אוניברסיטת חיפה
University of Haifa
جامعة حيفا

HMS
מרכז חיפה למחקרי מדיניות ואסטרטגיה ימית
Haifa Research Center for Maritime Policy & Strategy

MARITIME STRATEGIC EVALUATION FOR ISRAEL 2017/18

Chief editor: **Prof. Shaul Chorev**

Edited and produced by: **Ehud Gonen**

Can Israel Become the Startup Nation for the Maritime Domain?

Hannan Carmeli

Overview

The maritime domain presents a sea of opportunities for innovation. For decades it had a reputation of being conservative in nature. And indeed the only revolution it experienced in modern times took place half a century ago with the wide scale introduction of the multimodal container, which definitely triggered a paradigm shift. Since then, the domain has experienced the expected gradual digital **evolution**, however the coming years promise to bring a digital **revolution** (disruption) to the space. The distinction between the terms technology Evolution and Revolution is important in this context. It is the latter (Revolution) that this chapter focuses over as it triggers disruptive changes which in many cases drives changes in business paradigms.

The abovementioned gradual *evolution* manifested itself through continuous improvements in "bottom line" indicators such as reduced time to handle a unit of cargo, reduction in crew size needed to operate a vessel and continuous increase in TEU (Twenty-Foot Equivalent Unit) capacity.

David Ben-Gurion, one of Israel's founding fathers, stated that *"the sea is NOT a border but rather a bridge and a passage to other great empires..."*. It was further established by the founding fathers that mastering the seaways is a must for a small and isolated country such as Israel, and critical to its future development. Israel indeed used to have a reputable fleet, however its number of vessels has been continuously on the decline over the last few decades. In the 1970's it reached a peak of 110 vessels, a number which declined to 36 merchant vessels out of which 10 only fly an Israeli flag in early 2016.

It is the author's belief that **a new additional manifestation of our founding fathers' vision of mastering the high seas should be of a digital nature. That is, the leveraging of local high tech assets in order to position Israel as a leader in the future Smart Port and Smart Maritime innovation space**.

Israel is well positioned to contribute to the port and maritime domain:

1. Israel's workforce includes an estimated community of ~15,000–20,000 professionals employed in port, maritime and related value chain (source: Shipper, Port of Ashdod)
2. The first ever modern naval missile battles were conducted by Israel's navy during the 1973 Yom Kippur war. These resulted in outstanding success for the Israeli-made Gabriel sea missiles, and proved the superiority of Israel's high-tech capabilities when applied to the marine environment.
3. General Motors, Ford, VW and other car manufacturers have all recognized Israel's supreme automotive innovation capabilities, and have engaged in digital R&D and

scouting in Israel. This is despite the fact that (same like with shipbuilding) Israel has no material manufacturing infrastructure. This serves to prove the ability to adapt technology to new emerging domains.

4. With a long coastal front Israel has a history of winning world championships in sailing and windsurfing, as demonstrated by world champions Brukman, Friedlander, Korzits, Fridman and others.
5. Last, the coast of Israel has a long heritage of seafaring culture which started with the ancient ports of Acre and Caesarea dating back to c. 13–18 BC which connected ancient Europe with the Middle- and Far-East regions. Moreover, the early models of the metal sextant (used for celestial navigation – than known as Astrolabe) was designed and built by Abraham Zacut a Jewish astronomer who was born in Spain and moved to Jerusalem (1452–1515). Zacut was an author of Nautical and Astronomical almanacs and was the first to build a metal sextant (to replace earlier wood models) which allowed better precision in celestial navigation.

Current Situation – Conservative Industry

The domain has experienced a gradual technology evolution over the last 10-15 years. Although not a *revolution*, this *evolution* has manifested itself in bottom-line operational improvements.

- Average cargo handling pace (load/unload) – increased from ~200 tones/hour 30 years ago to more than 2000 tones/hour today (assuming 5 "hands" for total of 150 movements per hour)
- Growth of vessel capacity from 3000 TEU 30 years ago to more than 20000 TEU today (fig. 1)
- The number of crew members operating a vessel has gone down from 50–60 in the 1950's to 18-25 today

Though **the overall business paradigm has not changed**. The value chain including all its links and members, has stayed in place. Perhaps the most graphic representation of heritage at its "best" is the pilot climbing on board a vessel to maneuver it into and out of the port. Day or night, hail or sunshine, on a small service boat braving the waves, the port's pilot gets out to the open sea, climbs the shaky ladder, gets onto the bridge and instructs tug boat by radio to push the aft, pull the bow etc. All in all – an error-prone and mostly manual process.

