

Report Roland Berger

MIDDLE EAST



Israel's automotive and smart mobility industry

ELECTRIFIED, AUTONOMOUS AND INTELLIGENT





MANAGEMENT SUMMARY

n this study, we assess the mobility startup ecosystem in Israel, which has, over the last decade, developed into one of the most successful mobility startup hubs globally and has become a key source of innovation. The rapid growth and increasing international recognition make it an interesting ecosystem to study.

In previous years, we have closely examined the Israeli startup market with our local partners EcoMotion and the Fuel Choices & Smart Mobility Initiative. In our first two editions of this study, which were released in 2016 and 2018, we examined the unique nature of the Israeli mobility landscape and highlighted investment and growth opportunities. In the 2021 version of our study, we draw on conclusions from previous studies and update our findings based on, inter alia, the insights of 20 interviews¹) and a survey with more than 50 respondents.

In our view, four key stakeholders have driven the Israeli mobility ecosystem in particular: the mobility startups themselves, vehicle manufacturers and suppliers, investors, and government entities. Each of these has shown considerable growth, even during the COVID pandemic. For example, the number of Israeli mobility startups grew from 400 in 2016 to above 600 in 2020 and manufacturers from all over the world are expanding their activities in the country. Meanwhile, technology investments have reached an all-time high, according to IVC, and government entities are continually expanding their incentives and aid for local startups.

In addition to examining the ongoing development of the Israeli mobility landscape, the 2021 study examines the biggest challenges that startups face and how they might be overcome. Additionally, we cover how the recently established diplomatic relations between Israel, the United Arab Emirates, and Bahrain could spur the next chapter of growth for Israeli startups.

The future for Israeli mobility innovation remains exciting as startups continue to challenge and disrupt the automotive industry and mobility as we know it today. Going forward, we expect even more success stories to emerge from Israel's mobility ecosystem.

1) Conducted with leading mobility startups, R&D and innovation centers of original equipment manufacturers (OEMs)

FAST FACTS & CONTENTS

growth rate of mobility startups since 2016

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billion US dollars 2020 investments in

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The automotive "MADE" trends

Global mobility is currently being reshaped by four megatrends: New Mobility, Autonomous Driving, Digitalization, and Electrification (aka "MADE"). Over the last half decade, these trends have heavily disrupted the automotive industry and are driving the market towards greater "user friendliness" by removing prevailing inefficiencies.

For example, the average car is used only 60 minutes per day²) and commuters spend 10% of their driving time per year in congestions.³) Vehicle emissions alone account for 15% of the global total, according to the IEA. On top of that, World Health Organization figures reveal that over 1.3 million people die in road crashes every year.

In the course of the MADE disruption, new business models and services are emerging as incumbents adapt to the these trends and new players flood the mobility landscape with innovative solutions.

1.1 / New mobility

Mobility in the future is expected to be a mixture of individual and shared mobility and transportation with a convergence of people and goods transportation.

Mobility is shifting from an asset ownership model towards a Mobility-asa-Service (MaaS) model. This shift is being driven by several social factors: urbanization, population growth, and environmental concerns. In addition to



2) RAC Foundation

3) INRIX

Global mobility is currently being reshaped by four megatrends: New Mobility, Autonomous Driving, Digitalization, and Electrification.

traditional MaaS offerings (e.g. taxis, metro, bus, trains), riders will increasingly According to our Automotive Disruption Radar, already today, around 50%

turn to ride sharing services and micro-mobility solutions with better convenience and cost advantages when compared to traditional vehicle ownership. $\rightarrow A$ of riders use an app at least once a week to plan a door-to-door trip across the 18 countries examined in the study.⁴) The global rise in shared mobility is supported by favorable regulations seeking to reduce vehicles on the road, particularly in congested areas.

1.2 / Autonomous driving

Autonomous vehicles are gaining traction. Driven by regulation, improved safety and technological advancement, they form the basis for new services in both individual and shared mobility, as well as goods transportation.

