Adjusting to the new normal

Data-driven mobility insight post-pandemic in Stockholm

Executive Summary

In the unprecedented global event of the COVID-19 pandemic, societies around the world have had to adapt to a new way of living. The virus has led to a re-evaluation of the fundamental aspects of daily routines, including work, shopping, and notably, travel. WSP investigates this topic where the primary focus is on the profound changes that have characterized as the “new normal”.

In this report, The “new normal” is defined as the shifts in people’s travel behaviors and preferences that occurred during and after the pandemic, and how they affect the choice of mode, destination, and purpose of travel. Therefore, the objective of this report is to examine the dynamics of urban mobility and offers insights for adapting to this transformed landscape.

The method for analysis here is mainly looking at the trends in related aspects that affecting the way people travel in Stockholm. The data used in the analysis are free open-source big data from various sources, such as mobility data, public transport supply & demand, multimodality, car ownership, and economic situation. These data can support the analysis and enrich with the insights which later can drive the conclusions taken in this report. However, it is important to note that the data used in this report is limited to the time period between 2020 and 2022 to ensure consistency with the common scope of all sources.

According to the analysis in this report, the new normal has taken root in people’s behavior. Online shopping, home delivery, working from home, are continuing and growing. Even though pandemic’s effects have receded, it shows that the economic uncertainties take over as the driving factor in new normal behavior.

Transport authorities and government should anticipate a potentially slow recovery of public transport demand as it will be very flexible and uncertain. Real-time data will play a crucial role in understanding the travel behavior in the coming times which related stakeholders should harness the benefit of those type of information.

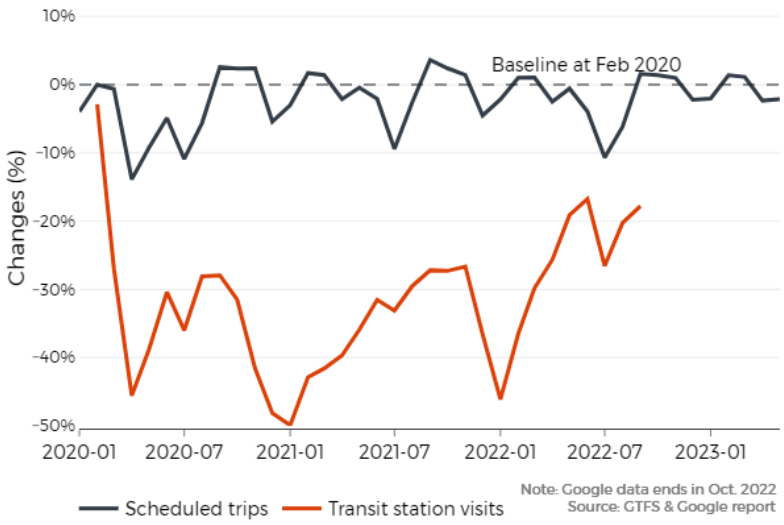
Unbalance Supply and Demand Under The Pandemic

This paper investigated the supply and demand of public transport in Stockholm. The study utilizes open data resources from General Transit Feed Specification (GTFS) for information of public transport supply and Google Mobility for demand analysis. GTFS represents the number of daily scheduled trips and Google Mobility offers a glimpse into mobility at the public transport stations. Google Mobility report represented changes in the mobility at the transit stations compared to a baseline in February 2020, before pandemic started. Therefore, GTFS data is also represented as percentage changes from pre-pandemic level for better comparison between demand and supply.

Given the exceptional circumstances during the pandemic, where public authorities were encouraged to maintain supply in order to minimize potential crowd inside buses and trains, this data emphasizes the potential value of real-time demand information for future planning. It demonstrates how such data can be a valuable resource when demand fluctuates, and nowadays people rapidly adapt their transportation preferences. This insight encourages proactive planning and adaptability without suggesting cost-cutting measures during pandemic situations, prioritizing the understanding of evolving commuter behaviour.

Steady supply of public transport while demand was falling during pandemic in Stockholm

Figure 1 - Supply and Demand compared to the baseline Feb 2020



Work from home takes root post-pandemic

The Stockholm Municipality has reported the share of public transport trip compared to journeys by car in the city every year up until 2021, using the report from SL and Stockholm region. The data shows in figure 2 that the share of public transport Stockholm fell in 2020 which is likely due to the restriction aimed at controlling the spread of the virus. Noticeably, it fell to 60% and then afterward it bounced back to 70% in 2021 which means some have returned to public transport.

Looking at Google mobility data for Stockholm city, the trend in public transport showed some tendency to closing the gap between the recent and the baseline demand but still far from previous level before pandemic. Note that Google provided the data publicly only until October 2022.

