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THE HONG KONG
INSTITUTION OF ENGINEERS
香 港 工 程 師 學 會
Young Members Committee
青年會員事務委員會

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one road
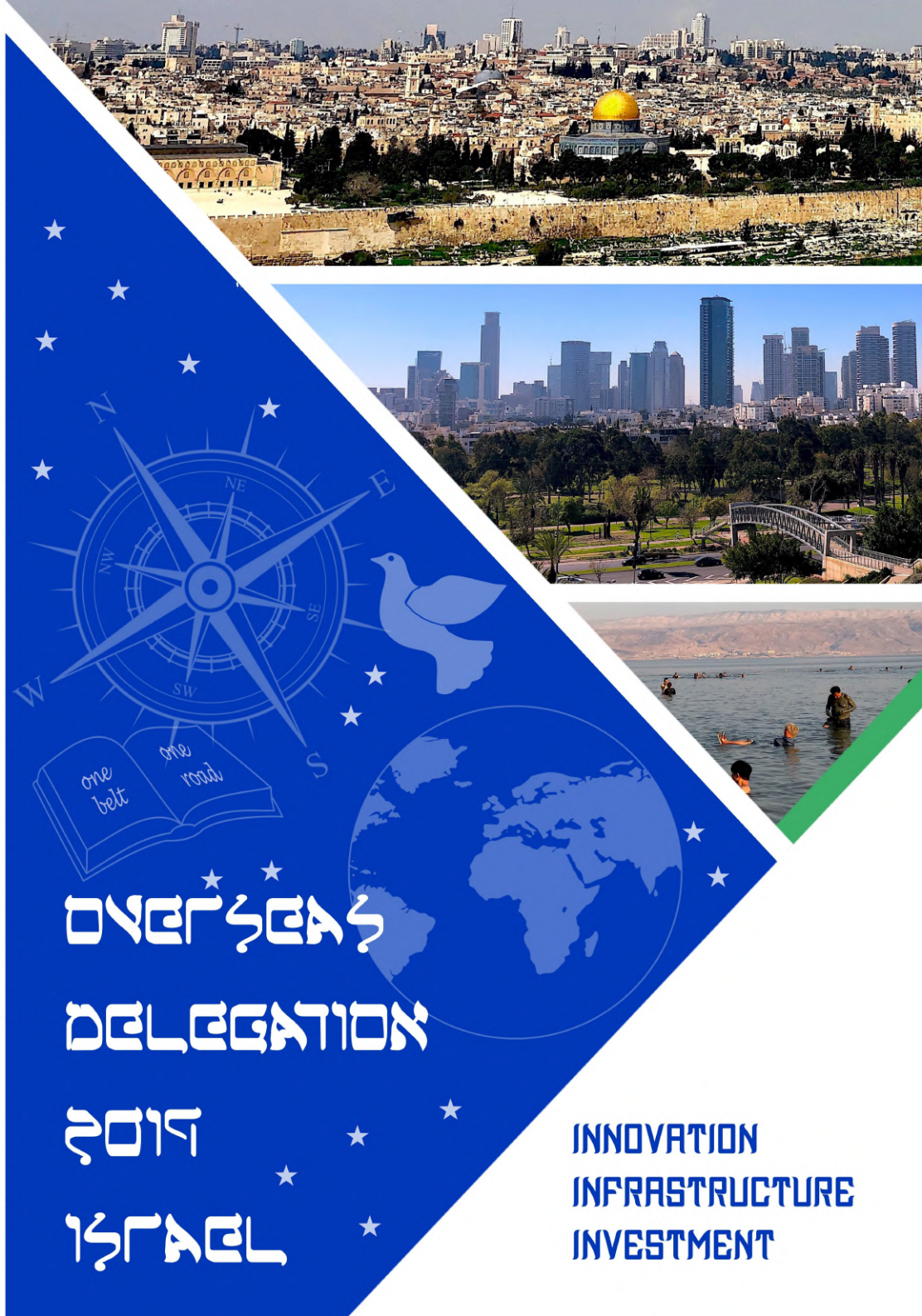
OVERSEAS
DELEGATION
2019
ISRAEL

INNOVATION
INFRASTRUCTURE
INVESTMENT

# CONTENTS

MESSAGES

**Ir Ringo S M YU**
President, The HKIE

The YMC Overseas Delegation has always been an annual highlight event for young engineers to explore engineering marvels and unique culture. This year is of no exception with one of the most technologically advanced countries as the destination under the theme of Innovation, Infrastructure and Investment.

