the measures relate rather or exclusively to goods traffic. None of the options for action can be seen as a panacea, the measures tend to have a specific effect on various challenges. It should also be noted that no single measure has the potential to achieve large reductions in mileage or stops. This underlines the importance of making traffic with LCV more compatible to urban environments. To this end, options for action to improve the availability of stopping and parking facilities must be focused on. Particularly effective and suitable are the establishment of loading zones for delivery traffic and the improved provision of information on free stopping and parking areas for commercial traffic. If the use of LCV is to be noticeably reduced, drastic economic measures would have to be introduced that make delivery traffic significantly more expensive. However, this could also lead to a reduction in the quality of supply for the population.

Future research is needed regarding appropriate design of measures including monitoring with frequent evaluation and expanding the knowledge base about use of light commercial vehicles, especially service traffic.

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