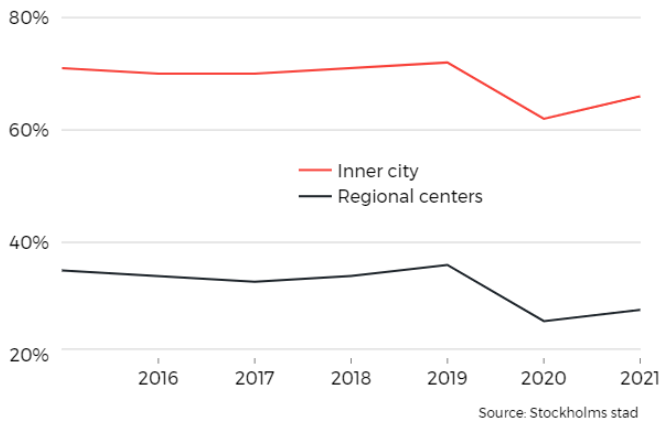
Both data demonstrate that people are returning to the public transport in a slow pace. Google also provides mobility data at workplaces which the data displays in figure 3 that people are returning to their offices slowly, it shows 20% less than before pandemic hit. This explains the slow return to the public transport as well because in general, a major share of trips by public transport is made for commuting to work.

There is potential that the demand might not return to the previous level soon, especially given that flexible workplace culture is becoming a new normal for the society. Employers are becoming more open about working from home and employees appreciate the flexibility.

In addition, the return to public transport is faster than the return to workplaces. This implies that people might have started to use public transport more for other purposes rather than commuting to work.

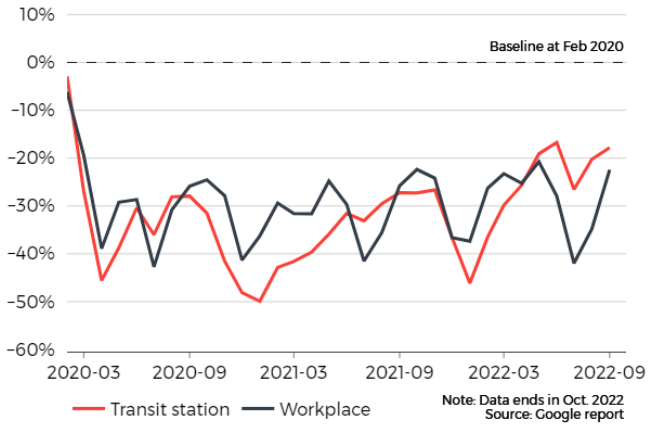
A small bounce in public transport trip after dipped during pandemic

Figure 2 - Share of public transport trip compared to journey by car in Stockholm



Slow return to public transportation and workplaces since pandemic started

Figure 3 - Changes in mobility in Stockholm compared to baseline (at transit stations and workplaces)



Renewed interest in public transport

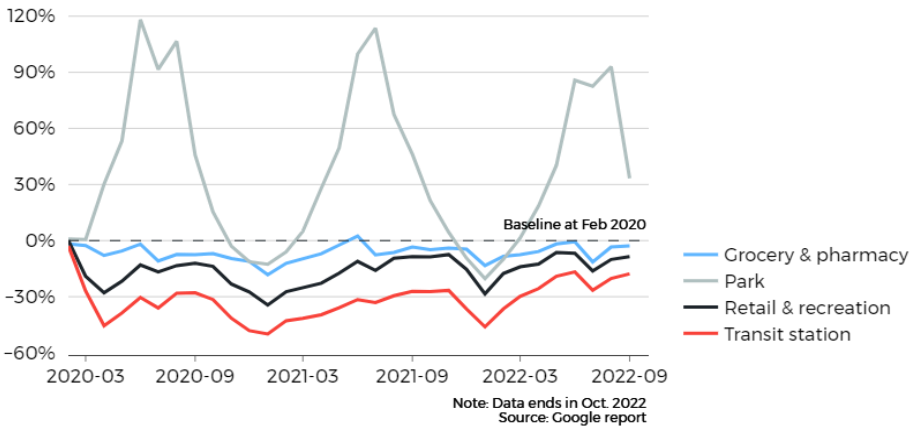
It is likely that people would start to appreciate working from home and doing different things or activities in life when lockdown measures restricted them. Looking at the different activities in figure 4 such as mobility at retails, groceries, and parks from Google Mobility data, one activity is sticking out which is that people visited parks twice more frequently compared to pre-pandemic. This is understandable that people would want to go out and visit parks, as it is an easy and healthy option during the pandemic and lockdown. Furthermore, seeing the peak is around summer period, the activity seems to continue unaffected by pandemic and restrictions.

Mobility at retail-recreation and grocery-pharmacy went down during the pandemic. However, people are returning to their retail and recreational activities but still lower than baseline level pre-pandemic. The difference is not remarkably high and remains steady, which indicates towards seasonal variation rather than impact of the pandemic. The groceries and pharmacies serve necessities, and therefore, minimal impact from the pandemic is understandable.

The data shows that people are returning to retails, recreation and continuing to visit parks. This indicates an increasing interest among the people towards recreational or leisure activities. This also explains why the return to public transport is faster than the return to the workplaces. People are using public transport also to visit parks, retails, recreational places, and groceries.