Israel is a smart choice for the delegation. It is one of the tipping global leaders in innovation. In history, natural resources are deficient to support the development of cities in Israel. The location of the country was once at the desert area. Generations of Israelis embraced the challenge by innovation. Their determination in developing enabling technologies for the well-being of their country and the growth of their cities has been strong and solid. When it comes to the modern Israel, finance and technology business prevails in parallel with global conglomerates. I am sure the Delegation would be an eye opening experience for our young members.

I would like to take this opportunity to express my heartfelt congratulations to the HKIE Young Members Committee for having another successful delegation, and all the delegates for their accomplishments. The teamwork of the YMC overseas delegation has been well-demonstrated and the results turn out to be impressive. Driven by innovation, let's work together to build Hong Kong into a smarter city and seek for an alternative growing point for the economy of Hong Kong.

**Ir Dr P L YUEN**
Vice President, The HKIE

Heartfelt congratulations to the YMC for having another successful overseas delegation to Israel.

Israel is a geographically small entity but plays a prominent role on the global stage together with major countries.  Sitting on the barren desert with limited settlement in the past, innovative technology and infrastructures have gradually been developed for the cities of Israel.  These advanced technology and infrastructures are deemed to be of critical importance to the stability and continuous growth of the city, supporting the life and living of the people in the country.

Through this trip, our engineers had an opportunity to gain valuable insight and broadened their engineering knowledge from the Israeli counterparts on the successful experience in innovation, infrastructure and investment for the benefit of society. More than the technical aspect, I believe friendship will be formed between our Delegates and the local Israelis.  The Delegation would be our linking bond in seeking potential partnership and collaborations for Hong Kong's new generation, providing them with limitless opportunities in contributing to the Hong Kong economy in a brand new way.

**Ir Edwin K F CHUNG**
Vice President, The HKIE

I write to congratulate the success of the YMC Overseas Delegation to Israel 2019. I am delighted and pleased to be an advisor and an interviewer for this delegation which has a long and successful history of accomplishment over the years.

Hong Kong is now in a catching mode with respect to innovation and technology as Hong Kong is years behind our neighbouring cities.  Despite its unique position with hostile neighbours, the Israel's development of cutting-edge technologies in software, communications and the life sciences have evoked comparisons with Silicon Valley and is first in the world in expenditure in research and development as a percentage of GDP.

The delegation to Israel, themed "Innovation • Infrastructure • Investment", studied Israel's advanced technology, policy/practice, startup ecosystem and their potential applications in Hong Kong.  The visiting of Israel is an excellent choice and also timely.  The delegation team consists of

16 young engineers with different background and engineering disciplines selected through a well-designed process. After the selection, the team would need to investigate, plan, arrange and manage the itinerary for the visit.  As part of this delegation, young engineers acquire professional and administrative knowledge through planning and attending a series of seminars, site visits and exchanges with professionals, both locally and overseas. They are able to enhance their administrative and communication skills and create their engineering ideals.

Having successfully completed the programme, I believe these engineers are now better equipped for their advancement in future endeavour in their career as a professional.

I wish to congratulate Ir Tak TANG, Mr Thomas LAM and their team for accomplishing this successful mission for the YMC.

**Ir Dr Otto L T POON, BBS, OBE**

Past President, The HKIE

I remember that I first joined the YMC Delegation to Boston, United States in 1995 to study the Boston Harbour Clean-up Plan. It was probably the first if not one of the first YMC Delegations overseas. Since then the footprint of the YMC Delegations had covered many parts of the world.

All YMC Delegations have a purpose, to learn a subject of particular interest such as wastewater treatment of Boston, green buildings and environment at the Netherlands and the United Kingdom, metro system in Moscow, infrastructure of the London Olympics, manufacturing industries in Germany, renewable energy in Iceland, to name a few.

