

Automotive market data in respect to required link lengths

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ISAAC Study Group

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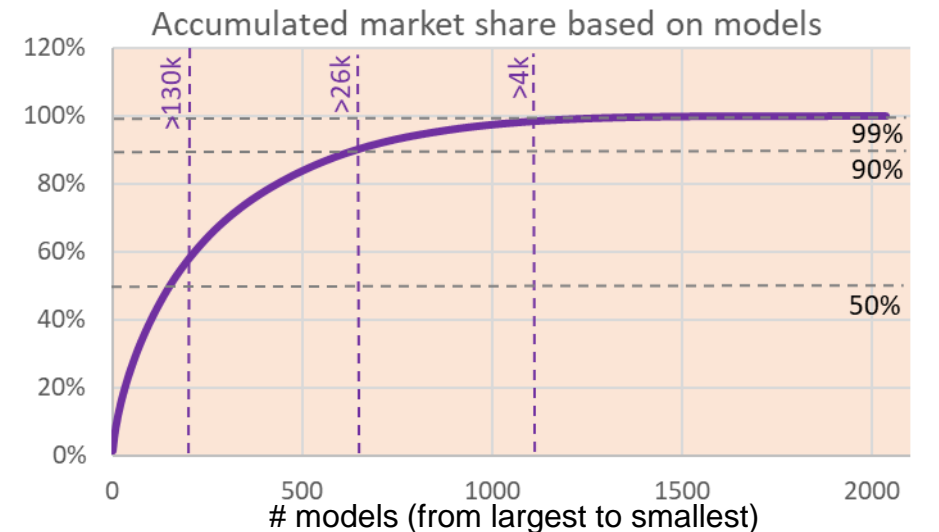
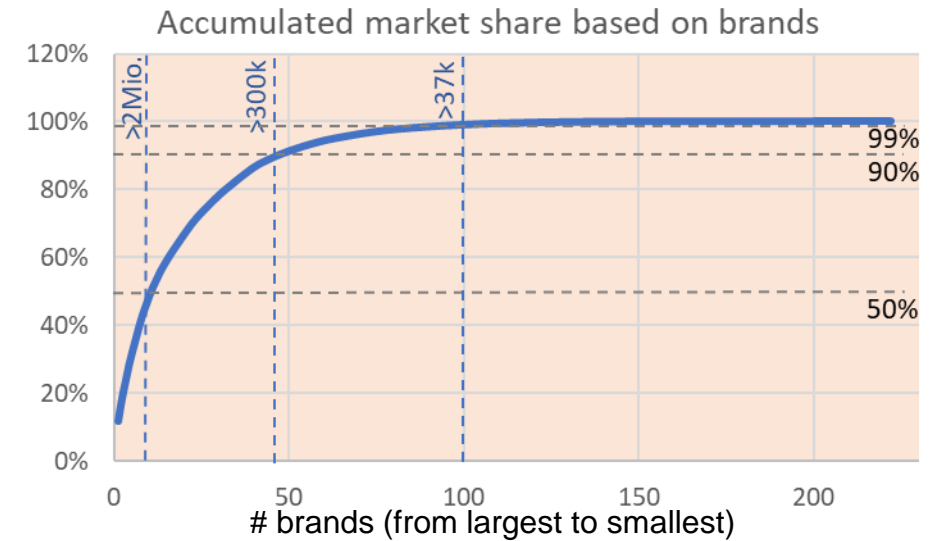
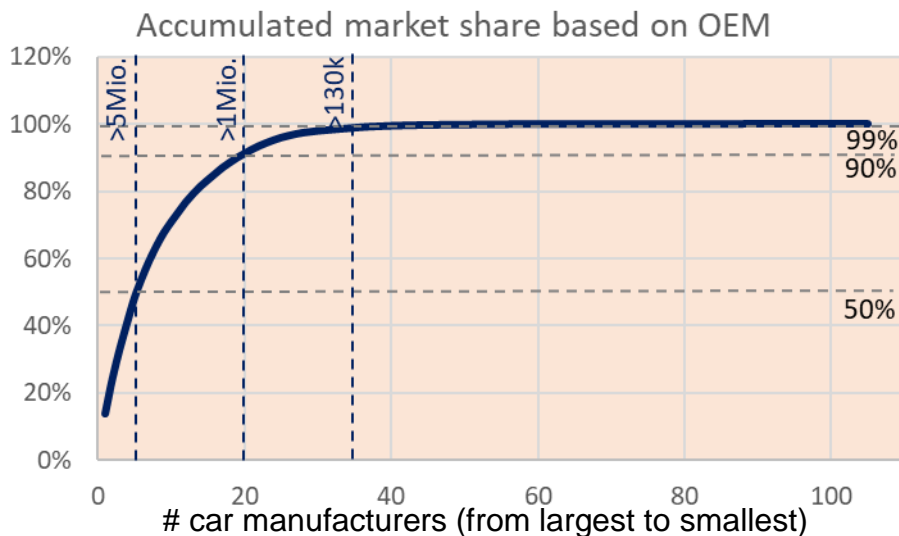
Motivation

- One of the core motivations to start the ISAAC SG was to better support automotive (camera/sensor) applications.
- This presentation provides general market data in respect to the automotive industry.
 - Number of units, models, brands, manufacturers
 - Segments
 - Lengths
- This presentation provides some specific data in respect to cameras and link lengths.

General numbers for the 2022 automotive market.