Increasing interest towards recreational and leisure activities followed by same trend in public transport

Figure 4 - Changes in mobility in Stockholm compared to baseline



Note: Data ends in Oct. 2022
Source: Google report

People's choice under economic uncertainty

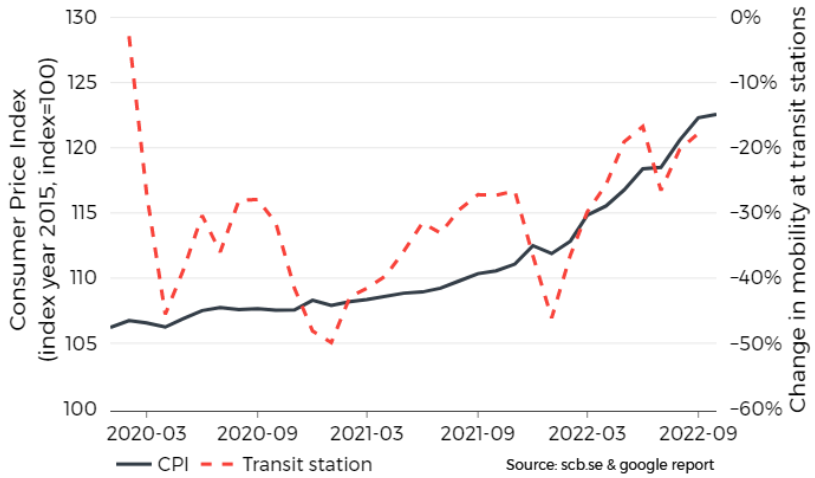
It is expected that people would become less inclined to use public transport and would be more interested in travelling by car due to the pandemic. Initially, there was a surge in interest in owning a car as a means of reducing exposure to crowded public spaces and maintaining a sense of safety. Various surveys around the world indicated that the interest of owning a car increased after the pandemic.

An increasing car ownership often affects public transport negatively as more individuals chose travelling with their convenience personal vehicles. This trend poses challenges for public transport authorities around the world who were struggling with reduced revenues and challenging situation with evolving demand.

However, economic realities gradually came into play. For instance, the consumer price index in Sweden has risen significantly which leads to financial stress and uncertainty for many households. This affects how people choose the most cost-effective way to travel. When it is compared on the same time period as in figure 5, during such economic uncertainty people may think public transport is a better solution than car.

Economic uncertainty may drive people back to public transportation

Figure 5 - Consumer price index and change in mobility at transit stations in Stockholm

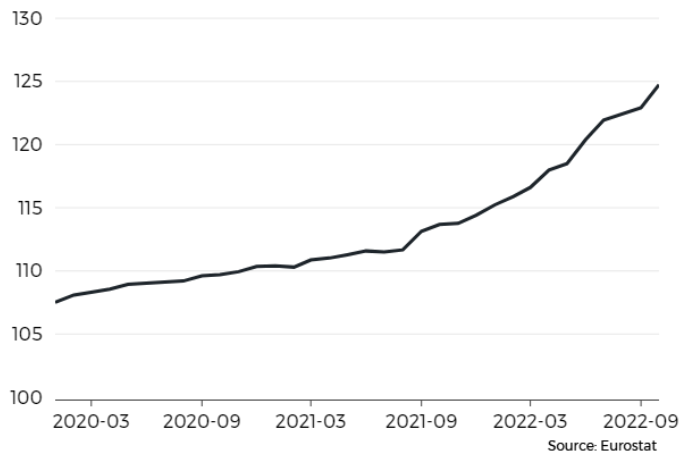


Economic uncertainty means higher car cost

To understand how the increasing consumer price index impacts the cost of buying and operating new cars, a harmonised consumer price index data from Eurostat is applied. Here, car price is the purchase of new motor cars, while the operation costs are fuel price, spare parts, and maintenance costs. It's assumed that higher consumer price means higher cost for car and therefore, public transport may seem a better solution during economic uncertainty. Figures 6 and 7 show the car price is 25% higher while operating cost is 50% more in the last 7 years.

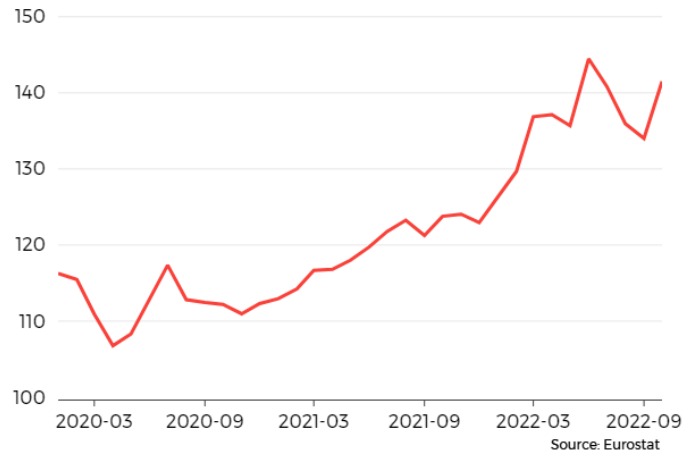
Car price is 25% higher in 2022 than 2015

Figure 6 - New car purchase cost in Sweden (index=100 in year 2015)



