

Report

Mobility tech as a source of innovation: Israel's smart mobility start-up ecosystem

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Preface

Mobility is a fundamental part of daily life and ripe for constant change and innovation.

Today the mobility industry is in flux. Smart mobility introduces advanced technologies, data, and digital solutions that revolutionize conventional transportation modes, resulting in increased efficiency, safety, and comfort. Innovative disruptions are shifting technologies from fossil fuels and manual vehicles to electric, autonomous and smart vehicles. Industry players are seeking a competitive advantage by adapting and re-inventing themselves either by developing solutions in-house or bringing in ready-made products and technologies, and start-ups and scale-up tech companies are an important source and channel for innovation and technology breakthroughs. Like most industries, they are facing a market slowdown.

This report looks at global mobility trends and investment in smart mobility across geographies and technologies. The trends indicate where new technological development is needed, possibly generated by start-ups. The report highlights the role of Israel's smart mobility ecosystem as a hub for regional and global innovation, explores the challenges and strengths of the ecosystem, and describes key factors for its success looking forward.

Disclaimer: The analytical part of the report was prepared in August-September 2023.

Authors and contributors

This report is the result of a collaboration between McKinsey & Company and EcoMotion. McKinsey provided its expertise on global trends in mobility, including the results of regular mobility consumer surveys conducted by the McKinsey Center for Future Mobility (MCFM), insights from Start-up and Investment Landscape Analysis (SILA) on the state of global mobility start-up ecosystems and the role of Israeli companies globally, and interviews with international industry experts.

EcoMotion provided its expertise on the Israeli context and leveraged its network of Israeli start-ups to conduct interviews and a survey.

This report was developed with guidance from David Chinn, Managing Partner of McKinsey in Israel, Andreas Tschiesner and Kersten Heineke, co-leaders of the McKinsey Center for Future Mobility. The research was led by Martin Kellner, Associate Partner in McKinsey's Munich office and McKinsey Center for Future mobility, Anat Erlich, Associate Partner in McKinsey's Tel Aviv office who leads the Energy & Sustainability service lines, and Jennifer Schwarz, Executive Director at EcoMotion.

Marina Salimgareeva, a consultant based in Tel Aviv, led the working team, including Roei Ashkenazi and Amit Negby from McKinsey and Daniel Levy and Assaf Oren from EcoMotion. We thank McKinsey consultants Selina Hauch, Anna Suslova, Nikolay Gnuchev and Claudia Kofler for their support in project management and content development, and Capabilities & Insights analyst Roy Emodi for analytical support.

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We are grateful to the numerous leaders of Israeli and global start-ups and companies who offered their perspective and valuable insights.

¹ Founded in 1997, IVC Research Center is the leading data source and business information company in Israel's high-tech industry. IVC helps clients understand the Israeli market and access its latest trends and developments. www.ivc-online.com

McKinsey & Company

McKinsey & Company is a global management consulting firm that provides business management consulting services to clients across multiple industries. It has more than 130 offices in over 60 countries.

<https://www.mckinsey.com/>

The McKinsey Center for Future Mobility (MCFM) works with stakeholders across the mobility ecosystem by providing independent and integrated analysis of possible future mobility scenarios including autonomous driving, e-mobility and shared mobility. The Center's mission is to help companies, investors, governments and social sector entities transform the way they approach mobility in all its forms, making it easier, more sustainable, smarter and cheaper for everyone.

<https://www.mckinsey.com/features/mckinsey-center-for-future-mobility/>

EcoMotion

EcoMotion – a Global Smart Mobility Community – is a joint venture between the Israel Innovation Institute, the Israel Ministry of Transport and Road Safety and the Israel Ministry of Economy and Industry.

Based in Tel-Aviv, EcoMotion is a dynamic and growing community in the smart mobility field comprising over 700 start-ups and 15,000 community members. EcoMotion creates a global platform for start-ups to connect with other community members such as global industry, investors, entrepreneurs, academy, public sector entities in the field of smart mobility to collaborate, network and explore synergies. EcoMotion encourages innovation through events such as meet-ups, challenge competitions, adaptations and the annual Main Event.

<https://www.ecomotion.org.il/>

Executive summary

Mobility is a high-impact industry and a fundamental part of daily life, contributing to global shifts in productivity, environmental sustainability, and accessibility of jobs and infrastructure. Five mega-trends are shaping the mobility ecosystem: climate change, electrification, autonomous vehicles (AVs), shared transportation and software over hardware¹.

- 1. Climate change:** Growing global awareness of climate change is driving new sustainable modes of transportation. Companies and investors are increasingly focusing on supporting the net zero effort, i.e., where the level of greenhouse gases released into the atmosphere is equal to the amount removed.
- 2. Electrification:** Electric vehicles (EVs) are a major disruptor. They are perceived as a viable mobility option and are rapidly growing in popularity supported by regulation in many states.
- 3. AVs:** Autonomous mobility (private autonomous cars, intra-city robotaxis, public transport shuttles, drones, long-distance freight vehicles) is a dynamic area that is expected to provide new levels of consumer experience, increase levels of uncertainty and disrupt existing business models.
- 4. Shared transportation:** Innovation in shared transportation will play a key role in the future of mobility in the form of new modes of transportation, such as shared mini- and micro-mobility, hailed mobility, last mile delivery, car sharing, shared robotaxis and urban aerial mobility.
- 5. Software over hardware:** Software for mobility is crucial for the advancement of all other trends.

Global investment in future mobility has grown over the last 10 years but slowed in 2022-23, similarly to other industries. Limited funding and increases in interest global rates have encouraged commercialization and less focus on exploration. As a result, most mobility segments have seen market consolidation.

Israel's smart mobility start-up ecosystem plays an important role on the world stage.

Israel is the fourth-biggest mobility start-up hub in the world in terms of financing (US\$30+ billion investment in 2010-2023) and the biggest in terms of investment per capita and as a share of GDP. Investment in mobility is highly consolidated in Israel and is driven by major M&As. This is similar to the situation in the UK and Sweden where over 50% of investments in the last 10 years has been generated by top-3 deals.

¹ McKinsey Center for Future Mobility, interviews with industry experts

The strong global presence of the Israeli tech on the one hand creates a dependency on global trends and funding landscape fluctuations. On the other hand, it helps Israeli start-ups to stay more resilient to local shocks due to the diversification of their client base, partnerships, and talent pool. Israel followed the global trend and saw funding for high-tech sectors including mobility peak in 2021 then decrease in 2022-2023.

A survey² run in September 2023 cites access to funding and finding the right strategic partners/investors as the top challenges for Israeli start-ups. The ability to maintain relationships with international investors and strategic partners will be crucial as international investment and R&D spending is an important pillar of the ecosystem, followed by government support.

According to the survey³ of Israeli start-ups, Israel's biggest strengths are professional networks and access to talent. The concentration of start-ups across industries enables talent and knowledge exchange, which is particularly beneficial for software solutions. The ability to retain and attract top talent will be another important factor for the success of the ecosystem.

In Israel, what is the next phase in the development of the local ecosystem? How will the global trends influence the market? And what will most enable start-ups to scale? Looking ahead, there is a significant need for new mobility technologies. Technologies from multiple sectors and use cases could be adapted to serve emerging needs of mobility. Start-ups in Israel and beyond will benefit from tailoring their solutions to the industry needs of today and tomorrow. They should strive to connect with global networks, investors, and industry to advance the mega-trends shaping mobility.

Disclaimer: The analytical part of the report was prepared in August-September 2023.

² EcoMotion Community survey of Israeli mobility companies, conducted in August-September 2023 (136 respondents among Israeli start-ups; 40 among global start-ups)

³ *ibid*

1. Mobility landscape: global seismic forces

Mobility is a fundamental part of daily life and is ripe for constant change and innovation. Five mega-trends are shaping the mobility ecosystem: climate change, electrification, autonomous vehicles (AVs), shared transportation and software over hardware.¹

Climate change

Global awareness of climate change is growing. Many countries have committed to net zero emissions, i.e., where the level of greenhouse gases (GHG) released into the atmosphere is equal to the amount removed². Transportation alone accounts for ~20% of overall GHG globally, 75% of which come from the exhaust emissions of road vehicles³.

The global view of mobility is also shifting. Modes of mobility are changing and new ones are emerging, e.g., EVs and innovative shared services. This is a step in the right direction but reaching the net zero target requires fully green solutions and production methods across the mobility sector⁴.

Companies and investors are increasingly aware of the need to develop solutions that are not only more environmentally friendly, but also enable and support the net zero effort. These include carbon-neutral production of vehicles, production processes that produce no GHG emissions and the use of sustainable fuels⁵ such as biofuels (e.g., hydrotreated vegetable oil, HVO; bioethanol) and synthetic fuels (synfuels, e.g., ammonia, methanol⁶).

Climate change will affect the mobility market as both a target and a challenge. As extreme weather incidences become more frequent and/or severe, mobility and supply chain infrastructure becomes increasingly exposed to disruptions. Storm surges, extreme sea cyclones, coastal flooding and coastline changes will affect sea freight while extreme temperatures and natural disasters will affect air and ground transport.