- Based on about 71 Mio. units
- 105 identified manufacturers (OEMs)
- 222 identified brands
- 2036 identified models

Source: S&P-Global



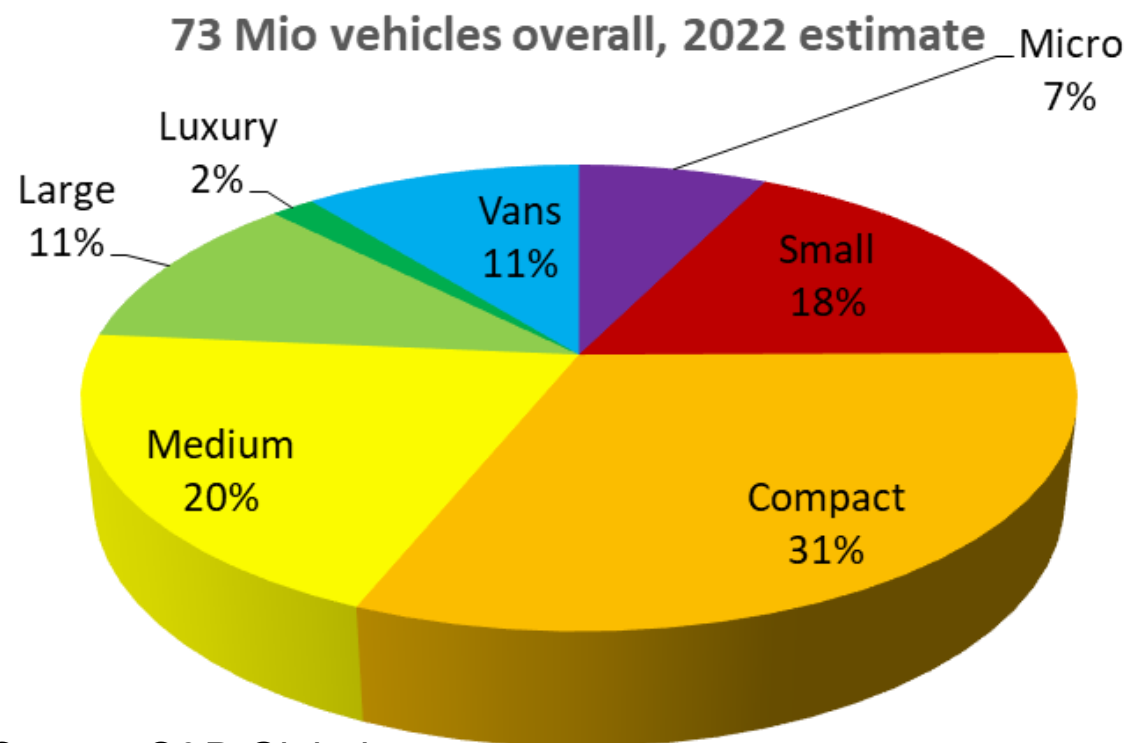
Distribution of market.

- There is a vast number of car manufacturers, brands, and models.
- However, the numbers show that the sales are not distributed evenly.
- Only about 5% of the brands and car manufacturers and 7% of the models determine >50% of the market.
- This justifies to concentrate on high volume car manufacturers, brands, and models, when wanting to generate estimates for specific properties.

Category	# explicitly counted	50% share (#/min units sold)	90% share (#/min units sold)	99% share (#/min units sold)
OEMs	105	5/5Mio.	20/1Mio.	35/130k
Brands	222	10/2Mio.	47/300k	100/37k
Models	2036	151/130k	640/26k	1190/4k

Classification of cars

- There are different ways to segment the automotive market.
- The criteria used for the presented graph are based on customer relevant criteria such as:
 - Model pricing and positioning
 - Vehicle size measurements
 - Product substance
 - Engine lineup
 - Sales & service quality



Source: S&P-Global.

“Van” includes mini vans, pickups and mini-trucks

Lengths in the automotive market.

- The length of cars increases with the class.
- The segment share “van” has been continuously increasing¹⁾. This is an important reason why the average length of cars has been increasing in the last 20 years.

	Micro	Small	Compact	Medium	Large	Luxury	Van
Share	7%	18%	31%	20%	11%	2%	11%
Est. av. length ^{2) **)} [m]	3.57	4.1	4.46	4.74	4.96	5.2	5.48

For about a quarter of the market the vehicle is in average about 5m or longer*).

*) Naturally, there are shorter models in these segments while there are also longer models in the compact/medium segment.

***) Numbers vary somewhat with the exact classification.

1) See e.g. <https://www.epa.gov/system/files/documents/2022-12/420s22001.pdf>

2) See e.g. <https://www.automobiledimension.com>, <https://www.way.com/blog/average-car-length/>

Example: Car dimension and link length for camera

	BMW X5 („Medium“)	BMW X6 („Medium“)	BMW X7 („Large“)
Length [m]	4.925	4.960	5.181
Width [m]	2.004	2.004	2.000
Height [m]	1.765	1.700	1.835
Max. link length [m]	8.405	8.680	8.545
Req. link length [m]	10.926	11.284	11.108

- The installed cable is significantly longer than the length and width of the car might suggest.
- The cable length the system needs to support can additionally be longer than the cable installed, e.g. when a margin of 30% is added to compensate for long term weather impact (esp. heat and damp).
- The respective parking camera is base equipment of every car.
- There is a significant market share for cars longer than the examples given.

Source: e.g. <https://www.automobiledimension.com>

Summary and conclusion.

- The automotive market consists of a vast number of car manufacturers, brands and car models (distributed over about 71 Mio units in 2022).
- About 25% of these units sold in 2022 were about 5 m or longer.
- The link length for e.g. a parking camera is typically one of the longest.
- It is significantly longer than what one might anticipate from just looking at the dimensions of the car.
- Parking cameras are a widespread feature in cars (often mandatory).
- Especially when adding a safety margin (e.g. 30%) the requirement to support a 15m link is well justified.

Thank You!