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Summary of data analysis:

Year	Number of Orders	Crates loaded	No. of journeys	No. of vehicles	Total Miles	Average miles per order	Vehicle capacity utilisation	Weight Utilisation	Running Costs (£)	Tonnes of CO2
2019	6,344	31,036	492	4	14,948	2.5	59.7%	42%	3,587	6.0
2020	11,610	61,007	1,022	4	18,717	1.8	55.4%	40%	4,492	7.5
% change	83%	97%	108%	0%	25%	-31%	-4%	-2%	25%	24%

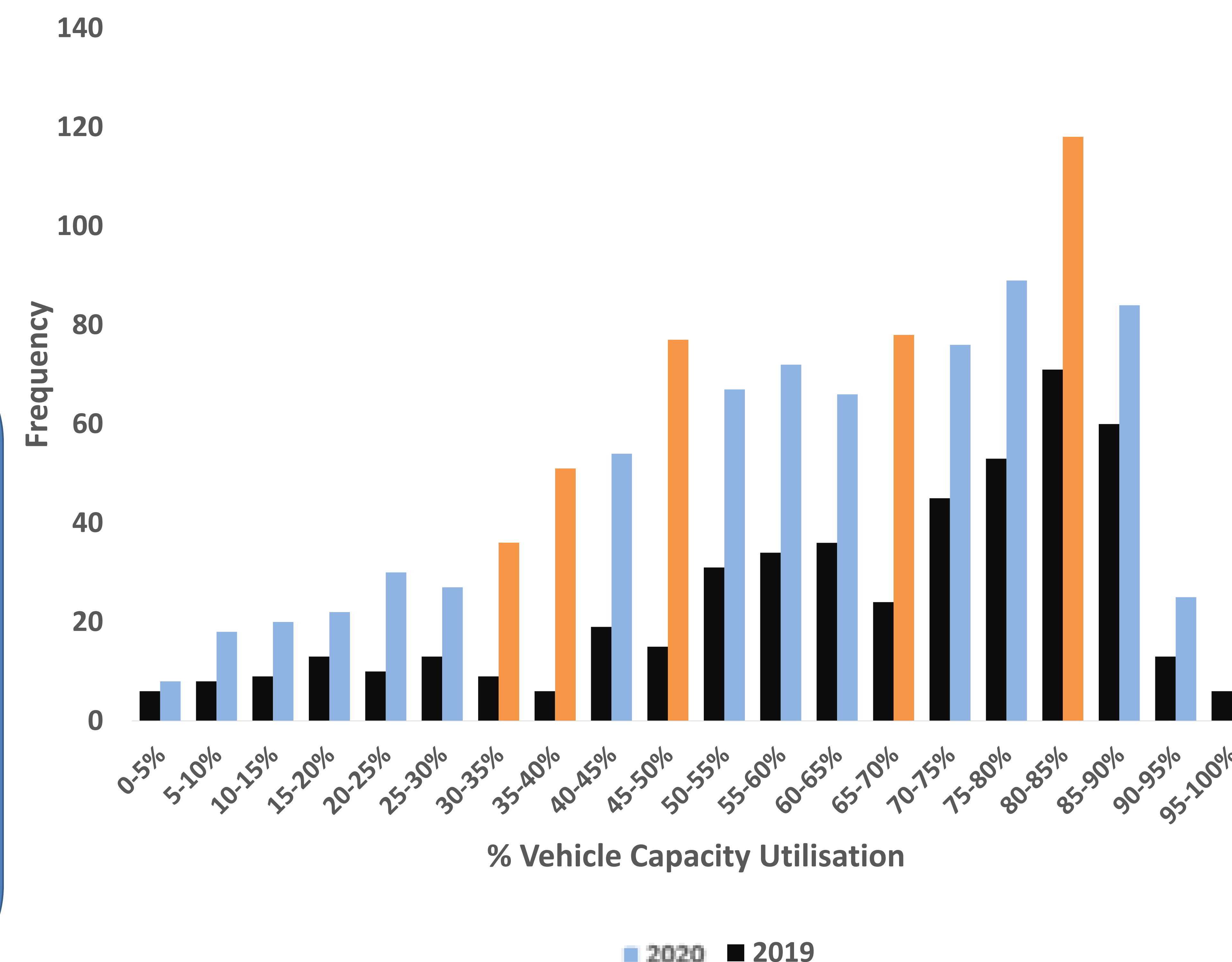
Introduction:

- COVID-19 lockdown increased demand significantly for home deliveries. The UK online grocery retail sales increased by 75.2% and 59% of the consumer shopped online for grocery deliveries in 2020 (Mintel, 2021)
- The surge in demand for online orders increased pressure on the grocery home delivery operations. However, the impact of increase in demand on vehicle capacity utilisation levels for home delivery operations is less studied
- The vehicle capacity utilisation level during COVID-19 can provide understanding for increasing carrying capacity of home delivery vehicles from 3.5 tonne to 4.25 tonne alternate fuel vehicles (DfT, 2018)
- This study analyses impact of COVID-19 pandemic demand surge on the UK grocery retailer's vehicle capacity utilisation levels compared to 2019 levels in home delivery operations

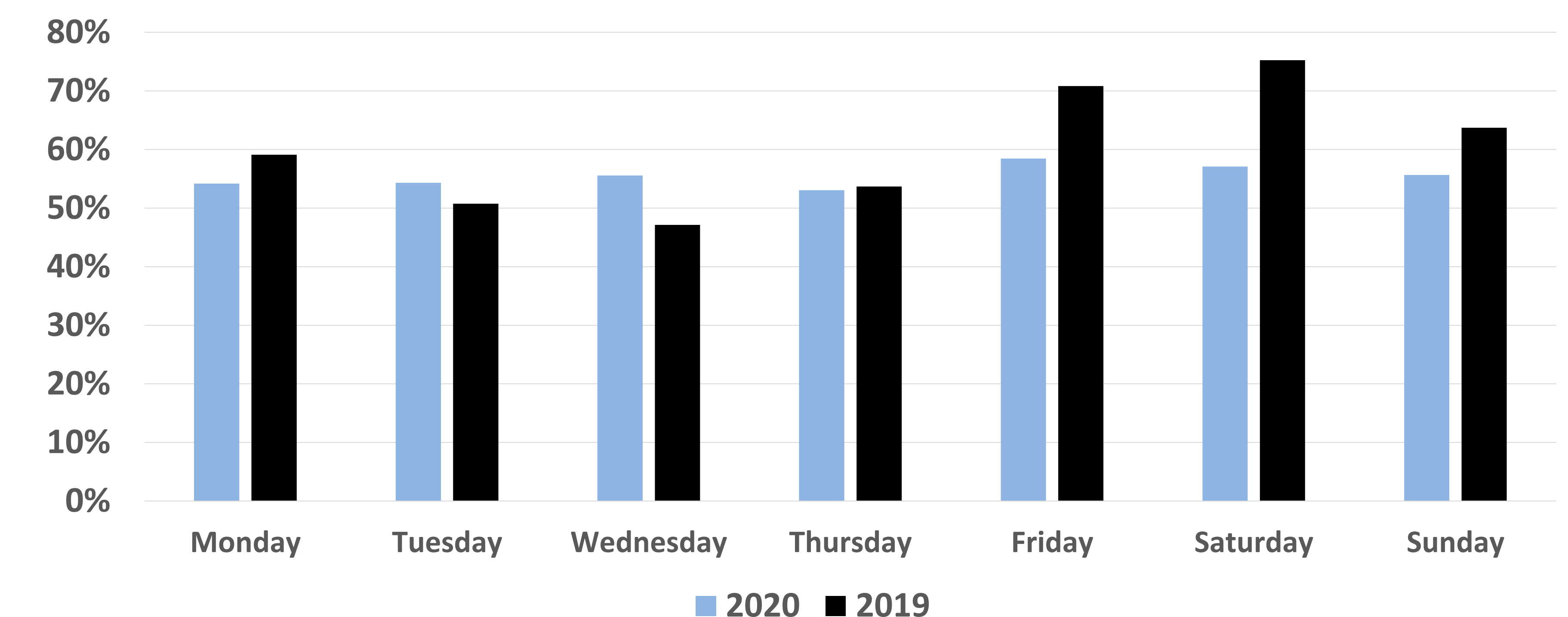
Methodology:

- Home delivery data collected for three months of April, May and June for 2019 and 2020 by a major retailer in the UK for Cambridge.
- The data comprised of number of chilled, frozen and ambient crates, quantity, origins, delivery time windows, miles per order, delivery dates and vehicle type used (box van).
- The costs were calculated using RHA cost table for vans and carbon emissions were calculated using activity-based approach
- The data was analysed using descriptive statistics

Vehicle Capacity Utilisation Histogram



% of Vehicle Capacity Utilisation by Weekdays



Result:

- Significant increase in demand for number of orders, crates loaded and total miles in 2020 compared to 2019 levels
- The number of journeys increased by 108% and average miles per order decreased by 31%. However, number of vehicles remain same.
- Weight utilisation and vehicle capacity utilisation has marginally decreased by 2% and 4% respectively in 2020
- There are no additional benefits for this grocery retailer to increase carrying capacity of 3.5 tonne to 4.25 tonne vehicles for the home delivery operations in Cambridge.