Consumers too are changing (Exhibit 1). Over 60% of respondents in McKinsey's Mobility Consumer Pulse⁷ are aware of environmental issues and state their desire to change their behavior to have a more positive impact; half say that they will travel less over the next 10 years to protect the environment. Over 80% of respondents are willing

¹ McKinsey Center for Future Mobility, interviews with industry experts

² <https://mckinsey.com/featured-insights/mckinsey-explainers/what-is-net-zero>

³ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mobilitys-net-zero-transition-a-look-at-opportunities-and-risks>

⁴ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-race-to-decarbonize-electric-vehicle-batteries>

⁵ <https://www.mckinsey.com/industries/oil-and-gas/our-insights/charting-the-global-energy-landscape-to-2050-sustainable-fuels>

⁶ Interview with executive of major logistics company

⁷ MCFM Consumer Pulse survey covers 25,000+ respondents who regularly use mobility in 13 countries (Europe, Americas, Asia and Africa) covering more than 75% of global sales volumes

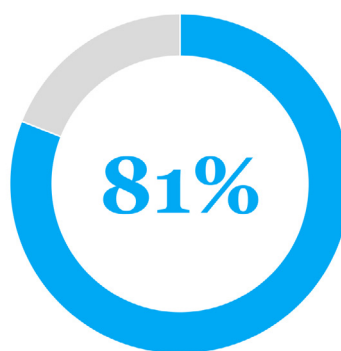
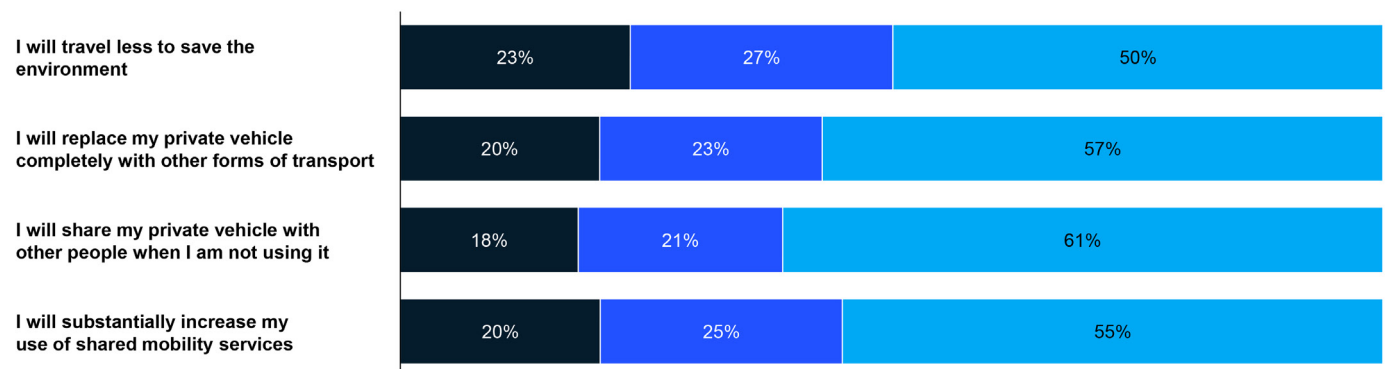
to pay a premium for a zero-carbon car. The use of private vehicles is also expected to decline across most geographies, with over 40% of global travellers expecting to replace their private vehicles with other forms of transport. In China this figure rises to 60%.

Exhibit 1:
Anticipated mobility shifts over the next 10 years

Average share of replies on attitudes towards mobility

■ Agree, Completely agree, Strongly agree ■ Somewhat agree ■ Completely disagree, Disagree, Somewhat disagree

“Within the next 10 years...”



**are willing to pay at
 least 5% premium for
 a Zero carbon car**

Source: McKinsey Center for Future Mobility, Mobility Consumer Insights Solution, Feb 2023 ; Insights are gathered from participants in 13 countries , covering more than 75% of global sales volumes

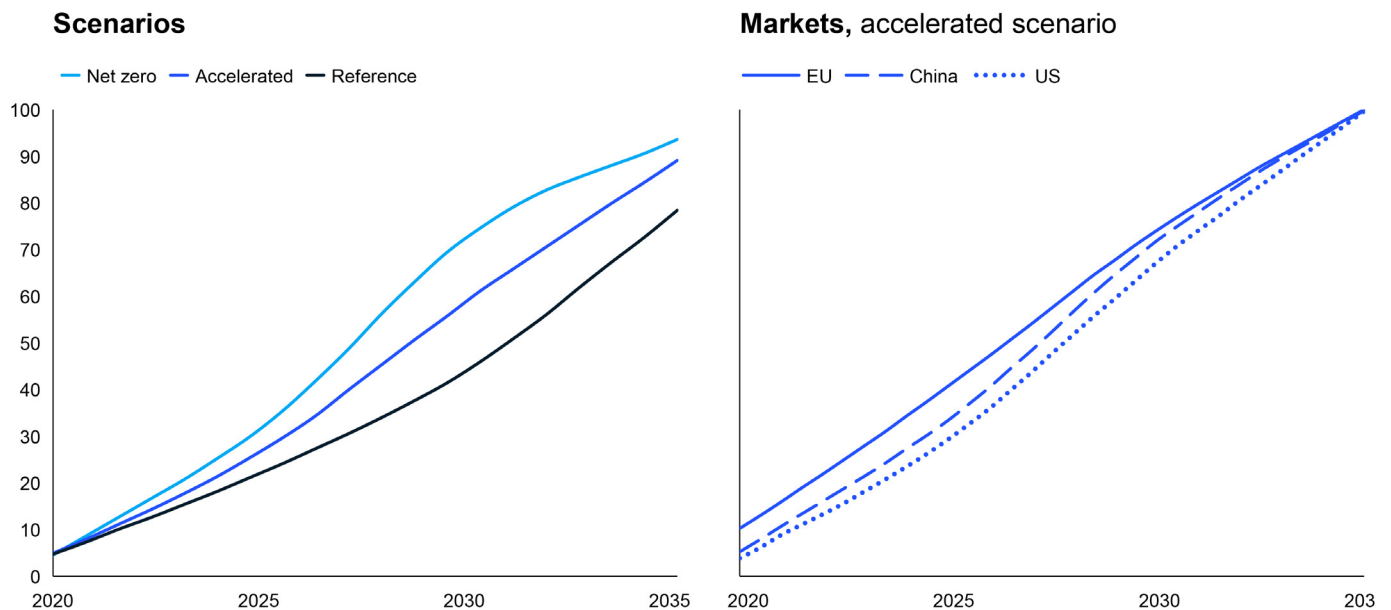
Electrification

Despite the slowdown observed in Q2-Q3 2023, EVs are a major disruptor that will shape the mobility agenda for years to come. They are perceived as a viable mobility option⁸ and are growing in popularity, supported by regulation in many countries. New regulatory targets in the EU and the USA aim for an EV share of at least 50% by 2030, and several countries have announced accelerated timelines for bans on the sale of internal combustion engines sales in 2030-2035 (Exhibit 2). Consumers are also moving towards sustainable mobility, with more than 45% considering buying an EV⁹. EV disruption has been part of the mobility agenda for some time, with a global 0.4% penetration rate in 2014 and 2.2% in 2018. Worldwide demand¹⁰ for EVs is projected to grow six-fold from 2021 to 2030¹¹.

Exhibit 2:

Forecast EV sales in leading automotive markets

EV (battery, fuel cell and plug-in hybrid EV) sales in percent of new passenger vehicle sales



Source: Center for Future Mobility

Three potential scenarios: Net-zero scenario – regulation to follow commitment track to reach the net-zero target; Accelerated scenario – most likely scenario under which consumer adoption will exceed regulatory targets; Reference Scenario – scenario under which currently expected regulatory targets will be met

In Q3 2023, several automotive players lowered their EV targets and reduced planned investment and expansion plans, in line with the overall slowdown of the markets and more conservative consumer behavior.

⁸ Interview with founder of Venture Capital Fund

⁹ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-the-automotive-future-is-electric>

¹⁰ McKinsey Center for Future Mobility projection

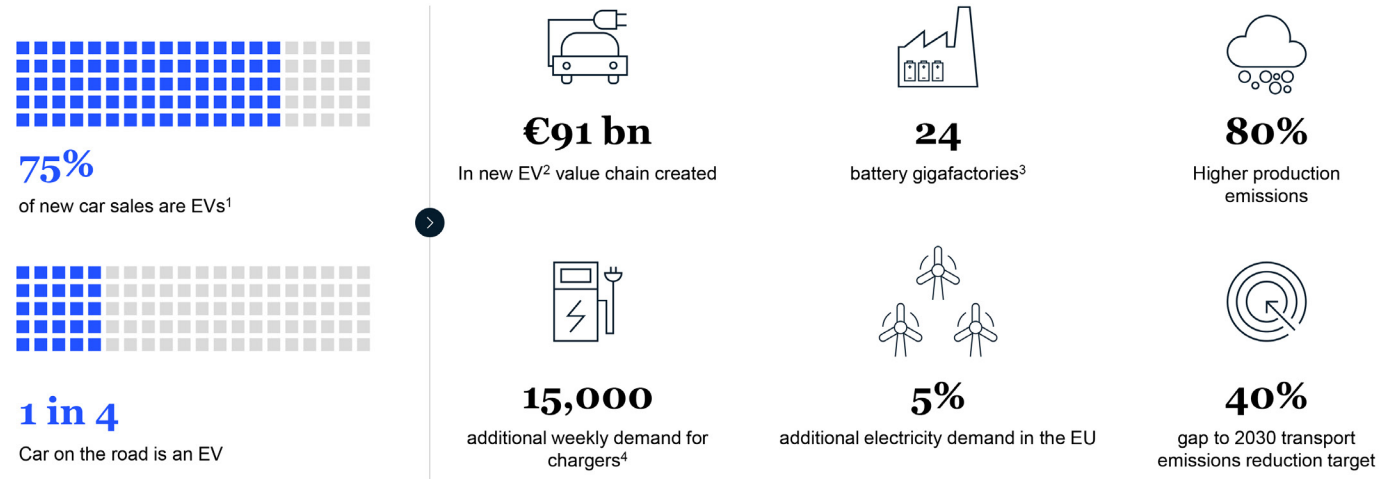
¹¹ <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-an-ev>

Innovation needed for wide consumer adoption and zero-emission production of EVs includes new technologies for electric batteries; electric motors; supporting infrastructure (energy grid, chargers, charging station deployment); urban planning development and design; and know-how to operate new modes of public transport¹² (Exhibit 3).