The 2019 YMC Delegation to Israel is unique with its emphasis on innovation, new technology and start-up companies. The purpose matches seamlessly with Hong Kong's heavy investment in science and technology as well as support for incubation and entrepreneurship.

Israel has similar population of Hong Kong of 7 million. Yet she claims her number of successful start-up companies listed in Nasdaq is more than China, Korea and Japan combined. It is an achievement that Hong Kong as the lead city in the Greater Bay Area should emulate.

I therefore congratulate Mr Thomas LAM for having the foresight to lead the Delegation to Israel. It happened at a very opportune time.



**Ir Paul Y C CHAN**

Chairman, Continuing Professional Development Committee, The HKIE

The YMC delegation team for this year to Israel to study Innovation of Technology was meaningful and considered as hitting the right pulse of the world trend at present. I was happy to see that most of the YMC delegates had gained much exposure in this subject and the tour was very successful in that some world famous innovative manufacturers and produce were seen and visited. On the other hand, visits to the long historic culture of Israel were also carried out that gave this tour a balanced ingredients to the participants. I congratulate the chairman, event organisers and members of the tours for the success of this event and wish this good custom will be sustained for the benefits of YMC members. I also look forward to having the opportunity to meet some of you for sharing of experiences for this interesting tour.
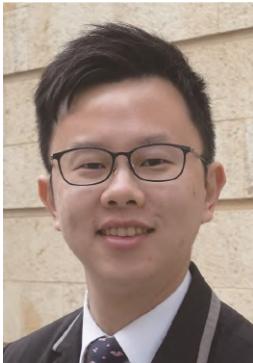
**Ir Tak W T TANG**

Chairman, YMC, The HKIE

On behalf of the HKIE-YMC, I congratulate the team for continuing the great tradition of the HKIE-YMC in pursuing a study on the global latest engineering development trend with an aim of bringing insights for the improvement of Hong Kong. Building on previous studies, the team took forward the topic of Innovation and set to investigate its interaction with Infrastructure and Investment.

Travelling to Israel on a quest to uncover this successful start-up nation provided us with a lot of inspirations. One thing, and perhaps the most important thing, that sustains the entire ecosystem of this innovation hub is the PEOPLE. The talents among the people and the unity of the people. Everyone is within reach of just a couple of phone calls. I mean it literally. With just a phone call, we were sitting there interviewing the CEO of a hi-tech company who had had several tech exits that worth millions of dollars. Quite unexpectedly for us, with another phone call, there we were meeting with Mr Dov Moran – the inventor of the USB memory stick – generously sharing personal experience on entrepreneurship.

The point I am trying to make is that we can also have those key ingredients in Hong Kong. We enjoy the close proximity of people. This makes our work at the HKIE-YMC vital in building a strong engineering network. We are not just seeking that companion who tells us exactly what and what not to do, but instead we want that peer support to enable us to Step Out to explore for ourselves, and Step Up to reach our full potentials.

We focus our work on providing to our members the three key bedrocks of a learned society – education, experience and exposure. This study trip combines all three. We are pleased to see that the 16 young delegates from a diverse engineering background have taken the lead to the study. Through their hard work in over half a year, they have also organised activities in sharing the experience to HKIE members at large.

This report showcases the work of a group of dedicated young engineers. Inside it, I hope you will find New Perspective and New Momentum. Happy reading!



**Mr Thomas C H LAM**

Delegation Manager
Honorary Treasurer, YMC, The HKIE

Innovation, infrastructure and investment are the crucial and interdependent elements that drive a city's economic growth and sustainable development. In recent years, Hong Kong has been urged to enhance competetiveness amid the increasingly intense regional and international competition. It is hoped that this year-long study could enable young engineers to understand the current situations in Hong Kong and gain inspirations from Israel, a fast growing country renowned for its advanced technology and vibrant start-up ecosystem, on how to develop Hong Kong into an innovative and sustainable city.

On behalf of the delegation team, I would like to take this opportunity to express my sincere gratitude to the HKIE-Continuing Professional Development Committee and the sponsoring organisations for their generous support to bring this delegation to a success.