Operating cost is almost 50% more than 2015

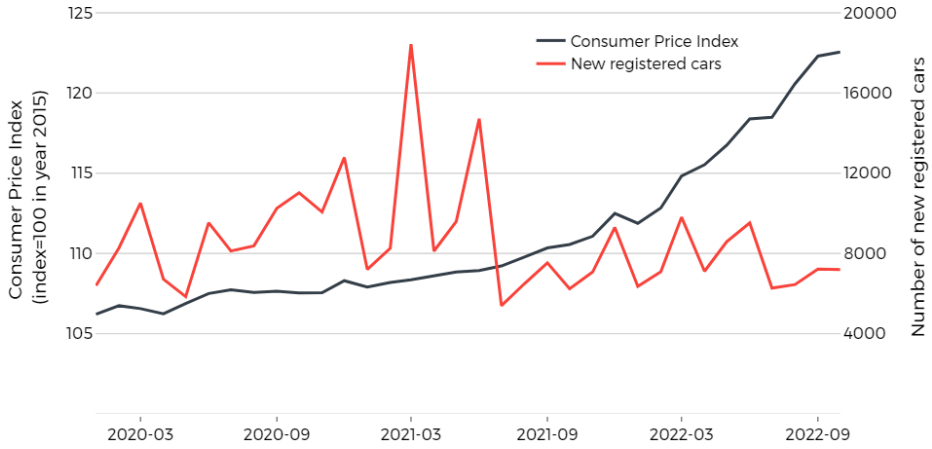
Figure 7 - Personal transport operating cost in Sweden (index=100 in year 2015)



A steep rise in these costs in the recent months occurred in Sweden due to political unrest in Europe and consequent disruption in supply chain. Accordingly, number of new car purchases was reduced. According to some studies, car ownership is often directly related to the use of public transport and as it is observed that less car acquisition since economic started to be uncertain in 2021, people are showing higher interests in the public transport.

Higher price index discouraged people to buy new cars

Figure 8 - Comparison between new car registration and consumer price index in Sweden

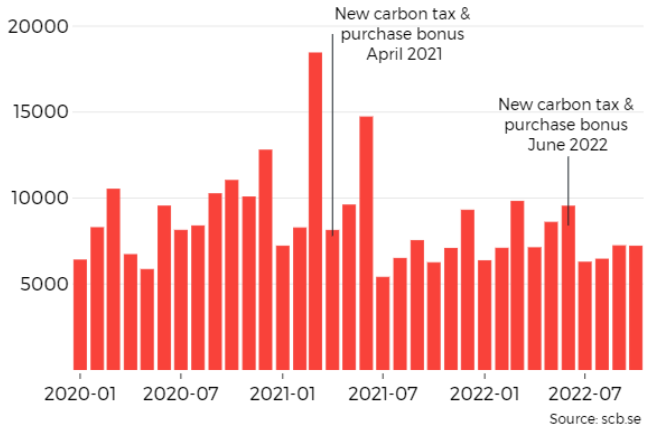


Car ownership decreased despite policies promoting car purchases

Recently, the government of Sweden introduced new rules for carbon tax along with incentives for purchasing environmentally friendly cars. These policies have been renewed twice, first in April 2021 and then again in June 2022. Notably, People bought more cars in both March and June of 2021. People who wanted to buy cars that will be taxed higher from April 2021 may have bought the cars before that to avoid a higher tax. People who wanted to buy greener cars that will gain from the new bonus rule may have bought the cars after it was implemented, in this case in June 2021. This presumption can explain why the numbers in figure 9 are so high before and after the policy was introduced.

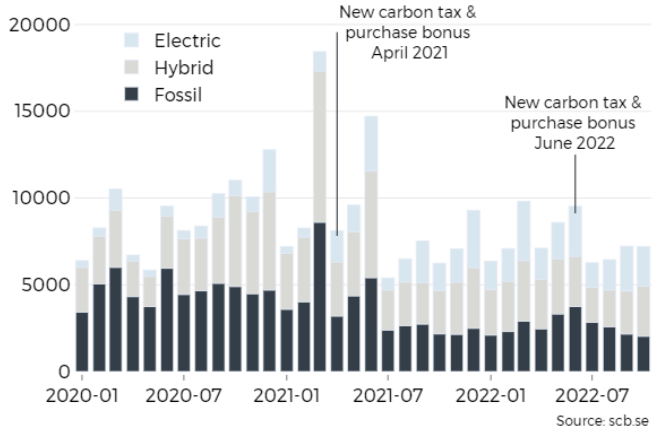
Policies do not always stimulate new cars purchases