Although still not fully autonomous, many cars today already have multiple autonomous features, such as advanced driver assistance systems. Features such as automatic stopping, emergency steering, autopilot for highways, automatic parking, and "driver monitoring" to detect fatigue have already reduced the number of accidents. As autonomous adoption and emergency features continue to improve, so too will passenger safety.

Fully autonomous technology is expected to emerge gradually in the second half of this decade and could become mainstream after 2030. To pave the way for widespread adoption, however, several technology areas need to be mastered first. Those include, inter alia, environment recognition, advanced prediction, decision-making algorithms, real-time learning, and accurate road mapping. As such, the path towards fully autonomous vehicles holds a lot of potential for startups looking to fill those technological gaps.

1.3 / Digitalization

Since autonomous driving and novel transportation solutions depend heavily on rider connectivity, digital capabilities and functionality will continue to expand rapidly. By 2025, 90% of all new cars sold will be connected to the internet in some way.

To that end, original equipment manufacturers are investing in Internet of Things (IoT) applications, cloud computing solutions, artificial intelligence (AI),

4) Visit our website on the Automotive Disruption Radar which examines the disruption of the automotive industry across 18 countries



and voice control. At the same time, manufacturers are also considering the cybersecurity implications as these increasingly become a concern for connected vehicles.

With new monetization opportunities and business models stemming from connected cars, many startups have emerged globally in this field.

1.4 / Electrification

With commitment from most of the world's leading OEMs, electric vehicles (EVs) are on the path to becoming the preferred choice in the passenger car segment. By 2030, nearly a quarter of all new passenger cars sold will be electric. \rightarrow B

Driven by rising environmental awareness and global efforts to combat emissions, governments and consumers are increasingly supporting the adoption of sustainable, electric vehicles. A combination of emissions restrictions and bans on conventional engines, paired with lucrative incentives for both OEMs and consumers, are set to increase electric vehicle adoption.

Additionally, battery technology is improving rapidly, which alleviates customer "range anxiety", or concern about how far a vehicle can go on a single charge.

B / Global electric vehicle sales [% of total new car sales]



The expected rise in electric vehicles is also reflected in unprecedented valuations of EV OEMs, partially exceeding the valuations of long-established incumbent OEMs. For instance, Tesla is valued at USD 641 billion, NIO at USD 65 billion, and Xpeng at USD 24 billion.⁵) By way of comparison, Toyota is currently valued at USD 210 billion and BMW at USD 63 billion.

1.5 / Implications for new market entrants

The automotive market as we know it will be significantly disrupted over the next decade. Driven by the industry's move towards removing inefficiencies in mobility, business models will change and numerous opportunities for new market participants will emerge.

In the past, traditional automotive manufacturers captured large market shares and were able to defend their position due to strong barriers to entry such as high investments for intellectual property and manufacturing. Today, however, barriers to entry have dramatically fallen with the emergence of new technology. Going forward, service providers (e.g. Mobility Service Providers (MSPs) or Car-as-a-Service (CaaS) providers) are set to capture significant value in the market, while some of the traditional players will be driven out of the market or see their products commoditized.

New technology is one of the core contributors to our future, efficient mobility. Startup hubs such as Silicon Valley, Beijing and Israel therefore play a vital role in this shift. In the following section, we will closely examine the development of Israel in recent years and its contribution to global mobility innovation

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5) Data retrieved on March 11, 2021

Israel's dynamic ecosystem

In recent years, Israel has developed into a mobility innovation powerhouse. The number of mobility-related startups has sharply increased. Investor appetite has reached unprecedented heights. Global automotive manufacturers are steadily increasing their involvement and government support continues to grow. Not even the COVID pandemic has halted the growth trajectory of the Israeli mobility ecosystem and the future remains promising. $\rightarrow C$

2.1 / Mobility startups

Today, Israel is home to one of the world's largest technology hubs that has seen enormous growth, particularly in the mobility space. Since 2016, mobility startups have grown by 50%, from 400 then to over 600 in 2020. Israeli startups are highly sought after by global corporations for strategic alliances and acquisitions. $\rightarrow D$

C / Major activities of mobility-related startups in Israel



D / Development of Israel's mobility startups along the 4 MADE trends



CAGR of the number of startups between 2016 and 2020

As the global automotive industry is disrupted by the MADE revolution, Israeli startups are seizing the opportunity to develop novel solutions for the future of mobility. In fact, approximately 85% of all mobility startups in Israel can be allocated to one of the MADE trends.