I would also like to express my appreciation to the local and overseas organisations for hosting us and giving us insights into our key study areas.

Special thanks should go to the Consul General of the State of Israel in Hong Kong for their advice and assistance in the liaison work.

It is our great honour to have received support from our advisors including Ir Ringo S M YU, Ir Dr P L YUEN, Ir Edwin K F CHUNG, Ir Dr Otto L T POON and Ir Paul Y C CHAN. Their valuable advice throughout the planning stage of this delegation was valuable to this trip as well as our delegates.

Last but not least, I must express my truthful thanks to all delegates for their hard work and great effort to make the Overseas Delegation 2019 to Israel a memorable and successful one. It is my honour to be in the team.
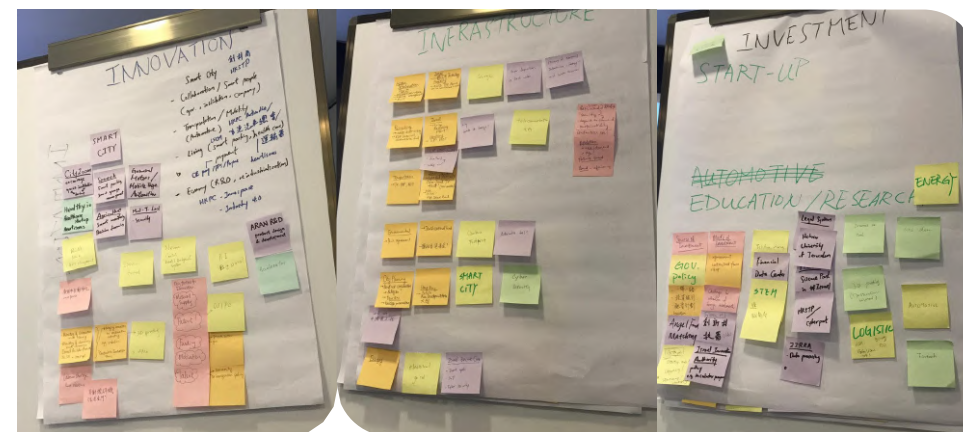
INTRODUCTION

### Background of YMC Delegation

Since 1991, YMC has been organizing delegations to different parts of the world with the following objectives:

∗ To widen the vision and horizon of young engineers;

∗ To appreciate latest engineering practices around the globe and assess the applicability of these practices in Hong Kong;

∗ To promote Hong Kong and its engineering practices;

∗ To enhance the relationship between HKIE and overseas Institutions.

These objectives can be achieved through the Delegation and a series of local seminars and visits held before and after the Delegation.

### Theme and Objectives of Overseas Delegation 2019 to Israel

Innovation, infrastructure and investment are the key drivers of a city's development. Innovation creates new technology and better solutions to tackle social and environmental challenges, and infrastructure provides the essential facilities to serve the basic needs of society and enable the access of information. While innovation and infrastructure support the development of each other, they require a strong ecosystem to support

their activities through investment in education, facility and the industry. With the theme of "Innovation • Infrastructure • Investment", the year-long study aimed to review of the current status in Hong Kong and to make recommendation for the future. The study explored how Hong Kong shall be developed to become a smart and innovative city by investigating the potential of introducing new technology and startup ecosystem.





#### Innovation

∗ To appreciate Hong Kong's and Israel's technological development in Industry 4.0, healthcare and financial technology

∗ To understand the status, opportunities and challenges of innovation development in Hong Kong

∗ To make recommendations on how to boost Hong Kong's innovation and technology sector

#### Infrastructure

∗ To identify common challenges in Hong Kong and Israel and study how they cope with the challenges during development