Exhibit 3:

Holistic industry impact of the e-mobility disruption

Passenger vehicles, European Union, Great Britain, China, Norway, 2030, accelerated scenario



¹. EVs include BEVs, PHEVs, FCEVs

². Includes electric drive, battery packs, power electronics, and thermal management

³. Assumes an average gigafactory with annual capacity of 25 GWh

⁴. Assumes an ideal EV—charger ratio of 10:1 and refers to public chargers, including chargers in multifamily homes

Source: McKinsey Center for Future Mobility; Regulation 2019/631 amendments; McKinsey Battery Demand Model

Three potential scenarios: Net-zero scenario – regulation to follow commitment track to reach the net-zero target; Accelerated scenario – most likely scenario under which consumer adoption will exceed regulatory targets; Reference Scenario – scenario under which currently expected regulatory targets will be met

Autonomous mobility

AVs are a new and exciting field. Applications range from private autonomous cars, intra-city robotaxis and public transport shuttles, to drones and long-distance freight vehicles. Demand for the services required for autonomous mobility such as charging facilities is also growing.

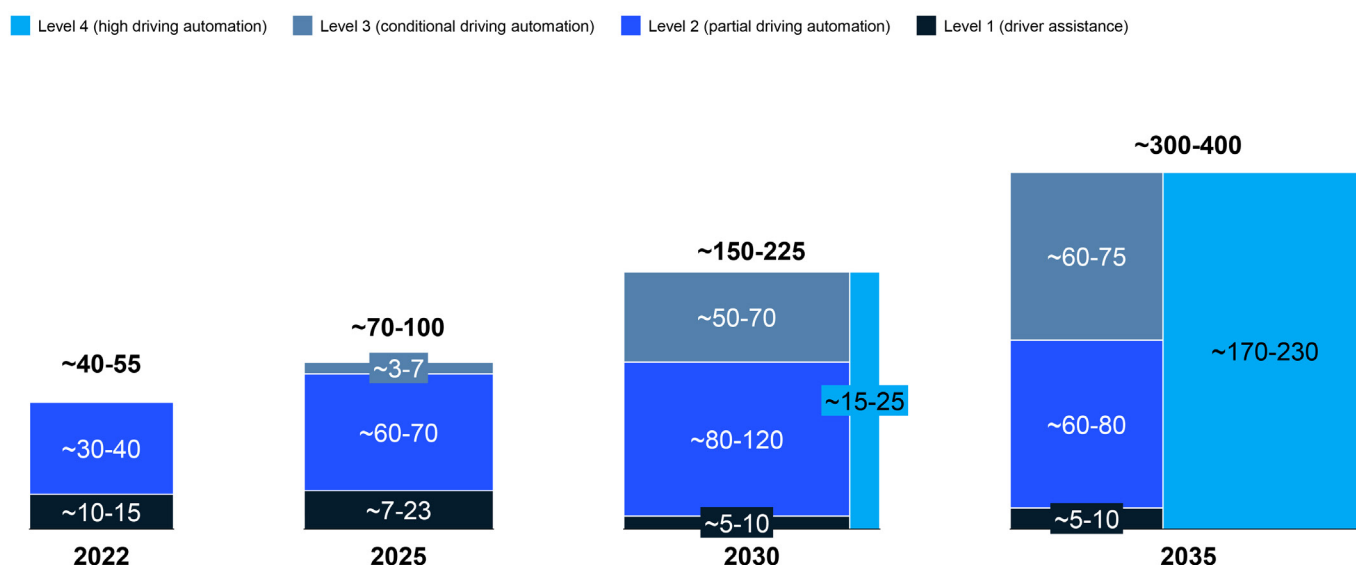
Investor expectations are shifting to practical applications of autonomous mobility. This is mainly reflected in the level of automation sought: L1 (driver assistance); L2 (partial driving automation); L3 (conditional driving automation); and L4 (high-driving automation). Current trends favor producing viable products in L2+ and L3 and delaying the development of L4 as steep up-front costs for developing L3 and L4 systems suggest that auto companies' efforts to commercialize more advanced systems may initially be limited to premium vehicle segments¹³. According to MCFM (Exhibit 4), global revenues from L4 systems, which provide almost full driverless driving, are expected to reach ~10% of the market in 2030. L2, which include driver assistance (auto steering/acceleration), will total ~60%.

¹² Interview with executive of major public transportation company

¹³ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/autonomous-drivings-future-convenient-and-connected>

Exhibit 4:
Forecast AV revenues by level of automation

US\$ bn



Source: McKinsey Center for Future Mobility, 2023

Autonomous driving technologies will enhance consumer experience, offering greater safety, easy operation for manoeuvres such as parking, and fuel savings through the maintenance of optimal speeds¹⁴.

AVs will also increase the level of uncertainty and disrupt existing business models. All players involved in mobility value chains will have to constantly align their strategies with the most recent technological developments and consumer reactions. Autonomous driving will transform the sector because of the high investment required. It will prompt major shifts within the technology stack and the customer experience in the vehicle. Logistics, too, will fundamentally change, e.g., drivers for long-haul transportation may no longer be needed. Such changes could lower costs and lead to shifts in value pools, such as the growth of e-commerce¹⁵.

AVs will also change the face of freight and delivery and shared transportation (robotaxis). Delivery AVs that focus on last mile (delivery direct to the consumer vs larger shipment and freight) are developing fast and could emerge sooner than shared autonomous robotaxis. They are less complex and cheaper to develop than passenger AVs and operate well on shorter distances. Given their favorable unit economics, autonomous modes of transport are becoming cost-competitive vs human-operated delivery options.

¹⁴ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/autonomous-drivings-future-convenient-and-connected>

¹⁵ <https://www.mckinsey.com/features/mckinsey-center-for-future-mobility/our-insights/whats-next-for-autonomous-vehicles>

Shared transportation

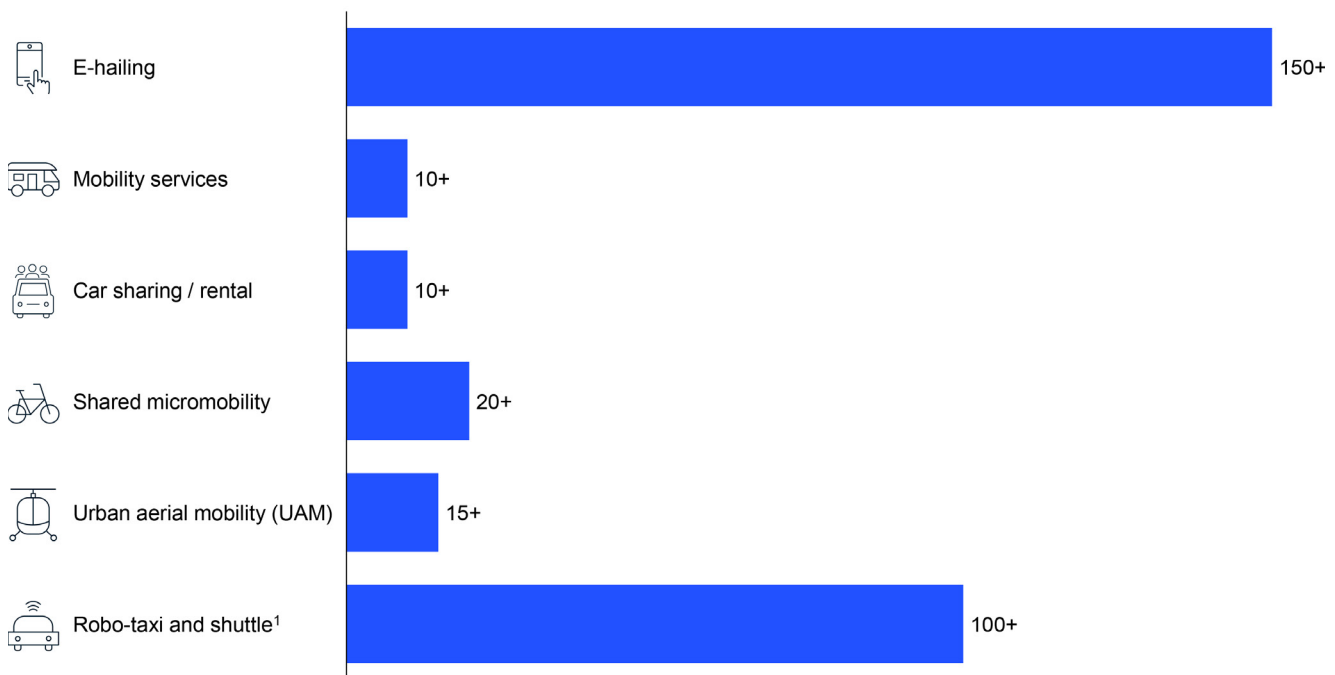
Shared transportation is not a new concept; public transport is widely available in cities around the world. However, its development and innovation will play a key role in the future of mobility.