Startups addressing the trend of new mobility provide innovative mobility solutions for passengers and goods, most notably in the area of shared mobility and micro-mobility, as well as in fleet management solutions. In May 2020, Moovit, a leader in the Mobility-as-a-Service space, was sold to Intel for USD 1 billion.

Autonomous driving-related startups have shown the strongest growth among the four categories. Since 2016, the number of startups in the autonomous space grew by 26% annually, driven by a steep rise in ADAS and passenger safety solutions – a trend that is in line with the rising adoption of autonomous technologies in mass-produced vehicles. In 2017, Mobileye, a leader in ADAS camera systems, became the largest exit in the history of Israel's tech industry, after selling to Intel for USD 15 billion.

Digitalization-related startups make up the largest share of mobility startups. These firms offer vehicle connectivity solutions (e.g. cloud, internet resources, infrastructure) and cybersecurity-related solutions. Since 2016, cybersecurity solutions alone grew five-fold, underlining the importance of secure connections as a prerequisite for increasingly autonomous vehicles.

Startups focusing on the development of electro mobility (e.g. EVs, batteries, charging facilities, electric motors) experienced moderate growth in recent years.

Source: EcoMotion, Roland Berger

Source: EcoMotion, Roland Berger

2.2 / Vehicle manufacturers and suppliers

Incumbent vehicle manufacturers (OEMs) and their suppliers (OESs) have also noticed Israeli innovation. Consequently, several OEMs and OESs have recently established business activities. General Motors started this trend in 2008 by setting up a local R&D subsidiary in Israel. Since then, more than 20 automotive OEMs and OESs have opened local innovation and R&D centers in Israel. $\rightarrow E$

Local subsidiaries often serve as intermediaries between the startups and the OEMs or OESs and fulfill several purposes, such as:

- Identification of potential investment and acquisition targets
- Accessing tech-savvy talent for R&D activities
- Developing proof-of-concepts (POCs) with startups and connecting the startups to the OEM's or OES's headquarters
- Jointly developing and adapting products and solutions to meet the requirements of the OEM or OES

Overall, OEMs and OESs as well as startups share a positive outlook and expect future collaborations to pick up further. Many of the startups indicated that they are already engaged in either a POC or joint development project with an OEM. An additional 50% of startups say they are looking to engage with OEMs "as soon as possible". Overall, the majority of the respondents highlighted the benefit of Israel's well-developed innovation ecosystem.

2.3 / Investors

Israel has long attracted the attention of local and global investors. In recent years, high-tech investments have taken off, reaching an unprecedented USD 10 billion in 2020, according to IVC. This represents a three-fold increase since 2015. Of this total, approximately USD 0.9 billion were invested in startups in the mobility space. Additionally, mobility startups received a total of USD 1.8 billion from M&As and IPOs, making 2020 the strongest year since the Mobileye IPO (2017). \rightarrow F

Most of the growth stems from an increase in larger investments – in fact, the number of investments larger than USD 100 million grew from just 4 in 2018 to 20 in 2020, as IVC data shows. This is in line with a shift in ambition of Israeli startups, who are now less focused on early exits than on growing their idea into an established company.

Relative to its size, Israel is a global leader with respect to startup investment and is often compared to iconic startup hubs such as Silicon Valley or Beijing.