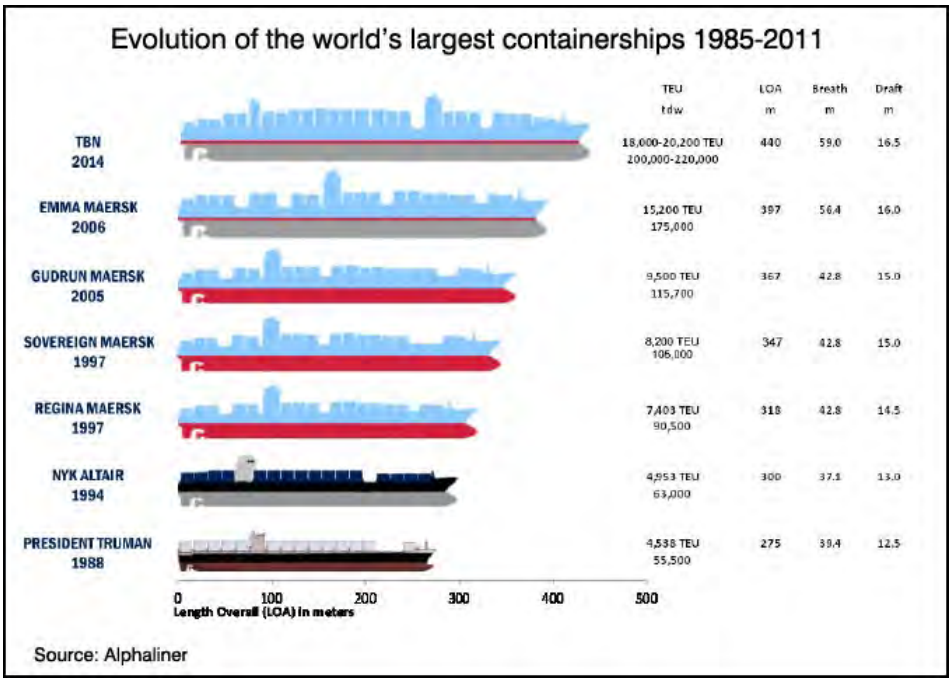

Figure 1 – TEU Evolution over the years

Signs of Disruption – Examples of Innovation Areas

There are multiple indicators of material (technology driven) change on the horizon. Those include actual projects and initiatives announced by related parties as well as "innovative spirit" manifested by meaningful players. Below are a few examples of such early indications for disruptive innovation.

Remotely Operated and Autonomous Vessel – this has been a long-term initiative which has manifested itself in numerous forms and venues. Ranging from remotely operated to autonomous vessels, and from actual operations to regulatory considerations. An example of a leading initiative in this space is that of DIMECC's One Sea Ecosystem[1] which includes major players such as Rolls Royce Marine (Eyes Wide Open[2] initiative), ABB, Wartsila, Ericsson and others.

Raised Awareness to Cyber Threats – cyber attackers are threatening all domains. The maritime space has experienced a few notable attacks recently, which have raised awareness and are triggering new regulations and action to be taken in order to face the

1 https://www.dimecc.com/dimecc-services/one-sea-ecosystem

2 http://www.rolls-royce.com/media/our-stories/discover/2017/discover-intelligent-awareness.aspx

threats (examples from recent months – the attack on Maersk's logistics systems and the manipulation of GPS systems in the black sea).

"Connected" Ship, **Port, Shipyard** – many indications exist today of gigabytes of data being available per hour/day from vessels and ports around the world with no proper analytics and integration among the silos of such data sets. Research has been conducted to address Port and Ship connectivity. Connected Smart Ship[3] by Hyundai Heavy Industries and Accenture and Connected port[4] by Accenture and SIPG are good examples. I expect a reasonable level of interest in cross boundaries innovation (port, shipping, forwarding etc).

Nomination of digital/innovation executives – a trend has been identified where leading companies in port, shipping and shipyard operations have recognized the importance of nominating an executive level (VP or C-level) to manage and promote "open innovation". These activities typically include scouting and hosting of events such as hackathons, meetups, pitch nights etc. Examples include Maersk's Chief Digital Office (CDO), Damen Shipyards Innovation Program Manager, and various executive roles at Wartsila including CDO as well as VP Digital Portfolio.

Israel's Digital Innovation Ecosystem Assets

Israel is well known for its startup ecosystem to the extent of getting branded as "The Startup Nation" in the book first published in 2009 by Dan Senor and Saul Singer. While many feel proud about it, others may argue overplay of that card. There is consensus though over the fact that something special is going on in that space, as is evident by relevant numbers and facts. When analyzing the "normalized data" (dividing figures by GDP in order to use the same yard stick comparing to other economies). Examples include the expenditure on (non-defense) R&D and VC investments, all as percentage of GDP and all placing Israel at the top of the list compared to other countries (fig. 2).