∗ To study and obtain first-hand information on Israeli major infrastructure and explore potential application in Hong Kong
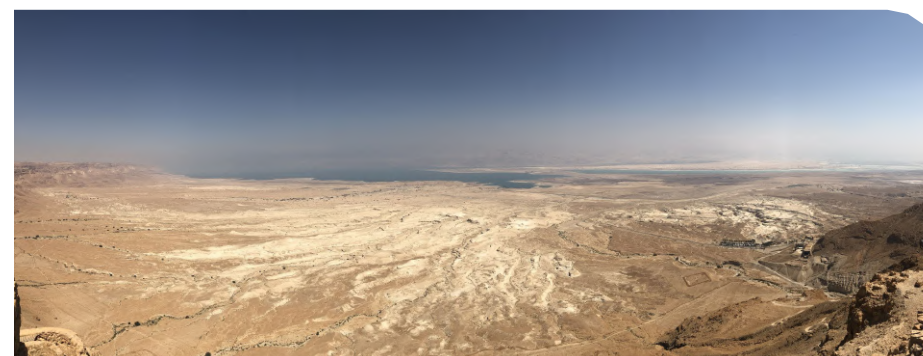
#### Investment

∗ To raise awareness on the importance of startup ecosystem to support innovation growth

∗ To understand the roles of government, venture capital and university in supporting innovation and entrepreneurship

## Composition of Delegates

Similar to previous YMC overseas delegations, overwhelming response was received during the recruitment of delegates in October 2018. Sixteen delegates were selected from a group of elite young members by advisors through interviews. These delegates are professional engineers, graduate engineers and students who came from a wide range of engineering disciplines, including Building, Chemical, Civil, Electrical, Logistics and Transportation and Mechanical. They work in different sectors of engineering professions, ranging from government departments, public organizations, consultants and contractors. The delegates are in essence a representation of overall young engineer community in Hong Kong.



## Why Israel?

Despite a population of just 8.5 million people, lack of resources and constant threats from war, Israel has developed itself into a Startup Nation with a supportive innovation ecosystem consisting of government support, dynamic business community, top educational and academic institutions etc. The country has the highest number of researchers in R&D per capita in the world and ranked second and third in most available venture capital and business entrepreneurship respectively, which attracted over 300 leading investors from all over the world (Burke, 2019). The technological innovation not only brings economic growth in Israel, but also helps address the country's challenges in healthcare, cyber security and shortage of resources. As Hong Kong and Israel are similar in terms of population size and the lack of natural resources, the experience of Israel would be a useful reference for Hong Kong in furthering innovation, infrastructure and investment advancement.

The delegates visited a total of 15 organizations in Israel. At the government level, we visited the Ministry of Economy and Industry and Israel Innovation Authority to discuss various policies and the government's role in supporting entrepreneurship and foreign investment. In the private sector, we visited Sorek desalination plant, Stratasys and the Center for Israeli Innovation to appreciate Israeli seawater reverse osmosis desalination, 3D printing medical prototyping and other state-of-art technology. We went to two start-up platforms, the Floor and Contech, to exchange information about the Fintech and construction development in Hong Kong and Israel. We also visited the Yissum Research Development Company of the Hebrew University, Grove Ventures and a number of start-ups to investigate the roles of technology transfer, private investment and entrepreneurship in Israeli start-up ecosystem. The trip also provided an opportunity to foster international relationship. We visited the Association of Engineers, Architects and Graduates in Technological Sciences in Israel to exchange our views on institutional affairs and explore collaboration opportunities.



Reference:

Burke, E. P. (2019). The HKIE Belt & Road Initiative Talk Series. Seminar presented in the Hong Kong Institution of Engineers.

LOCAL EVENTS

## Technical Visits

**26 January 2019**
Visit to Occasion Renewable Resources Company Limited

**23 February 2019**
Visit to Schneider Electric "Innovation Hub"

**4 March 2019**
Visit to HKTVmall's Robotic and Automated Pick and Pack System

**11 March 2019**
Visit to The Bank of East Asia Limited "Innovation Centre"

**14 March 2019**
Visit to CoCoon - Community For Entrepreneurs Incubator

**8 April 2019**
Visit to Hong Kong Productivity Council on Industry 4.0

## Technical Seminars

**29 November 2018**
Seminar on Tseung Kwan O Desalination Plant

**12 March 2019**
Seminar on Innovation in Construction Industry

## Cultural Events

**21 February 2019**
Seminar on Israeli Culture and History and its Road to Become the "Startup Nation"

**5 May 2019**
Discovering local Synagogue and Mosque of Judaism and Islam

## 29 November 2018

**Seminar on Tseung Kwan O Desalination Plant**



Having more than half a century of safe and secure water supply, potential water shortage has been arising due to global climate change. Since 2008, Water Supplies Department (WSD) has implemented "Total Water Management (TWM) Strategy" to balance water supply and demand and explore new water sources. As Hong Kong is a coastal city, WSD has planned to build a new seawater desalination plant at Tseung Kwan O (TKO) to serve as a strategic supply network to other parts of the territory.