Developments will vary across geographies, but will include both traditional (buses, trains, metros) and new modes of shared transportation¹⁶ such as shared mini (e.g., shared private vehicles) and micro-mobility (e.g., e-scooters), hailed mobility (e.g., Uber), last mile delivery, car sharing and – further down the line – shared robotaxis and urban aerial mobility¹⁷ (Exhibit 5).

Exhibit 5:

Investment in technologies related to shared transportation

2010-2023, US\$bn



¹. Approximated from investment in autonomous driving

Source: McKinsey Center for Future Mobility

By 2030, total revenues from hailed mobility could reach US\$450-\$860 billion, accounting for 80-90% of consumer spending in shared mobility¹⁸(Exhibit 6). The global micro-mobility market could more than double by 2030 to about US\$90 billion¹⁹.

¹⁶ [https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-mobility-mobility-evolves\(different-geographic-scenarios\)](https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-mobility-mobility-evolves(different-geographic-scenarios))

¹⁷ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/shared-mobility-sustainable-cities-shared-destinies>

¹⁸ ibid

¹⁹ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-mobility-mobility-evolves>

Exhibit 6:
Revenue forecast by shared mobility segment

By 2030, US\$ bn¹



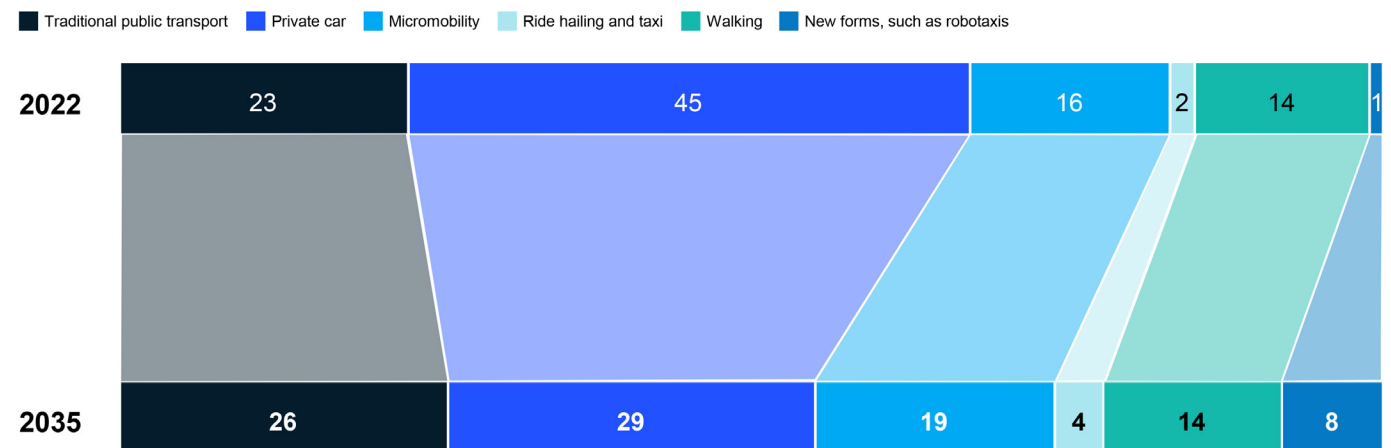
¹ Including North America, Europe, and Greater China. Market sizes are based on scenarios that include the current trajectory and further acceleration. Figures have been rounded.
² Includes subcategories e-hailing (dynamic shuttle services and pooled e-hailing) and shared autonomous vehicles (robo-taxis and robo-shuttles). E-hailing estimates are \$120 billion—\$130 billion for 2019 and \$380 billion—\$450 billion for 2030. Shared autonomous-vehicle estimates are <\$1 billion for 2019 and \$70 billion—\$410 billion for 2030.
³ E-kickscooters, e-bicycles, and e-mopeds.
⁴ Includes peer-to-peer (P2P) car sharing.

Source: McKinsey Center for Future Mobility

The development of shared mobility will reduce the need for non-sustainable private vehicles. In 2035, private cars are forecast to remain the most popular transportation option but their share of total mobility will decline (Exhibit 7).

Exhibit 7:
Mobility split by mode of transportation worldwide

Share of each mode, %



Note: Figures may not sum to 100%, because of rounding

Source: McKinsey Center for Future Mobility, 2023



Software over hardware

The importance of software for mobility is rising and is expected to reach one-third of a car's value in the next years, with some segments reaching this level already now²⁰. In the automotive sector this is referred to as the “software-defined vehicle”, where software controls functions traditionally handled by hardware. This is not a new trend but it is expected to continue. Software development is needed to support all mobility trends, including electrification (e.g., early detection and notification of battery problems); autonomous driving (e.g., AI for object detection and recognition²¹); IoT (Internet of Things) and V2X (Vehicle-to-everything) technologies required to connect “old” industries with new modes of operation (e.g., cargo monitoring²²); and mobile applications (e.g., for intermodal journeys that will be a leading feature of future mobility).

Software development is easy to scale and can penetrate new markets and product and vehicle segments. Intermodal journeys typically involve more than one mode of transport. Platforms that integrate all possible combinations for a particular route are already starting to emerge, allowing travellers to plan their journeys more easily. For example, Jelbi, a German-based public transport and sharing services app, shows possible routes involving various mobility modes, time required and cost²³.

The rise of mobility software generates the need for security solutions to avoid, detect and defend vehicles against cyber-attacks. Over the next 10 years, the size of automotive cybersecurity market is expected to nearly double and reach US\$10+ billion²⁴.

²⁰ McKinsey forecast; interview with founder of start-up focusing on mobility energy solutions

²¹ Interview with founder of start-up focusing on energy solutions for mobility

²² Interview with executive of major company in logistics

²³ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-mobility-mobility-evolves>

²⁴ McKinsey forecast

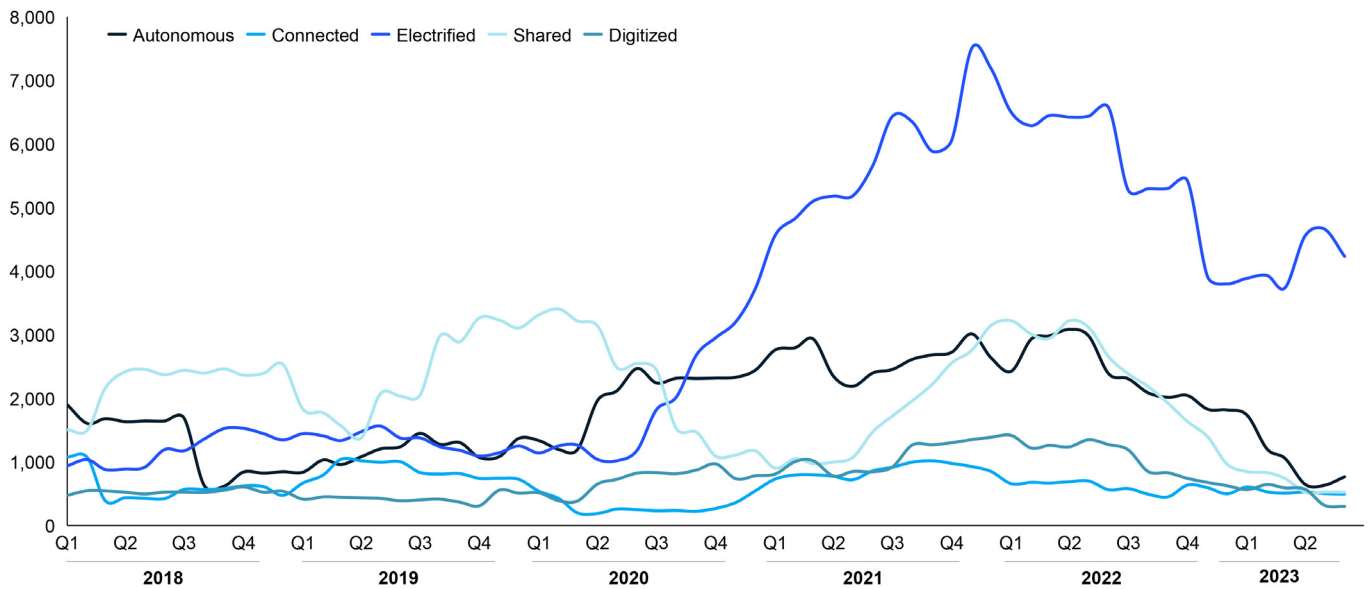
Global funding context: slowdown post 2021-peak

In 2022-23, mobility start-ups faced headwinds and post-COVID-19 growth slowed. Limited funding and increases in interest global rates have encouraged commercialization and less focus on exploration. As a result, markets have consolidated in most mobility segments. The electrification and energy segment saw an investment boom in 2021 to early 2022, but slowed in late 2022-2023.

Exhibit 8:

12-month rolling average of disclosed investment amount by mobility technology cluster

US\$ mn



Source: Start-up and Investment Landscape Analysis database, McKinsey

Global trends suggest that mobility ecosystems have enormous long-term growth potential and that solutions at the intersection of new mobility and sustainability will drive innovation in mobility and adjacent sectors. However, growth may be limited in the short term.