Figure 9 - Number of new registered cars in Stockholm

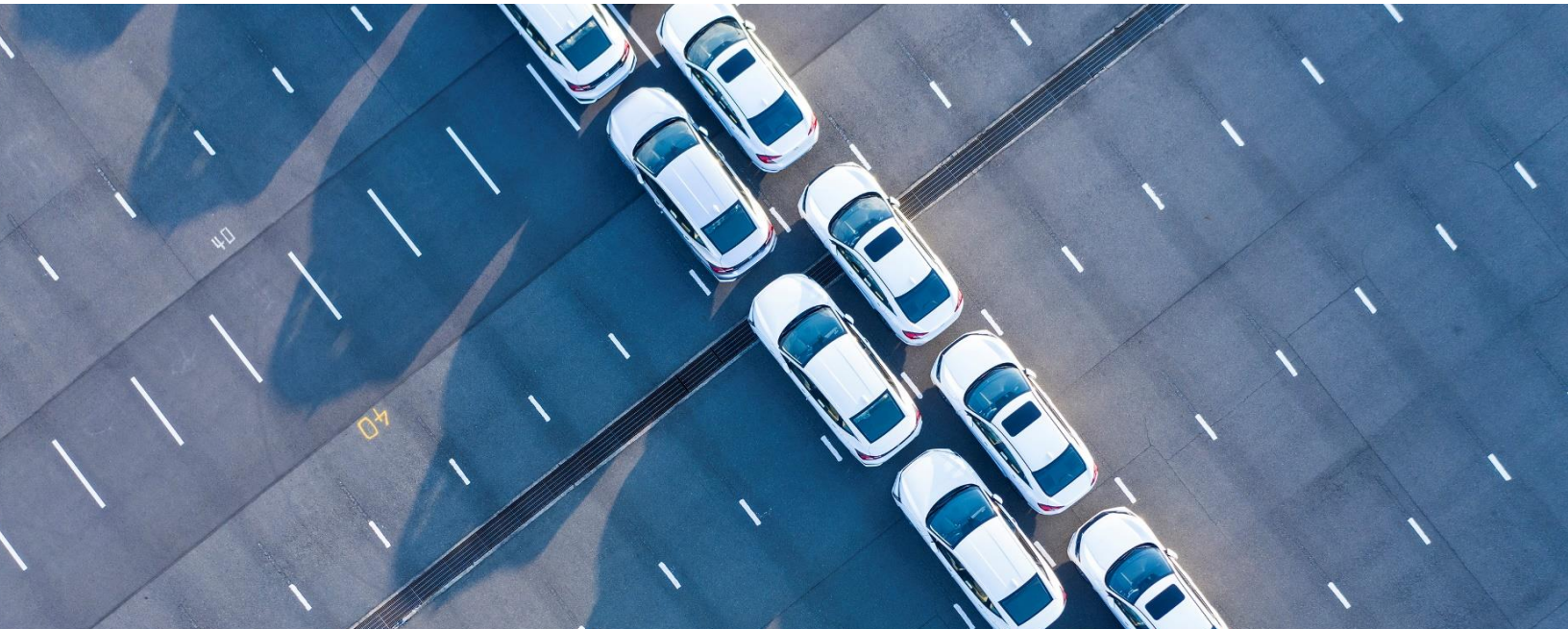


Policies aimed at boosting greener cars faltered

Figure 10 - Number of new registered cars by fuel-type



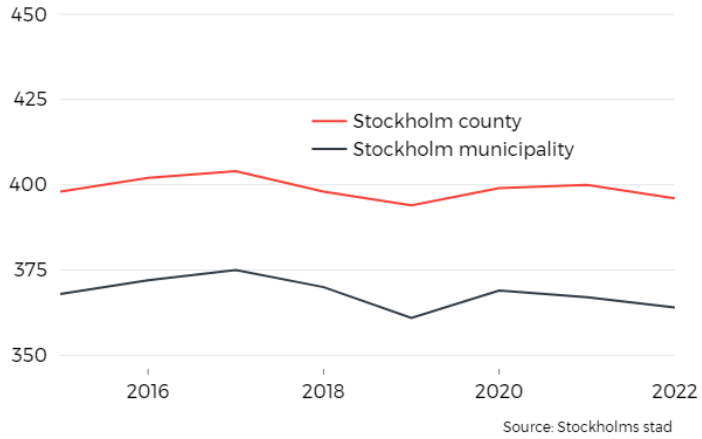
The data in figure 10 shows that electric vehicle purchase went up from 380 to 3100 between January 2021 to June 2021, a staggering eightfold increase. Over the same period, fossil dependent vehicles and plug-in-hybrid increased almost twice. The new policy shows a stronger impact on electric car among all vehicle types. Furthermore, the purchase of electric vehicles continued to grow in general until the end of 2022. However, the similar policy did not yield a significant effect in 2022 which can be affected by economic uncertainties during that year.



Even though people in Sweden are inclined to buy more and more electric cars, the total number of car purchase has not changed much. This is also evident from the car ownership level in Stockholm, where it has not changed much since 2015 as it is shown in figure 11. Interestingly, the car ownership level was declining in Stockholm several years before pandemic hit but then rose under pandemic period. This indicates that people became more interested in cars during pandemic. However, the car ownership fell again in 2022, indicating that economic uncertainty has been playing a bigger role in the decision to own a car.