On 29th November 2018, HKIE YMC and CPDC has co-organized a seminar on the TKO seawater desalination plant. Ir Thomas CHAN Tak Yeung, Chief Engineer of WSD, and Dr Srinivas (Vasu) Veerapaneni, Desalination Technology Leader of Black & Veatch were invited to share their knowledge and experience of participating in this project.

Ir Chan introduced the current challenges of water supply in Hong Kong, including fluctuation of rainfall and fresh water supply, keen competition of water resource along Dongjiang area and increasing water demand of both Hong Kong and Mainland China. In this regard, TWM was established to contain growth of demand and strengthen supply and desalination of seawater

was adopted as one of the new water sources to diversify the water supply. Desalination is a sophisticated technology and has been implemented in 150 countries. TKO plant will make use of membrane desalination with Reverse Osmosis (RO) process to separate the dissolved salt ions from seawater and obtain fresh water. The project was currently under design-build-operate contract tender stage and was targeted to be commissioned in 2022. It was estimated to provide 10% of daily fresh water demand in Hong Kong.

Dr Vasu explained the design considerations and methodologies of desalination. Water intake and outfall locations shall be well considered to minimize the adverse impacts brought to ecosystem in that area. To ensure good water quality for desalination, microfiltration or ultrafiltration can be adopted for pre-treatment as it can deal with varying water quality. During RO, hydro-mechanical conversion and positive displacement can be used for energy recovery. After 2 passes RO, water will be post-treated to adjust the pH value and reduce corrosion to the distribution system.

## 26 January 2019

**Visit to Occasion Renewable Resources Company Limited**
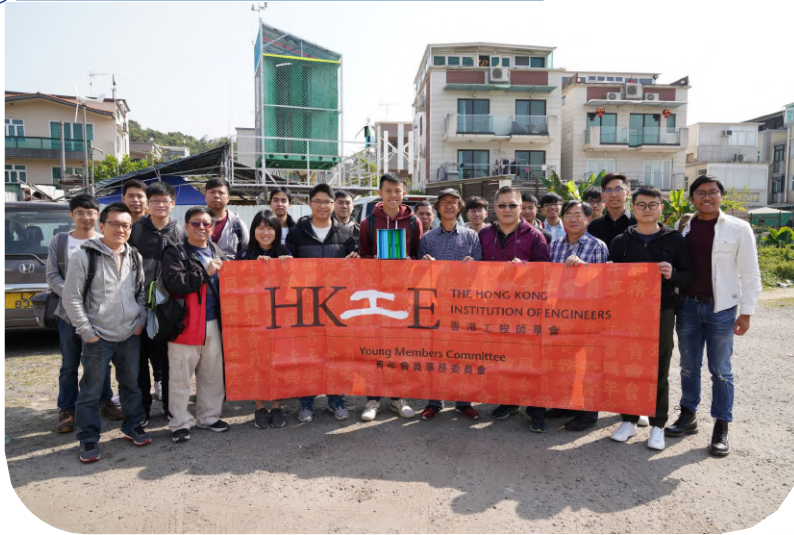


Occasion Renewable Resources Company Limited is a Hong Kong based company which focuses on the development and application of renewable resources, especially the Wind-Solar Power Unit. The participants were able to visit ORRC's workshop in Lau Fau Shan, which is also a test field for the Wind-Solar Power Unit.

The group was welcomed by the CEO and founder of the company, Mr Gomain Lai. He shared us with the details and benefits of the Wind-Solar Power Unit adopted with revolutionary design. The wind-solar power unit adopts shaftless inner rotor design with a tower structure which differentiates it from traditional wind power generator. It is especially suitable for operation under an environment with low wind speed of 0.22m/s which covers 80% of land and coastal areas of the world. With a specially designed deflector, it would also achieve 35-44% of wind utilization rate and Capacity of 3kWh/day. Furthermore, the energy efficiency could also be increased by integrating solar power panel on the wind power unit at the same time.