2. Israel's position in the global smart mobility ecosystem

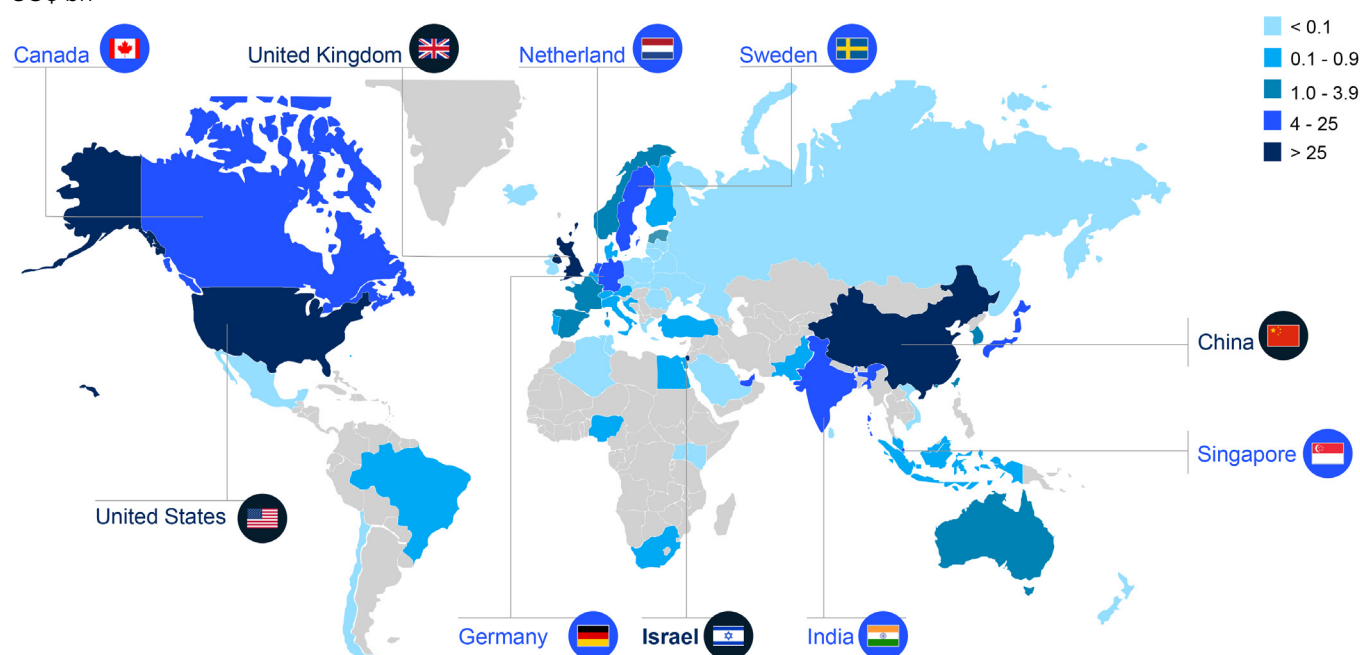
Most global trends are innovation-driven and disruptive. As such, start-ups are a leading catalyst of change.

In 2010-2023, Mobility investment has been heavily concentrated in the USA (US\$327 billion) followed by China (US\$230 billion) and the UK (US\$60+ billion)²⁵ (Exhibit 9). Despite its small market size, Israel is the fourth-biggest mobility start-up hub in the world (in terms of financing) with US\$30+ billion investment in 2010-2023²⁶. Germany ranks fifth (US\$20+ billion) but features multiple smaller deals²⁷. Israel is the No. 1 geography in terms of mobility investment per capita, followed by Singapore and Sweden²⁸ (Exhibit 10) and mobility investment as a share of GDP, followed by Estonia and Singapore²⁹. In Israel, top-3 largest deals account for over 50% of investment, similarly to the UK, Sweden and Singapore.

Exhibit 9:

Total disclosed investment amount in mobility 2010-2023 by target country

US\$ bn



Source: Start-up and Investment Landscape Analysis database, McKinsey

²⁵ McKinsey Start-up and Investment Landscape Analysis database

²⁶ ibid

²⁷ ibid

²⁸ McKinsey Start-up and Investment Landscape Analysis database, OECD

²⁹ McKinsey Start-up and Investment Landscape Analysis database, World Bank

Exhibit 10:

Top countries by disclosed investment per capita in mobility sector per capita

US\$ per capita

Top 10 countries	Investment per capita, US\$ per capita	Total disclosed investment amount since 2010, USD bn	Number of companies
① Israel	3.9	37.2	93
② Singapore	3.1	16.8	28
③ Sweden	2.1	21.9	53
④ United States	1.0	326.7	999
⑤ United Kingdom	1.0	64.2	226
⑥ Netherlands	0.9	15.4	79
⑦ Canada	0.5	19.3	106
⑧ Germany	0.3	24.0	255
⑨ China	0.2	228.4	399
⑩ India	0	16.3	219

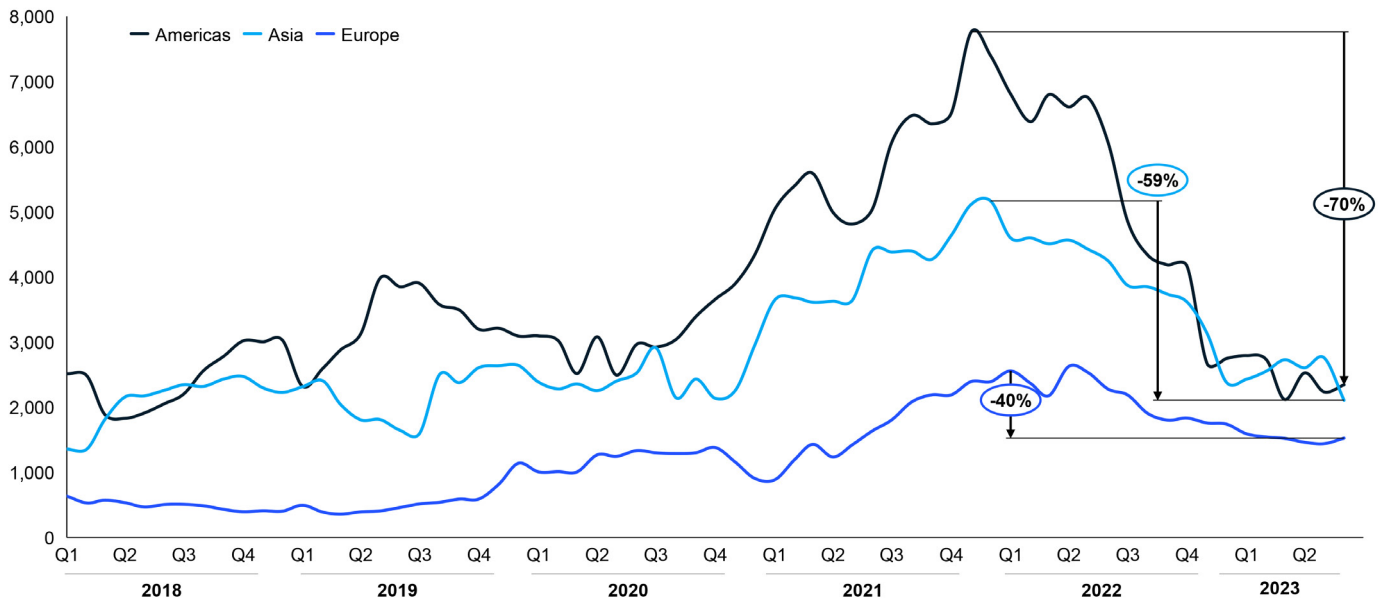
Source: Start-up and Investment Landscape Analysis database, McKinsey; IVC Research

In 2022-2023, investment slowed to pre-pandemic volumes in all geographies. In the Americas and Asia, it fell 60-70% compared to peak values at the end of 2021, followed by Europe³⁰ (-40%) (Exhibit 11).

Exhibit 11:

12-month rolling average of disclosed investment amount by region

US\$ mn



Source: Start-up and Investment Landscape Analysis database, McKinsey

³⁰ McKinsey Start-up and Investment Landscape Analysis database

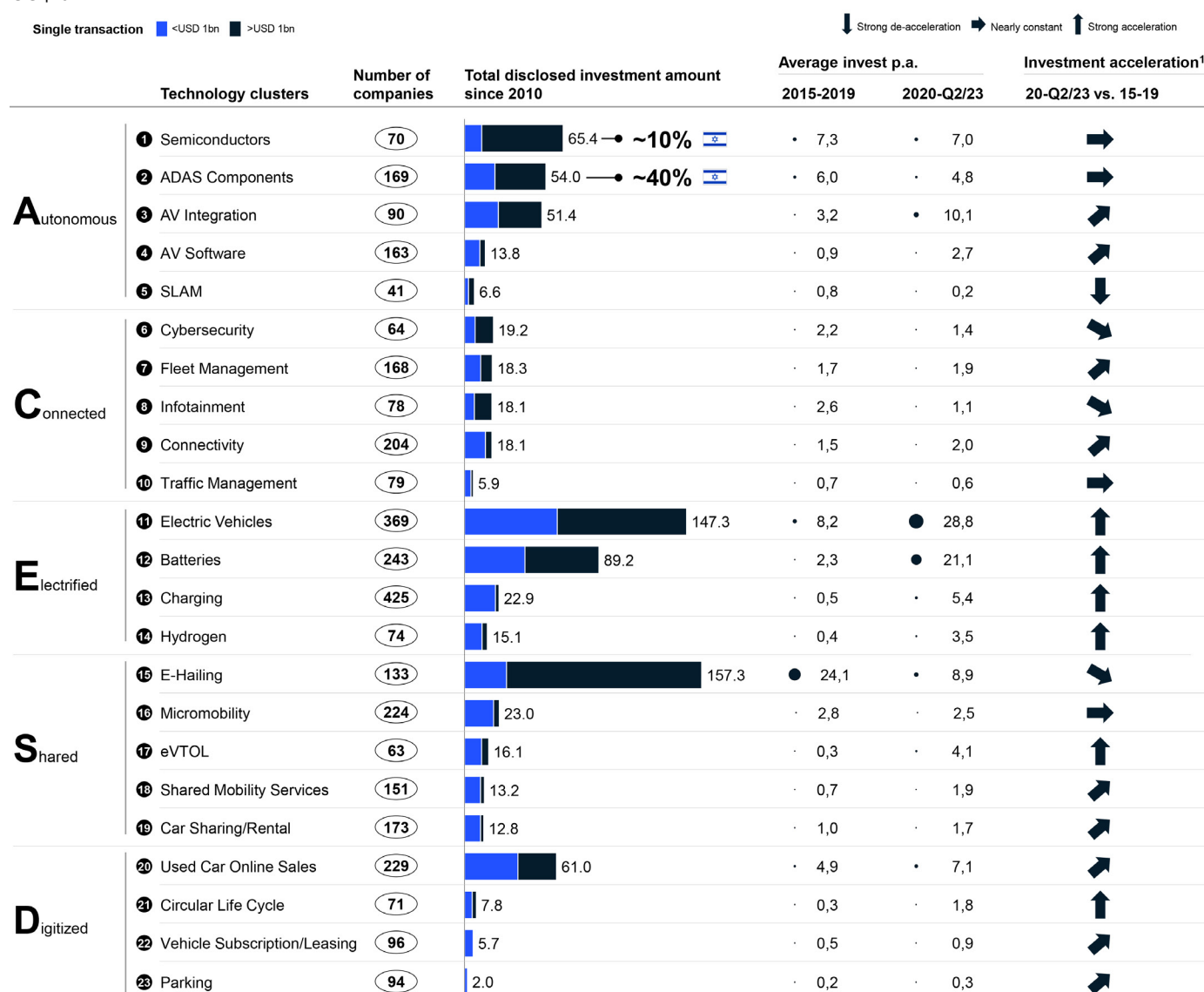
While global investment in future mobility has grown over the last 10 years, some technologies have attracted more funding than others (Exhibit 12). Since 2010, the top five technology clusters (excluding used cars sales) by amount of money invested were e-hailing (US\$157 billion); EVs (US\$147 billion); batteries (US\$89 billion); semiconductors (US\$65 billion, ~10% of that in Israel) and advanced driver assistance systems (ADAS) components (US\$54 billion, ~40% of that in Israel)³¹.

In 2020-2023, global events caused investment in mobility to fall and technology trends to change. However, investment in some technology clusters increased: EV investment grew ~350% from an average US\$8.2 billion p.a. in 2015-2019 to an average US\$28.8 billion in 2020-Q2 2023; battery investment grew ~900% from US\$2.3 billion p.a. to US\$21.1 billion; AV integration grew ~300% from US\$3.2 billion p.a. to US\$10.1 billion, surpassing ADAS components where investment³² declined.

Exhibit 12:

Global investment in mobility by technology

US\$ bn



¹ Difference in average investment amounts

Source: Start-up and Investment Landscape Analysis database, McKinsey

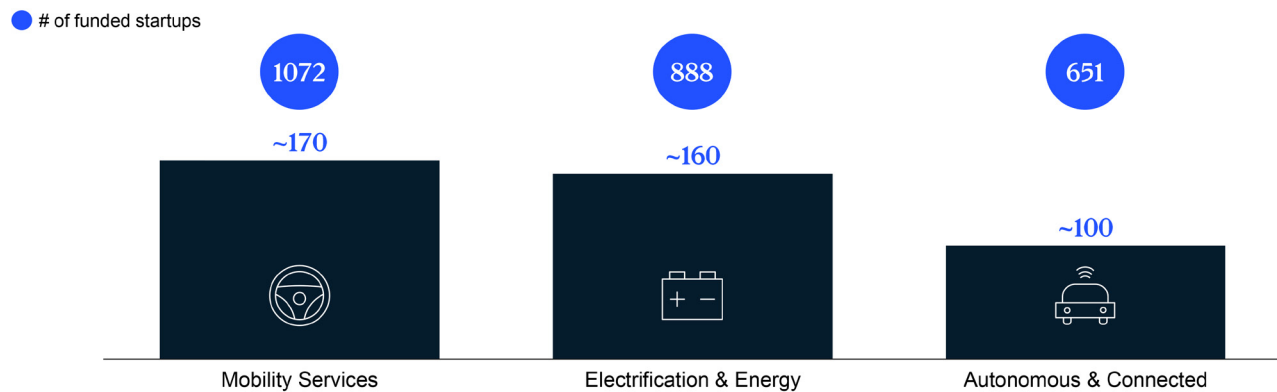
³¹ McKinsey Start-up and Investment Landscape Analysis database

³² McKinsey Start-up and Investment Landscape Analysis database

Since 2010, most investments have been allocated to mobility services (US\$170 billion), electrification and energy (US\$160 billion) and autonomous and connected technologies (US\$100 billion). The highest density of players is in mobility services (~1,100 companies) and electrification and energy (~900 companies). Electrification and energy (US\$180 million), mobility services (US\$160 million) and autonomous and connected (US\$150 million)³³ attract the highest average funding per start-up.

Exhibit 13:
Total global funding by mobility sector 2010-2023

US\$ bn

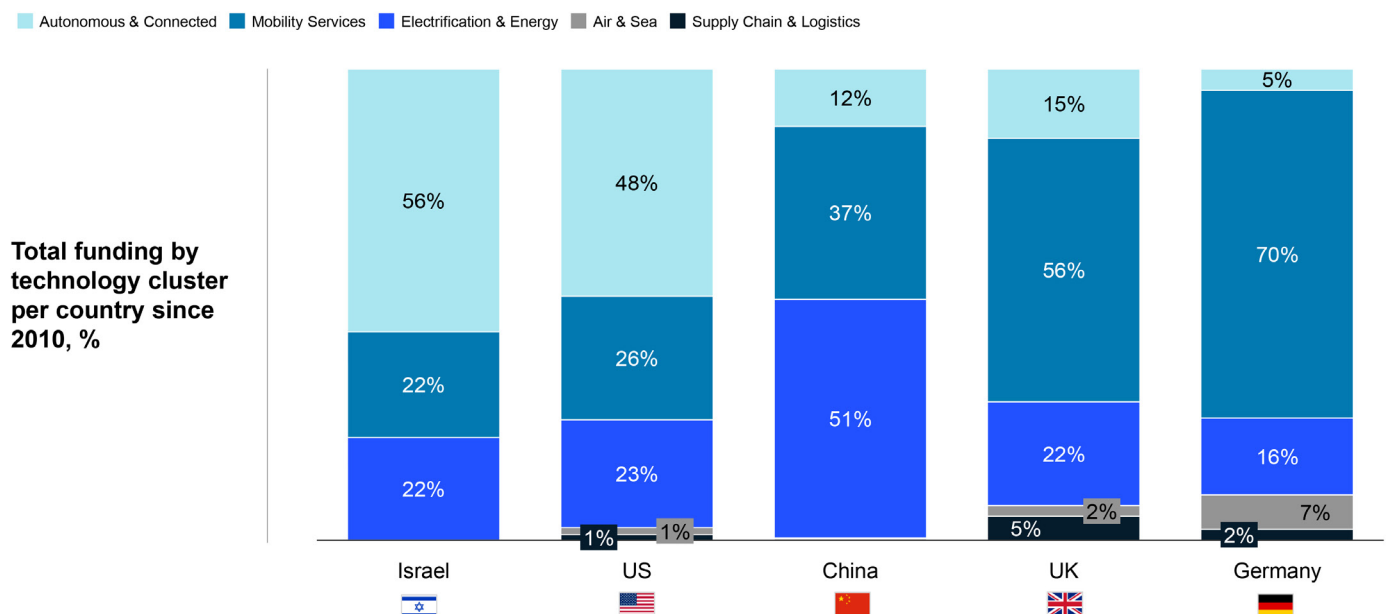


Source: Start-up and Investment Landscape Analysis database, McKinsey

Israel and the USA have the highest shares in autonomous and connected (56% and 48%), while Germany and the UK have the highest shares in mobility services (70% and 56%), and China in electrification (51%) (Exhibit 14)³⁴.

Exhibit 14:
Total global funding by country and mobility sector 2010-2023

Share of investment in sector, %



Source: Start-up and Investment Landscape Analysis database, McKinsey

³³ McKinsey Start-up and Investment Landscape Analysis database

³⁴ ibid

3. Israel's smart mobility start-up ecosystem

Over the last 10 years, the high-tech sector has become one of the largest and fastest-growing industries in Israel's economy, accounting for approximately ~10% of the workforce and contributing 18% of GDP³⁵. Israel has attracted the attention of global investors for its entrepreneurship and the success rate of its start-ups that scale to acquisitions or IPOs. It is known as the “start-up-nation” or the “scale-up nation”.

Israel is a geographic hub for new automotive and mobility technologies. Early successes such as WAZE (acquired by Google in 2013) and Mobileye (first IPO in 2014 acquired by Intel in 2017), and the rise and close of electric car company Better Place in 2007-2013, have put Israel on the mobility map. The mobility sector represents 8% of Israel's total high-tech industry³⁶ and Israel has the knowledge and skills to grow its auto-tech sector over the next 10 years.