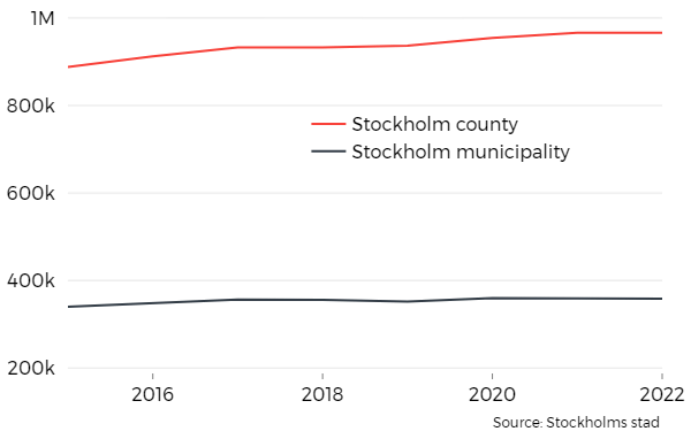
Stable car ownership over time

Figure 11 - Car ownership per 1000 inhabitants



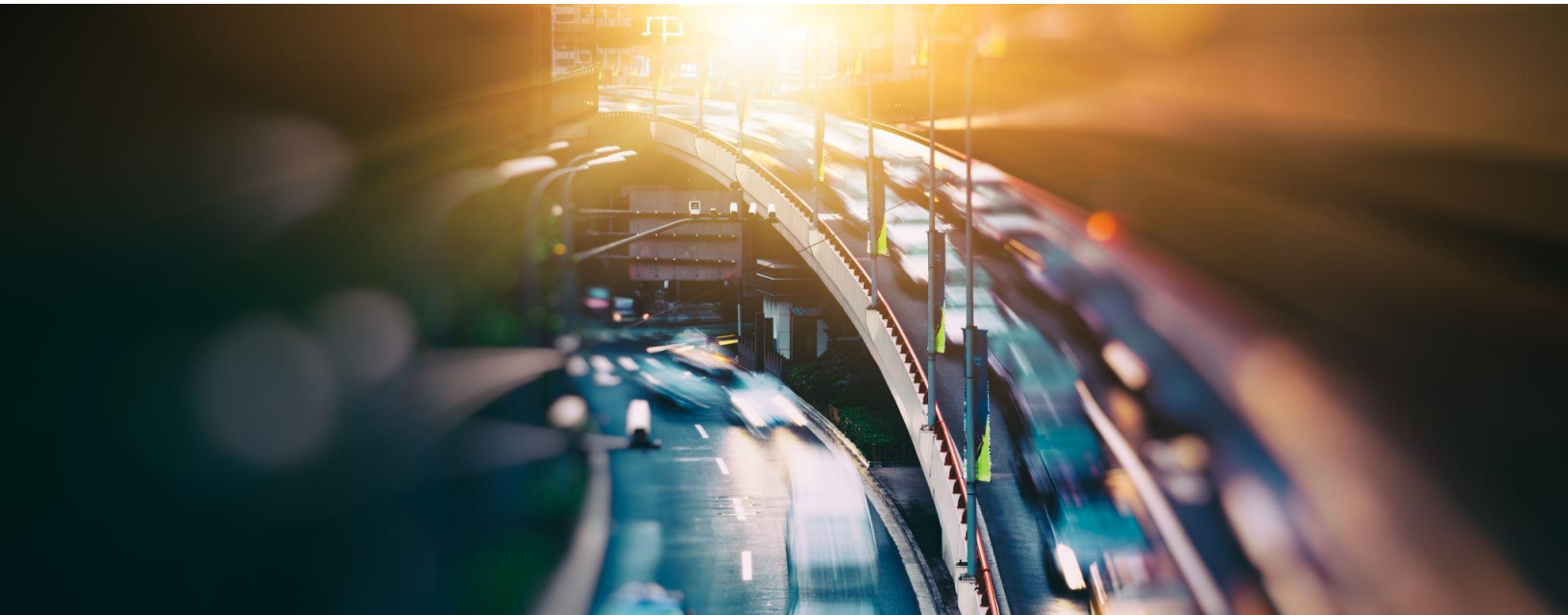
Slightly increase in total cars in Stockholm

Figure 12 - Total number of cars in Stockholm



Looking at the total number of cars in Stockholm as in figure 12, there is noticeable increase overtime since 2015 especially for Stockholm county area. This indicates suburban area is still interested in cars for main transportation as it is understandably that public transportation does not cover bigger area. Potential expansion can be investigated for further line or route expansion.

Incentives for electric cars can be a good way to push people for more sustainable way of travelling beside using public transportation. However, higher cost due to uncertainties as observed recently could discourage people from buying new cars. On the other hand, public transportation is still the best option for sustainable transportation where the government shall continue promoting in the future. As it is shown earlier in figure 2, Stockholm's share of public transportation in inner city is still 70% compared to journey by car which means people rely much to public transport for day-to-day activities.