With a fruitful discussion in Q&A session, participants also learn more about the applications of such

generator. For example, the power generation efficiency will be maximized by formulating a decentralized wind-solar power network. These Independent Micro Grid could reduce the cost of setting up electric cabin by generating and consuming electricity on the spot and achieve high efficiency compared to a single unit. The products can be applied on various aspects including base stations, IOT network, lighting and border surveillance system, and remote charging stations.

## 21 February 2019

**Seminar on Israeli Culture and History and its Road to Become the "Startup Nation"**



Israel is regarded as the Holy Land, especially by Jews, Christians and Muslims. During the recent decade, Israel is also globally known as the "Startup Nation". While many of us may still think that Israel is a country full of mysteries, this seminar by Ir Prof C F Lam has given us an overview regarding Israel in various aspects including geography, history, politics, economy as well as culture, while these are also crucial factors shaping Israel a Startup Nation.

Ir Prof Lam started the seminar with introducing the geographic location of Israel, where the formation of culture, religion and national identity of Jews began, then move on to illustrate Israeli historical background. Jewish people had been exiled from their homeland for more than two thousand years until the establishment of the State of Israel in 1948. However, since then the political situation of Israel has remained uncertain, especially the geopolitical issues between Palestine, the other neighbourhood countries in the Middle East and Israel.

Israel is considered one of the most developed countries in the Middle East, and is described as "very highly developed" on the UN's Human Development Index. Science and Technology development in Israel is rapid and reputable. Ir Prof Lam also introduced various locations in Israel and explained their significance to Isaeli people and religions including Christianity, Islam and Judaism.

The seminar was concluded by discussing major factors contributing to the success of Startup Nation. The speaker believed that innovative and fearless spirit of Israeli people, direct and reassuring government support, excellent academia and well-established mandatory military service system could be key elements that build up the Startup Nation.

Culture is an essential element of a Startup Nation. Ir Prof Lam elaborated culture of Jewish people to let us catch a glimpse of the food, education, architecture, art and religion culture of Israel. Ir Prof Lam also introduced various locations in Israel and explained their significance to Israeli people and religions including Christianity, Islam and Judaism. The seminar was concluded by discussing major factors contribute to the success of Startup Nation. The speaker believed that innovative and fearless spirit of Israeli people, direct and reassuring government support, excellent academia and well-established mandatory military service system could be key elements that build up the Startup Nation.

## 23 February 2019

**Visit to Schneider Electric "Innovation Hub"**







With the introduction of the "Hong Kong Smart City Blueprint" by the Innovation and Technology Bureau (ITB) aiming to embrace innovation and technology to build a world class smart city in Hong Kong, Hong Kong's new era of Internet of Things (IoT), the Fifth Generation (5G) mobile services as well as various smart city applications in the future were announced with the collaborative efforts of different parties.

On 23 February 2019, HKIE YMC organized a tour to the office and innovation centre of Schneider Electric. Schneider Electric is one of the world renowned corporations leading the Digital Transformation of Energy Management and Automation in Homes, Buildings, Data Centres, Infrastructure and Industries. By using the IoT-enabled solutions, it can seamlessly connect, collect, analyze and act on data in real-time delivering enhanced safety, efficiency, reliability, and sustainability. The tour was guided by Ir Ian Lee, Solution Director of Schneider Electric.

The tour introduced a brand new concept of the ecosystem of IoT, i.e. data collected from connected products (sensors) to edge control, then to a common platform (cloud) for the application of Apps, analytics and services. Not to forget that end-to-end Cybersecurity is the vital element to maintain the ecosystem. It devotes in provision of secured

platform to enable data sharing even with third party to fully utilize the collected data in relevant analysis and application. By then, it can promote research and development (R&D) development, boost ideas and introduce more variety to the industry.