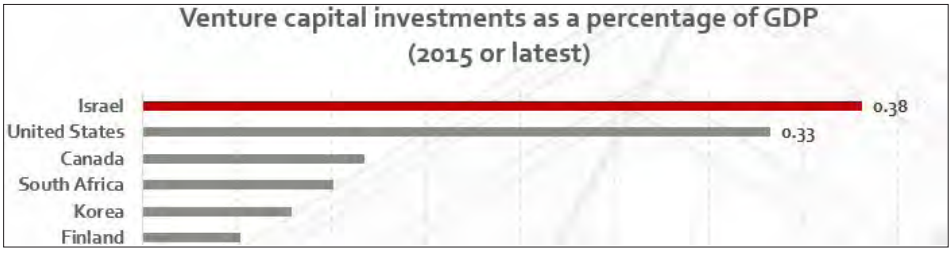

Figure 2 – Israel's Hi-Tech Ecosystem Assets

3 https://www.thedigitalship.com/conferences/presentations/2015kormarine/3.pdf

4 https://www.accenture.com/t20161012T003018__w__/us-en/_acnmedia/PDF-29/accenture-connected-ports-driving-future-trade.pdf

Among the reasons for the above are:

- Necessity as mother of all invention. Examples - Security needs which triggered creativity in harnessing new technologies to keep threats at bay; draught conditions as a stimulator to develop sophisticated irrigation and water management solutions.
- Productive collaboration by government, academy, the business sector and a multitude of other stake holders. This collaboration is inspiring to the extent that executives and officials from other countries frequently visit Israel to learn about the ecosystem and how governments could support their local hi-tech proliferation.
- Presence of Venture Capital, Private Equity and other investment platforms. While this could be viewed as an end result of the above, this vibrant community has been very active in attracting startups helping them flourish. As mentioned before, Israel ranks highest in terms of VC investment (compared to its GDP).

As a result, hundreds of global companies, most of which are leaders in their space, have opted to establish R&D centers in Israel (fig. 3). The typical path includes acquiring a local asset (startup or a growth company) and strengthening its R&D activity, basically establishing an R&D center. One of the core activities of such an R&D facility is to scout for local startups and other emerging initiatives and maintaining a deal flow for future strategic partnerships.

Figure 3 – Hundreds of R&D and Scouting Centers of Global Leaders were established in Israel

Local Port and Maritime Assets and their Relevance

The Maritime ecosystem in Israel was developed for the first time during the British mandate over Palestine in the 1930s. The first deep-water port was planned and constructed under the supervision of Sir Palmer in 1932 in the city of Haifa, which for decades served as Israel's maritime hub. Geopolitical circumstances have dictated that Israel be more of a terminal shipping point than a transshipment hub. This has seen some change over the last two decades with Jordan benefitting from access to Israeli ports and the construction of two new sea terminals in Haifa and Ashdod which will have the infrastructure to serve major shipping lines. Significant port operators won tenders for these terminal operations – Shanghai International Port Group (SIPG) for Haifa port and MSC's Terminal Investment Limited (TIL) for Ashdod. Existing ports are in the process of streamlining their operations and ramp up to face the expected competition. These new entrants are expected to introduce new practices to integrate with existing knowledge of shipping and port operations (and the related value chain).

Add to that the fact that Israel dependency on sea transport is higher than the global average and the awareness to the domain becomes clear (Israel has ~99% of its import/export tonnage transported by sea comparing to 85% global average)

Israel's Maritime Technology Ecosystem – what has been achieved so far

Awareness – the steps taken in 2017 proved the global and domestic interest in the domain and thirst for coordinated and focused activity to promote smart ports and maritime technologies. This was evident through few indicators:

- Willingness of local executives (usually at the CEO and board levels) to engage in sponsorship and partnership discussions. This include local players such as Port of Haifa, Port of Ashdod and other leaders in the local forwarders and ship agents value chain.
- Interest shown by regulators to help the "national aspects" of the initiative. These include government entities such as Ministry of Economy through its newly formed Innovation Authority and network of Foreign Trade economic attaches, Ministry of Transportation through its Administration of Shipping & Ports and more
- Hosting proposals by municipalities extended in order to promote innovation in their ecosystems. Most notably is the City of Haifa, which may serve as a natural home to the initiative due to its heritage as the cradle of Israel's new-era maritime activity (first deep-water port constructed by Britain in 1932).
- Attendance in domain specific events – the most recent one held in July 2017, was overbooked and received plenty of coverage (see Ports Strategy newsletter[5]). The next event is a major summit sponsored by Israel's Prime Minister's Office on the

5 http://www.portstrategy.com/news101/products-and-services/technology-innovation-sparked-by-startup-hub

subject of Smart Transportation.[6] For the first time ever, it will include a track focusing on Smart Ports and Maritime technologies. This track was booked up six weeks prior to the event.