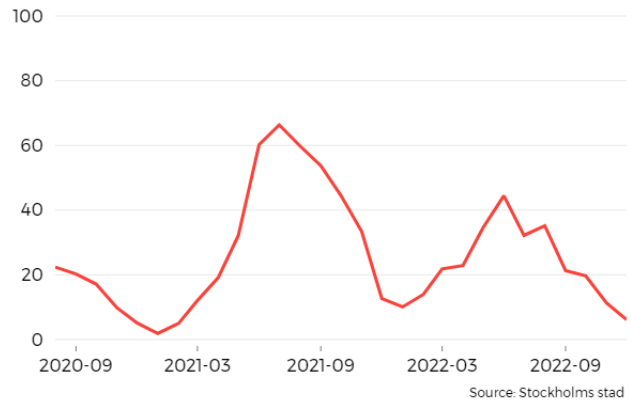


More options at shorter distances, competing with public transport

Recent travel behaviour trends are multimodal. People want flexibility in their choices. Therefore, mobility hub has been an attractive solution for the future transport. In Stockholm, alongside public transport and car, cycling and walking are very attractive options. Figure 14 shows increasing trend in 2022 of both cycling and walking in Stockholm since pandemic started. During 2020-2021, pedestrians and bicycle were decreasing. On the other hand, e-scooter usage was increased substantially in 2021 looking at the trend shown on figure 13. However, in 2022 e-scooters faced backlash due to negative image on media. Furthermore, their usage decreased at the same time new rule for e-scooters was imposed in September 2022, while bicycle and pedestrian numbers started to rise again.

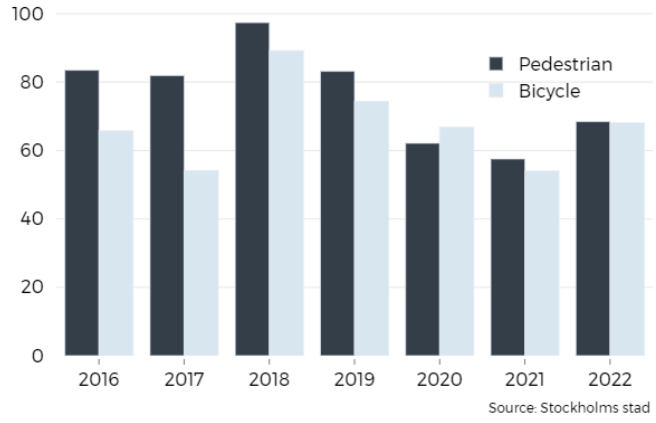
E-Scooter was more popular under pandemic

Figure 13 - E-scooter trips per day in Stockholm (per 1000 inhabitants)



Cycling and walking is starting to be popular

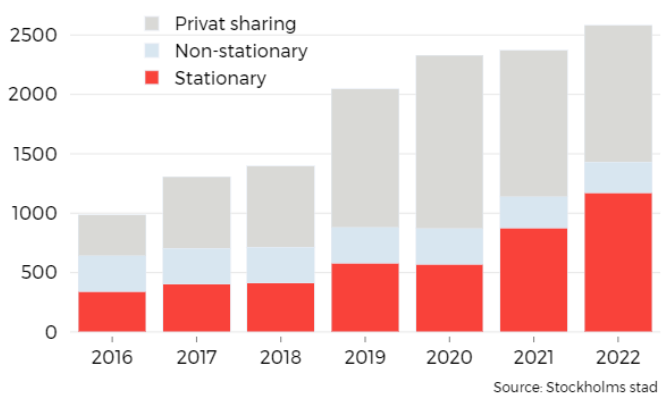
Figure 14 - Number of bicycle and pedestrian passages over Stockholm city (per 1000 inhabitants)



In general, cycling and walking are complementary to public transport because these modes are important to access and egress public transport stops and stations. However, cycling and e-scooters might compete with public transport for shorter distances. On the other hand, the observed sharp reduction recently in the e-scooter use might have also influenced the return to public transport.

Car-sharing is still too low to have an impact in mobility

Figure 15 - Number of cars in Carpool in Stockholm



In addition, car-sharing is another alternative option for travelling. As it shows on figure 15, over the past 6 years, the number of cars in carpool is more than double than before. Privat individual sharing contributes to this number which means there is potential for companies to provide more carpools.

However, accumulatively there is only 2 to 3 cars available for 1000 inhabitants in Stockholm. On the other hand, even though car-sharing is increasing the total number of cars in the city, it is still too few to have noticeable impact on public transport.

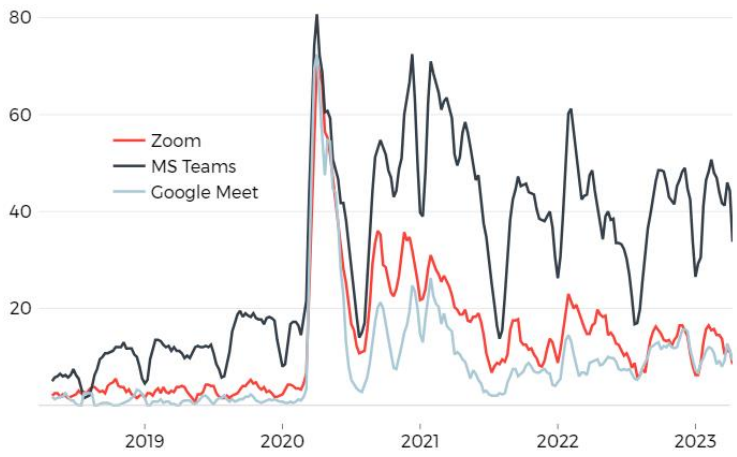
Online meeting continues and growing

The evolving landscape of work preferences and the enduring relevance of remote work have profound implications for the future of workplaces. With Google Mobility data revealing a shift towards remote work, it's evident that a significant portion of the workforce now values the flexibility and convenience of working from home. This preference for remote work is not just a temporary reaction to the pandemic but appears to be a long-term trend.