2.4 / Government entities

Like other tech hubs, Israel boasts favorable conditions to encourage the growth of startups, with multiple government entities taking supporting roles, e.g. with







Source: EcoMotion, Roland Berger

F / Israeli high-tech investments

[USD m, 2015–2020]



respect to R&D support, infrastructure development, early-stage funding, marketing, and networking events. In total, the Israeli government has invested and distributed USD 165 million in the mobility space over the past five years. Participating entities include (but are not limited to):

- The Smart Mobility Initiative (Fuel Choices), under the Prime Minister's Office, which is concerned with the development of testing and piloting infrastructure, mobility research collaborations with academia, open source high-resolution mapping of Israeli geography, projects improving Israel's transport sector, and funding of the mobility-related activities of the Israel Export Institute.
- The Israeli Innovation Authority (IIA), which promotes R&D collaboration between Israel and the international community. IIA supports hundreds of projects annually, ranging from pre-seed funding and incubator work to support for more established startup companies and industrial R&D enterprises
- · Additionally, EcoMotion, a joint venture of public and private entities and Israel's community for mobility startups, facilitates and fosters exchange between startups, investors, OEMs and suppliers, and academia, thereby creating a platform of knowledge-sharing, networking, and collaboration.

In steady exchange with the Israeli startup community, such entities are continuously expanding their support programs to address the most pressing topics for startups, for example by conducting "demonstration days" for OEMs and suppliers and hosting global mobility events. Additionally, government stakeholders look to develop additional testing facilities, draft regulation for new technology, and support the next generation of emerging startups.

3/

Key challenges

Despite Israel's continued growth of mobility startups, some challenges remain. In our survey of over 50 startups, access to financing, international expansion and access to talent were cited as the biggest challenges. Less frequently the challenges of access to pilot production, access to testing and unfavorable laws & regulations were mentioned. \rightarrow G

3.1 / Access to financing

Despite increasing investments in Israel, securing sufficient funding is the biggest challenge for startups. In a survey among mobility startups, nearly three quarters named access to financing as a key hurdle. One third called it "very challenging."

Startups indicate, that in 2020, access to capital became more difficult. The COVID pandemic made it more difficult to raise capital as face-to-face meetings were limited and investors grew more cautious. As such, throughout 2021, lowperforming startups are more likely to run out of funding.

Generally, when compared to Silicon Valley, investors in Israel are more cautious about investing in very early stage startups. In fact, two thirds of Israeli startups initially rely on self-funding and government grants, which they can repay once revenue starts to come in.



Results from a survey with 54 Israeli mobility startups

Source: EcoMotion, Roland Berge

For foreign investors, particularly strategic investors, Israel presents a considerable opportunity. Despite the COVID crisis, the number of Israel's mobility startups is only expected to grow and attractive opportunities for tech investors are expected to continue emerging.

3.2 / International expansion

For most startups, Israel is too small a market to compete in effectively. Unlike other global startup hubs, Israel is not located in a large and reasonably homogenous market such as North America or China. The success of Israeli startups is dependent on early entry into a foreign market, where challenges around limited personal connections and cultural differences prevail. Almost 60% of all respondents highlighted the need for early international expansion as a key challenge.

For startups, a collaboration with OEMs and OESs through their local subsidiaries represents a possible solution to this challenge. Moreover, entities such as Fuel Choices or EcoMotion are increasing their efforts to promote Israeli startups, e.g. by organizing global events, such as the EcoMotion Week and the Smart Mobility Summit, and by hosting large delegations of business representatives.

3.3 / Access to talent

With a population of just over 9 million, Israel has a relatively small but uniquely concentrated pool of talent. Despite the high level of education in Israel and the talent developed through military services, Israeli startups view access to talent, particularly for senior positions, as one of their core challenges.

Strong competition from local corporations offering attractive salary packages and a very regional focus on talent sourcing are key reasons for the talent shortage. Moreover, strong visa restrictions for foreign talent and the very high cost of living in Israel make it difficult to attract top foreign talent. This stands in stark contrast to Silicon Valley, which benefits from a steady influx of foreign talent. Additionally, talent in Israel is very engineering focused but lacking in business development and marketing skills. As such, assembling a senior management team is particularly challenging when startups seek to grow into large corporations.