Ecosystem overview³⁷

Israel has 724 active start-ups or companies (September 2023) with applications to the mobility sector (private and public companies, including acquired start-ups, established since 1990)³⁸ (Exhibit 15). The largest sectors by number of companies are autonomous and connected (26%) and mobility services (25%). Autonomous and connected is the largest sub-sector, showing how software-defined vehicles are driving most start-up tech solutions. Most Israeli mobility companies are small and medium enterprises (SMEs) and more than 85% have less than 50 employees.

³⁵ High-Tech's Contribution to the Economy <https://innovationisrael.org.il/en/reportchapter/high-techs-contribution-economy>

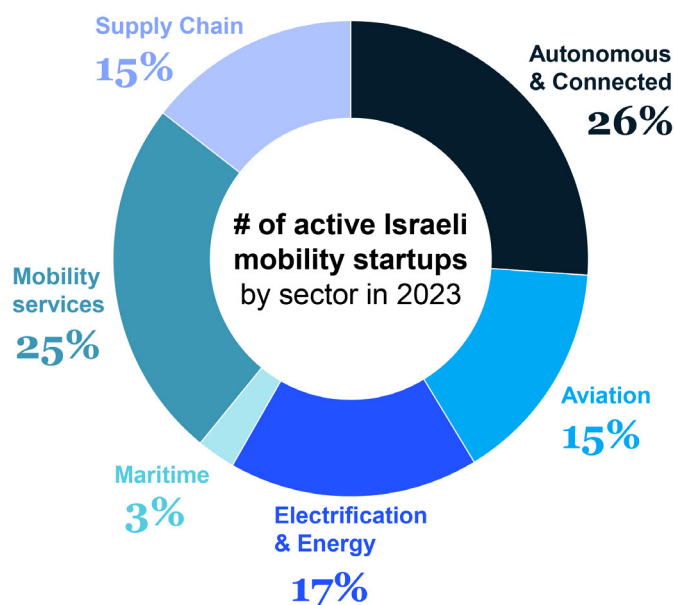
³⁶ IVC Research Center (dashboard created by IVC of mobility tech companies)

³⁷ Insights on the state of Israel's smart mobility ecosystem are gathered from qualitative interviews with industry experts, database of IVC Research Center and survey conducted among Israeli mobility companies in August-September 2023 (136 respondents).

³⁸ IVC Research Center (dashboard created by IVC of mobility tech companies)

Exhibit 15:
Distribution of active Israeli start-ups by mobility segment

% of companies August 2023



Source: IVC Research Center

In 2018-2023, 13 IPOs and 47 M&As were concluded in Israel's mobility sector (Table 1).

Exhibit 16:
Largest IPOs and M&As

2018-2023

Company	Year of IPO/Acquisition	Deal size ¹	
ALGOLION	Acquired by GM	2023	
Autotalks	Acquired by Qualcomm	2023	\$350M
Continual	Acquired by RadCom	2023	
mobileye	IPO on Nasdaq	2022	\$861M
CAARESYS	Acquired by Harman	2022	
INNOVIZ	SPAC, NASDAQ	2021	
waycare	Acquired by Rekor Systems	2021	\$61M
cipia	IPO Tel Aviv Stock Exchange	2021	\$22M
moovit	Acquired by Intel	2020	\$915M
GO>TO	Tel Aviv Stock Exchange	2022	
driivz	Acquired by Gilbarco Veeder-Root	2021	\$220M
Cybellum	Acquired by LG	2021	\$140M
GENCELL	IPO Tel Aviv Stock Exchange	2020	\$61M

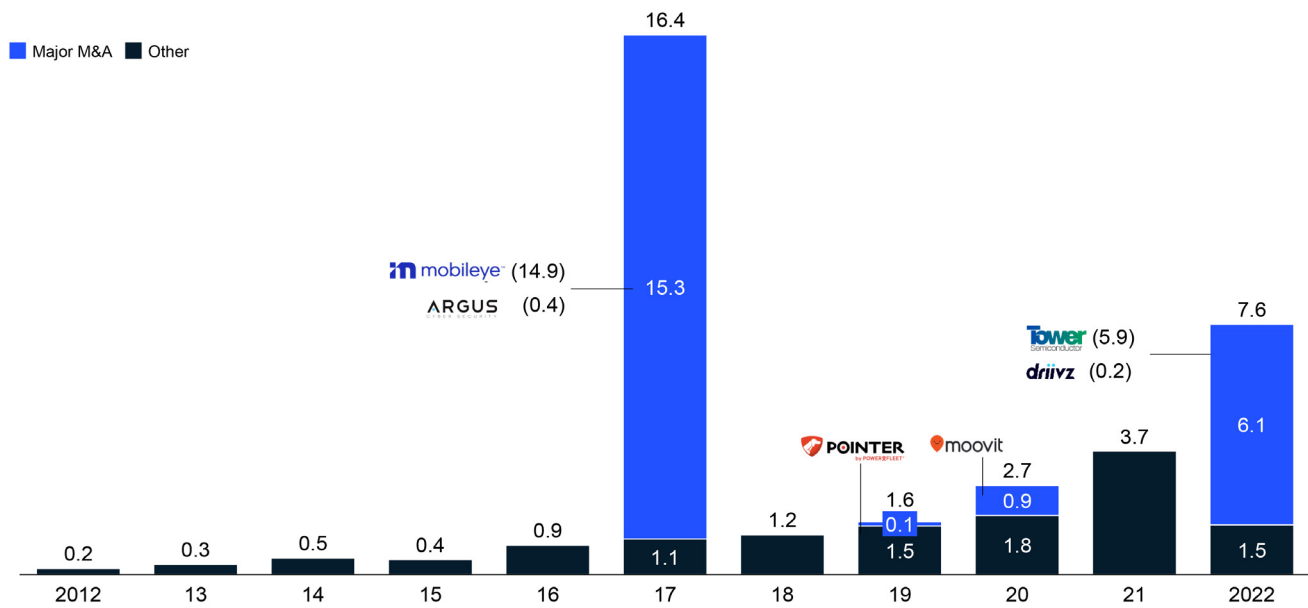
¹ If left empty, the deal size is unknown

Source: IVC Research Center, Start-up and Investment Landscape Analysis database, McKinsey

Funding for all high-tech sectors, including mobility, peaked in 2021 then decreased in 2022 and 2023, in line with global trends. The first half of 2023 saw a 50% YoY drop in global funding and a 73% YoY drop in Israel funding.

The volume of investment in Israel's mobility sector, excluding major M&As, gradually grew from 2012 to a peak in 2021. Largest M&As happened in 2017 and 2022. Most new start-ups were established in the autonomous sector (sensors and automotive-related technologies).

Exhibit 17:
Investment volume per year
 2012-22, US\$ bn



Source: IVC Research Center, Start-up and Investment Landscape Analysis database, McKinsey

In the past decade, Israel's mobility tech sector has attracted over US\$30 billion in funding, over half of which came from large M&As, such as Mobileye. Start-ups in autonomous and connected received the highest amount of funding (30+% excluding major M&As; 55+% including major M&As).

Challenges and opportunities in Israel's ecosystem

A survey³⁹ of Israeli mobility start-ups showed that the ecosystem's greatest strengths are professional networks (32% of respondents) and access to talent (25% of respondents) (Exhibit 18).

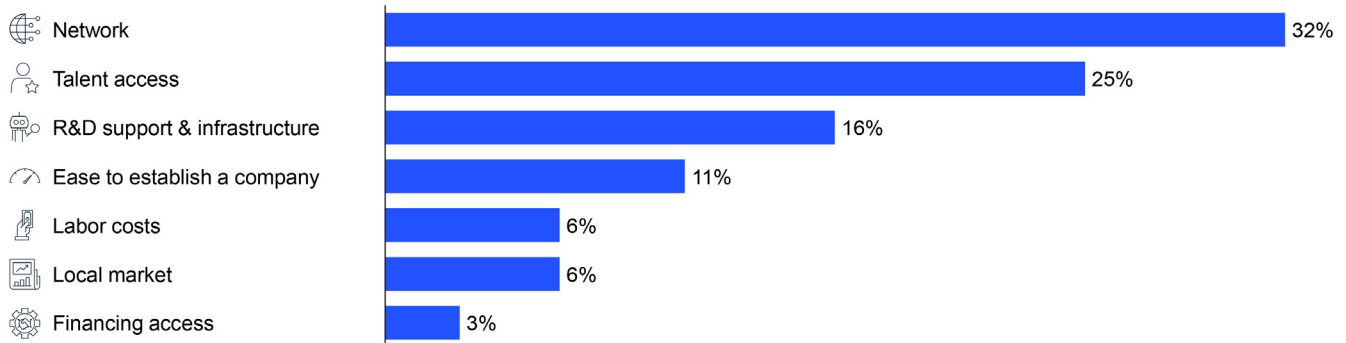
The local concentration of the ecosystem provides a strong talent pool of skilled engineers, researchers and computer scientists that has attracted many multi-

³⁹ EcoMotion Community survey of Israeli mobility companies, conducted in August-September 2023 (136 respondents among Israeli start-ups; 40 among global start-ups)

Exhibit 18:

The strengths of Israeli Ecosystem according to start-ups

Share of mentions as 1st place in strengths out of total 136 start-ups responses



¹ Participants were asked to rate the 7 strength options from 1 (highest strength of the Israeli Ecosystem) to 7 (lowest). The chart does not include division of the rates given into 4th to 7th places

Source: EcoMotion start-ups survey, 2023; N=136

national companies (Ford, GM, Nvidia) to set up R&D centers in Israel and scale-up start-ups (Via Van, Foretellix) to locate their R&D teams there.