As indicated by Google Trends data on figure 16, the usage of digital collaboration tools like Microsoft Teams, Zoom, and Google Meet remains high. This sustained digital engagement underscores the expectation that remote and hybrid work models are here to stay. Employees have become accustomed to these digital platforms as essential tools for seamless communication and collaboration, and organizations are likely to continue supporting remote work arrangements to attract and retain top talent.

People are still quite active in digital meeting platform

Figure 16 - Google trends on digital meeting software in Stockholm



Given these dynamics, the return to the traditional workplace setting is expected to be gradual and may never fully revert to pre-pandemic levels. Instead, businesses are likely to embrace more flexible work arrangements in the coming future.

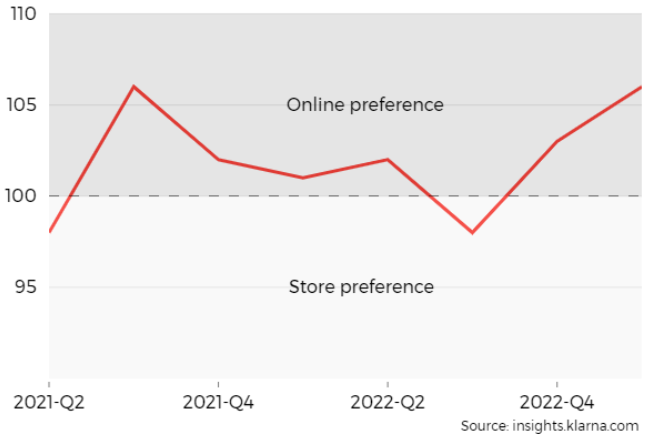
This ongoing new normal behavior will affect the way people commute to the workplaces which then demand for public transportation can be vary on day and time. Probably there will be less Monday rush hour and it would be Wednesday full-packed morning instead.

E-commerce and home delivery are booming

E-commerce activities also suggest increasing trends. According to E-commerce giant Klarna, online shopping is preferred than in-store shopping and the trend is rising as the data shown on figure 17. Although it went down in middle of 2022, it is assumed that revenge-shopping after pandemic was the reason for physical shopping. It can be seen in the following Q4 2022 onward where it becomes preferable again.

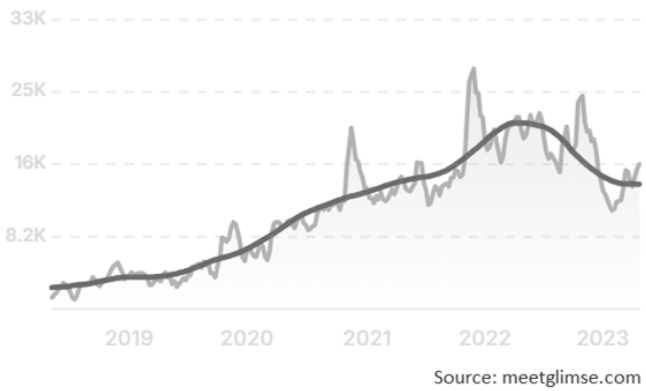
Online shopping is preferred over physical store in Sweden

Figure 17 - Preference for online shopping in Sweden



Package delivery service is highly desirable under pandemic

Figure 18 - Demand for Instabox delivery in Sweden



In addition for online shopping, it is observed that the demand for Instabox, one of biggest package delivery service, has grown quite a lot in the recent years. Figure 18 displays the increasing trend of Instabox since 2018 with the dip at the end of 2022 when people started to go out and shopping directly on the stores. When it is coupled with online shopping in which home delivery is the main service, it is reasonably both are mutually reinforcing. With the growing popularity of online shopping, it contributes to the increasing demand for home delivery. This means that it is expected that people will reduce travelling for shopping and buying things since they do not need to be in-store.

Conclusion

In this report, many aspects such as economy, car ownership, e-scooter and work culture play roles on whether people will return to public transport. These aspects are also uncertain. For example, people may prefer car if the economic uncertainty passes. Similarly, e-scooter may pick slowly again as the policies and image of e-scooter become stable. On the contrary, people may continue to use public transport for recreational purposes. It can be concluded that the demand in public transport will be very flexible and uncertain and therefore it will require demand responsiveness at a short timeframe.

It would require more frequent and regular assessment of the demand in order to be more responsive. This often means that transport authorities need data sources that can yield information at almost real-time. The traditional way of collecting data using travel survey may fall inadequate in this regard, because forming a survey and collecting reliable information take time. Fortunately, there has been overall digital transformation in people daily live. There are many sources such as sensors, mobile phones and other digital devices can provide information that is instantaneous and continuous.

Real-time data will play a crucial role in understanding the travel behavior in the coming times. The future-ready concept is such as utilizing cross-functional data for daily demand updates, while central statistics compile monthly society and travel surveys for specific insights. Relevant stakeholders should harness the benefit of digital transformation that provides ubiquitous data from different sources, to allow a more responsive demand analysis without having to wait for the data collection processes.

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