Until now, few startups considered remote working as a viable option to overcome the talent shortage. As the COVID pandemic proved the viability of working from home, however, more startups indicated an interest in establishing teleworking setups for certain positions.

4/

Geopolitical opportunities

4.1 / Recent developments

In August 2020, the Israel-UAE and Israel-Bahrain normalization agreements ("Abraham Accords") were signed. The agreements target a normalization of diplomatic relations and are set to facilitate business between all three countries. As a result, cooperation is expected to improve, especially in the fields of education, healthcare, energy, trade, and national security. Moreover, technologyfocused partnerships and joint ventures are expected to increase.

In the mobility space, the first commercial partnerships have already begun. The Al Habtoor Group and Mobileye announced plans to bring Mobileye's ADAS and Smart City technologies to UAE. On top of that, Maniv, an Israeli venture capital firm, has already invested in Fenix, one of the UAE's promising mobility startups.

Thanks to the new accords and current climate, we expect increased collaboration and cross-border investments between Israel, UAE, and Bahrain.

4.2 / Future mobility in the UAE

In the Middle East, the UAE is already an established technology pioneer and aspires to become a global leader in smart mobility. To that end, the country has focused its efforts around six smart mobility solutions and services: Connected ecosystem, autonomous transportation, electrification, micro-mobility services, Mobility-as-a-Service, and inter-modal integration. In line with the UAE's ambition, several projects have been launched in recent years:

- Personalized public transportation: In 2020, the Roads and Transport Authority of Dubai (RTA) signed an MoU with BeemCar to build a fully sustainable personal transportation option in downtown Dubai.
- High-speed inter-city transport: The UAE is planning a hyperloop connection between Dubai and Abu Dhabi. This is expected to reduce commuting times between the cities from one hour to about 12 minutes.
- Autonomous driving: In 2018, RTA launched the annual Dubai World Challenge for Self-Driving Transport, inviting leaders in autonomous transport to showcase their capabilities in a competitive format.
- two people, launched first tests on specific routes in Dubai with dedicated take-off and landing spots.

By 2030, national strategies aim to make the UAE a *leading country in* smart and autonomous mobility.

· Autonomous transportation: In 2017, Volocopter, a drone taxi designed for

There are several government entities in the UAE that are concerned with mobility innovation, such as (but not limited to):

- The Roads and Transport Authority (RTA) with the mission to "develop & manage integrated and sustainable roads & transportation systems at a worldclass level, and provide pioneered services to all stakeholders ...".
- The Integrated Transport Centre of Abu Dhabi (ITC), which aims to develop intelligent and sustainable transport solutions for the UAE.
- The Emirates Authority for Standardization and Metrology (ESMA), which hosts the annual International Future Mobility Conference and which authors the UAE's standards and regulations around autonomous vehicles.
- The Ministry of Infrastructure Development, which launched the UAE's National Smart Mobility Strategy to advance the UAE to global leadership with respect to smart mobility.

The UAE's rigorous adoption of novel technology ties in well with its desire to pioneer future mobility. By 2030, national strategies aim to make the UAE a leading country in smart and autonomous mobility. In line with the UAE's ambition and effort to boost future mobility, multiple startups have emerged, including Careem (ride hailing), Arnab (micro-mobility), UDrive (car sharing), Acacus (fleet management and autonomous technology), and Solva (electric last mile delivery).

4.3 / Collaboration between the UAE and Israel

Next to Israel, the UAE is the largest source of technology investment and venture capital funding in the Middle East. In 2019, startups received more than USD 400 million in funding,⁶⁾ with an emphasis on startups in the delivery and transportation space. Today, the UAE boasts a multitude of investors, VCs, and private equity groups. Mubadala, the sovereign wealth fund of Abu Dhabi, is the notable heavyweight investor, managing over USD 230 billion in total assets. In 2019, Mubadala announced a USD 250 million fund for investments in Middle Eastern technology startups.