Recommendations to decision makers

The facts and thoughts outlined above lead to the following recommendations made to decisions makers (in local and national government, academia and other areas):

1. **Recognize Ports and Maritime as an emerging Technology Sector** which will get plenty of attention over coming years. As indicated in the Overview above, the domain is likely heading towards disruption. Israel is unique in its high-tech capabilities on one hand, but also in its reliance on maritime transport on the other. Matching the two together is an obvious choice.
2. **Allocate resources and funds to support activity in the domain**. Consider allocating a port facility and funding to support technologies for an emerging need such as the future autonomous ship. An example for such past national initiative is the one which took place in 2010 driven by Mr. Haim Shani, then General Manager of the Ministry of Finance, which appropriated NIS 200M over a period of 5 years to jumpstarting the Fintech ecosystem which has subsequently produced dozens of startups and established companies delivering technology to the space.
3. **Integrate Maritime technology into other global initiatives**. Examples include the Chinese Belt and Road Initiative (BRI), European Network of Maritime Clusters (ENMC). Israel is already a contributing member in related initiatives and should leverage such towards the Maritime domain as well.
4. **Municipality level** – while other communities outside Tel Aviv and Herzlia struggle to bring high-tech jobs to their cities, they need to focus on their strengths. While many cities could claim "cyber" dominance or try to get branded as the "capital of smart cities" – there are only a handful which could claim leadership in the Ports and Maritime space. These should seize the opportunity. Haifa and Ashdod are the natural candidates for such claim, and need to work together with government to unleash the opportunities.
5. **Support the emerging and vibrant community** – the ministry of economy has budgets for supporting communities that can offer "additive" high-tech activity to what already exists in the overall eco-system. Such budgets should be appropriated towards the promising direction of Smart Ports and Maritime community. The seed for such a community was laid in a LinkedIn group called Smart Maritime Israel and further support to promote events and other activity should be offered.
6. **Magnet for global players** – Israel is well known for attracting large multi-national companies to invest in local R&D and conduct scouting for local technology. In

6 http://fuelchoicessummit.com/Agenda/SmartMobilityintheFuturePorts.aspx

fact there are some ~350 such global players who have already formalized such presence in Israel. Special effort should be announced and conducted by already existing platforms/vehicles to promote the message of Israeli-originated Smart Port and Maritime technologies. These platforms include the Ministry of Economy's Foreign Trade department, the Export Institute, Israel's Innovation Authority, ISERD and others).

Final Comments

The above themes and assumptions were thoroughly tested over the last 9 months through numerous meetings and presentations. While limited in number, there are already technology companies who show signs of success and prosperity – Freightos, Windward, Loggino and Wave to name a few. I feel stronger than ever before that there is a path to position Israel as a lead contributor to the smart port and smart maritime technologies.

As an additional proof of Israel's potential, note our very recent win in the prestigious annual Rotterdam World Port Hackathon (WPH). It is a well-known and high-profile event which attracts attention from innovators who show interest in bringing the digital message to the port and maritime communities. The 2017 (5th) WPH published a list of challenges to be addressed by innovators. The challenges were mostly related to supply chain digitalization, smart solutions for port operations, and the connected and autonomous ship of the future. The list of referees included representatives of IBM, SAP, Port of Rotterdam, Marine Traffic and many other leading technology and operational companies from the domain.

It was a few months earlier that theDOCK Innovation Hub was approached by Uri Yoselevich, an individual with an entrepreneur's spirit. "If you get us sponsorship to participate at the event, we will bring a respectful result" were his short words. We decided it was the right time to raise to the occasion. Together with Startup Nation Central, headed by Professor Eugene Kandel, we sponsored the team, and put them in contact with harbor masters in Haifa (Capt. Naftali Weiss) and in Ashdod (Capt. Morris Mor). The challenge picked was smart solutions for port operations, and the solution proposed was to leverage various sources of data in order to dynamically build an on-line depth map of the harbor and its approach.

The result? **The *Dock* Tech team was announced as the winner of the 2017 WPH** (fig. 4 – winning team accompanied by Mr. Nir Gartzman – co-founder of theDOCK).

Figure 4 – Israel's Dock Tech team sponsored by theDOCK and SNC – winners of the 2017 Rotterdam World Port Hackathon