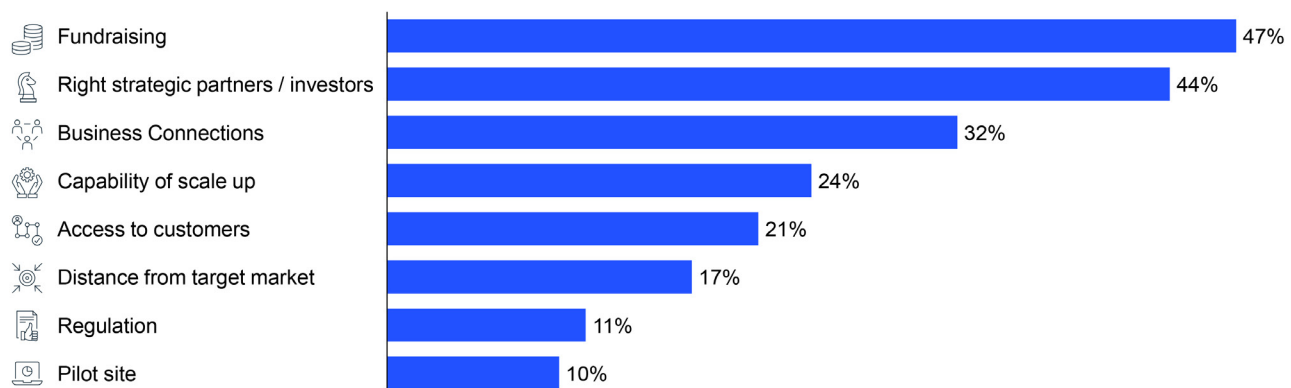
The top two challenges cited are fundraising, which has been heightened by the recent slowdown in funding, and finding the right strategic partners/investors (Exhibit 19).

Israel's strength as a talent hub for entrepreneurs and innovators generates high numbers of new start-ups that are addressing global challenges. However, the challenge comes at the scale-up stage, when larger financing rounds and larger-scale partners

Exhibit 19:

Key challenges faced by Israeli mobility start-ups by sector

Share of mentions out of all respondents (multiple choice), N=136 respondents



Source: EcoMotion start-ups survey, 2023; N=136

are required to achieve product market validation and key milestones. The participation and engagement of global industry partners, investors and clients is the most important factor to foster a thriving ecosystem.

Multinationals in Israel

Israel is a world leader in research and development (R&D) spending, with over 5% of GDP investment in R&D (highest among OECD countries). Over 50% of Israel's R&D spending is coming from the multinationals (top-1 in OECD), ~40% from the Israeli business enterprises and ~10% from the government⁴⁰.

Multinationals are playing an important role in all sectors of Israel's economy, including mobility. Nine of the top 10 global original equipment manufacturers (OEMs) are present in Israel through an R&D center or an investment arm or are scouting for proof of concept (POC) partnerships with start-ups. Eight of the top 10 original equipment suppliers (OESs, Tier 1) are also present. Since 2015, other global multinational corporations (MNCs) have established R&D or tech centers in Israel including Nvidia, Intel, NEC, Huawei and Porsche.

Israel has a small market and lacks a local carmaker. Its ecosystem therefore has a global perspective. Three-quarters of Israeli-founded start-ups look to Europe, the USA and South-East Asia as their target markets⁴¹. The presence of global industry players and investors through local offices, hubs or representatives is essential to help entrepreneurs build solutions.

Government support

Government support is another factor contributing to innovation in Israel's start-up ecosystem. Israel aims to place 16% of its workforce in high-tech and to further develop tech solutions. Three major initiatives support these aspirations:

- The Israel National Drone Initiative is a partnership between the Israel Innovation Authority, the Ministry of Transport, the Civil Aviation Authority, and the Smart Transportation Administration. Its goal is to establish a national air network to transport medicines, vaccines, tests and medical equipment, retail market shipments, etc.⁴² In June 2023, Israel conducted the first air taxi test flights⁴³.
- The Israel Cyber Center for Intelligent Transportation Systems (CylITS) is a national research and testing facility for smart mobility cybersecurity funded by the Israel Ministry of Transport, Israel National Cyber Directorate and Ayalon Highways. It offers testing services, validation, and certification of solutions, advises on regulation, offers educational and R&D support to the ecosystem.
- The Pilot for Autonomous Shuttles created by the Israel Ministry of Transport, Israel Innovation Authority and Ayalon Highways brings together four consortium partners (start-ups and operators) to run an autonomous bus pilot with government funding, with an aspiration to lead to the commercial use of autonomous buses.

⁴⁰ OECD Main Science and Technology Indicators, 2021 (latest available as of September 2023)

⁴¹ EcoMotion Community survey of Israeli mobility companies, conducted in August-September 2023 (136 respondents among Israeli start-ups; 40 among global start-ups)

⁴² Launching the Fourth Phase of the National Drone Initiative | Israel Innovation (innovationisrael.org.il)

⁴³ First Air Taxi Test Conducted in Israel | Israel Innovation (innovationisrael.org.il)

Conclusion

A smart mobility ecosystem incorporates a range of stakeholders engaged in advancing mobility including start-ups, investors, innovation hubs, industry players (Tier 1 and OEMs), regulators, academics, government entities and cities. Each stakeholder has an important role to play in the integrated innovation value chain through, e.g., financing, partnerships, customer-supplier agreements, and identifying challenges and developing solutions to address them. Being part of an ecosystem helps start-ups scale and attract investor funding and identify new business opportunities.

Thanks to its large educated and skilled workforce, culture and government support, Israel has developed one of the strongest start-up ecosystems in the world with more start-ups per capita than any other country.

In Israel, what is the next phase in the development of the local ecosystem? How will the global trends influence the market? And what will most enable start-ups to scale? Looking ahead, there is a significant need for new mobility technologies. Technologies from multiple sectors and use cases could be adapted to serve emerging needs of mobility. Start-ups in Israel and beyond will benefit from tailoring their solutions to the industry needs of today and tomorrow. Start-ups should strive to connect with global networks, investors, and industry to advance the mega trends shaping mobility, while staying relevant for the local talent pool and partners.

There consistently are new challenges to solve within the mobility sector. New innovations and technologies must continuously emerge to sustain a strong ecosystem and move mobility forward. The more risky, disruptive technologies can be developed with the focus of major multinational corporations or with public funding. Particularly in a more challenging fundraising environment and considering market consolidation globally, the ability to adapt to the growing pressures and requirements from the industry, investors and talent will define the success of mobility start-ups.

Glossary

The report defines “smart mobility” as any technology that supports or enables the mobility of people or goods. Mobility technologies include the automotive sector and technologies applicable to infrastructure, services, navigation, safety, logistics and distribution, shipping and air transport. They fall into six categories:

- Autonomous and connected – technologies that support autonomous driving, software for connected vehicles and cyber security
- Mobility services – technologies that contribute to more effective, efficient, safe and convenient forms of transport and passenger experience including shared or pooled services
- Energy and electrification – technologies that support electric transportation, energy storage, the infrastructure required and alternative fuels
- Supply chain – technologies related to Industry 4.0¹, tracking or movement of goods
- Aviation – technologies related to air transport or drone systems for civil mobility
- Maritime – technologies related to maritime transport and shipping

¹ Industry 4.0—also called the Fourth Industrial Revolution or 4IR—is the next phase in the digitization of the manufacturing sector. It is driven by disruptive trends including the rise of data and connectivity, analytics, human-machine interaction and improvements in robotics.

Key terms and abbreviations

ADAS	Advanced driver assistance systems: these use advanced technologies to assist the vehicle drivers
EV	Electric vehicle: these vehicles run fully or partially on electricity using an electric motor that is powered by a fuel cell or batteries
AV	Autonomous vehicle: a vehicle capable of sensing and navigating its environment and operating without human involvement through the use of sensors, cameras, radar, AI and more
Sustainable fuels	Sustainable fuels: Fuels that are produced from renewable or low-carbon sources and can reduce greenhouse gas emissions compared to fossil fuels. This includes biofuels such as hydrotreated vegetable oil (HVO), or bioethanol, and synthetic fuels (synfuels) such as ammonia or methanol. They can be used as drop-in fuels in conventional internal combustion engines (ICE)
Robotaxis	Self-driving, autonomous vehicles operated by ride sharing or taxi services
Last-mile delivery	The final stage of logistics where goods move from the distribution center to their final destination
Mini mobility	Small, lightweight vehicle for 1 to 2 people which can travel safely in the city and enclosed from the weather
Micro mobility	Transportation using small, lightweight vehicles operating at speeds below 25 km/hr such as bicycles or scooters, especially electric ones that may be borrowed as part of a self-service scheme in which people hire vehicles for short-term use within a town or city
OEM	Original Equipment Manufacturer refers to the company which produces original vehicles components which are subsequently assembled and installed during construction of the new vehicle
OES	Original Equipment Supplier supplies all other parts in the vehicle required by the car manufacturer to produce the vehicle
MNC	Multinational corporation
SME	Small and Medium Enterprises
Tier 1	Automotive supplier companies which supply parts or systems directly to OEMs
IoT	Internet of Things referring to collective network of connected devices and technology that facilitates communication between these devices.
V2X	Vehicle to Everything is an all-encompassing term for the cars communication system where the vehicles is able to use on-board communication tools to connect and communicate with surrounding infrastructure
E-Hailing	The process of ordering a car, taxi or other transport pick up via virtual devices
Semiconductors	A semiconductor is a material which has an electrical conductivity value falling between that of a conductor, and an insulator. They are used to make various kinds of electrical devices

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December 2023