In the future, we expect cross-border investment in Israeli startups from the UAE to increase, driven by considerable investor appetite for technology investments. In times when Israeli startups are increasingly looking for funding, investments from the UAE constitute a promising opportunity to spur the growth of Israeli startups and increase the collaboration with UAE-based companies. Likewise, Israeli investors are expected to take advantage of similar opportunities in the UAE.

Aside from investment, the UAE provides the necessary infrastructure to test and pioneer technology and is supported by a very forward-looking, technology-focused government. By launching pilot projects in different fields and setting itself ambitious targets, the UAE underlines its ambitions as an early adopter of smart mobility solutions.

Several stakeholders on both sides have already acknowledged the potential for tighter collaboration in the tech industry. Aside from some of Dubai's largest companies signing agreements with the Israeli tech industry, the "UAE-IL Tech Zone" was launched by Israeli Start-Up Nation Central as a community connecting investors and entrepreneurs from both countries. Going forward, we expect the UAE to become a valuable partner for Israel's mobility startups and vice versa - whether that is with respect to investment, technology testing, or collaboration with some of the UAE's incumbents.

In the future, we expect cross-border investment in Israeli startups from the UAE to increase, driven by considerable investor appetite for technology investments.

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Conclusion

The automotive and mobility industry is currently undergoing rapid, impactful, and lasting change driven by the ongoing megatrends of New Mobility, Autonomous Driving, Digitalization, and Electrification. Key drivers for the emergence of the MADE trends are the demand for more efficient mobility and the availability of technological solutions. By providing the necessary solutions to meet this demand, mobility startup hubs such as Israel significantly contribute to the ongoing disruption and are able to capture significant value.

Today, we are still early in the mobility revolution and multiple challenges remain that demand innovative solutions. We expect Israeli mobility startups to capitalize on these opportunities and the growth trajectory of the Israeli mobility ecosystem to continue.

While the COVID pandemic may have led to a slowdown of expansion plans and delays in projects, most startups managed the pandemic well. However, Israeli startups indicate several challenges that prevail, most notably access to financing, international expansion, and access to talent. While some of them are being addressed by local stakeholders, new avenues for international cooperation can further accelerate the growth of Israeli startups.

The outlook for Israel's mobility ecosystem is bright. As the disruption of the automotive industry continues, the demand for innovative mobility solutions will rise. We expect the number of mobility startups to grow and the technology investments to increase further as Israeli innovators address the demands of future mobility. Similarly, collaborations between startups and OEMs and suppliers will intensify, particularly as developed countries move past the COVID pandemic. Lastly, collaboration and cross-border investments between Israel and the UAE - and potentially other Arab countries - is expected to pick up and could spur the next growth chapter for the Israeli startups ecosystem.

Either way, Israel's mobility landscape remains one to watch.

AUTHORS

Dr. Wolfgang Bernhart Senior Partner +49 711 3275-7421 wolfgang.bernhart@rolandberger.com

Santiago Castillo Partner +971 4 364-5300 santiago.castillo@rolandberger.com

Arvind CJ Principal +971 4 446-4080 arvind.cj@rolandberger.com

Janik Schmalhorst Senior Consultant +971 4 446-4080 janik.schmalhorst@rolandberger.com

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www.EcoMotion.org.il www.EcoMotionWeek.com Email: EcoMotion@israelinnovation.org.il

Further Readings

AUTOMOTIVE TRIPLE TRANSFORMATION

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SMART MOBILITY

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ECOMOTION is a Smart Mobility Community with over 600 startups and 13,000 members, creating a platform for knowledge-sharing, networking and collaboration. Through international events, the community unites all stakeholders of future mobility, including entrepreneurs, industry representatives, investors and more, to stimulate the growth of the mobility ecosystem locally and globally. EcoMotion is a JV of the NGO Israel Innovation Institute, the Smart Mobility Initiative of the PMO and the Ministry of Economy.

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