Ir Lee interacted with participants by asking for ideas of Dream Smart Home and explained functions and mechanisms behind their featured products that enhanced comfort, energy saving, security and etc. Followed by sharing on other innovative smart gadgets applied during the involvement in the design of new hotels and offices which target to provide superior user experience, integration with interior design and increase efficiency of manpower and fixtures, he further elaborated their future plans aiming to develop various connected products to suit latest technological developments in Building, Data Centre, Industry and Infrastructure fields.

## 4 March 2019

**Visit to HKTVmall's Robotic and Automated Pick and Pack System**
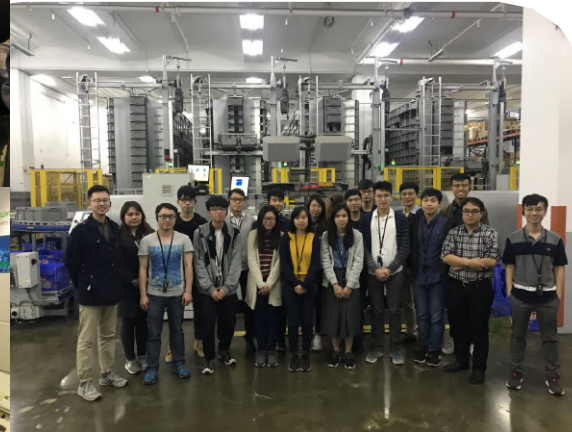


A technical visit to Tsing Yi Distribution Centre of HKTVmall on 4 March 2019 was jointly organized by the Young Members Committee and Continuing Professional Development Committee. There are 19 participants attended. The visit is one of the local events of the YMC Overseas Delegation 2019.

As one of the well-known e-Commerce providers in Hong Kong, HKTVmall has embraced a strong platform and infrastructure to meet with the growing order volume and higher customer expectations.  The Tsing Yi Distribution Centre, one of its three major distribution centres in Hong Kong, has been equipped with a robotic and automated pick and pack system, which could handle 30,000 products and process more than 30,000 orders daily.

The visit began with a guided tour at the distribution centre by Mr. Gilbert Tam, Assistant Manager of Corporate Communications Department. He briefly introduced the overall operation flow of the distribution centre and the group was then shown with the Horizontal Carousel System (SCS), an automated system deployed to facilitate the picking process.  SCS is a Goods-to-Man System, which is designed to save hundreds of metres of travel distance from traditional picking by pick cart. The picking accuracy is assured by barcode reader, laser indicator and the electronic labels to show picking quantity that facilitate the works of

pickers. A motion sensor is also integrated to help checking the quantity put into the order tote bin, and then automatically deliver the bin away once finished picking.

Mr Tam also presented and demonstrated the checking & packing process with a semi-automatic check station. Applying dynamic weight sensor, weight check is performed automatically to totes on the conveyor. Totes beyond 5% weight variance will be delivered to the manual check station for verification. There will also be a 10% random check of all orders to pass through the check station. Finally, the totes will arrive at the packing station with the final double checking.

After the guided tour, a presentation of HKTVmall and e-Commerce development in Hong Kong was given as a summary to conclude the technological applications and infrastructures to support on the continuous growth. The system has brought benefits such as 1/3 headcount saving, less dependent on skilled labour, less error and injury, more job opportunities for students, females, etc.

It was mentioned that the level of automation shall be customized based on different needs. For example, robotic arm in piece picking may not be cost-effective, it imposes high requirement on calculation, processing, logic programming, and precision of positioning compared to simple steps by human operators. Meanwhile, the speaker also shared their future vision to digitalize their processes and tackle logistics challenges, providing online delivery tracking and big data analysis to study customer behaviour for promotion and picking assignment.

## 11 March 2019

**Visit to The Bank of East Asia Limited "Innovation Centre"**

Fintech is revolutionizing the nature of commerce and end-user expectations for financial services. It changes the way people make payments, manage their wealth, finance their businesses, etc. In recent years, the Bank of East Asia Limited (BEA) has foreseen the trend and applied advanced technologies to digitize operation, streamline services and improve efficiency. A technical visit to the BEA was organized on 11 March 2019.

The visit began with a tour in the BEA Innovation Centre at the BEA Tower in Kwun Tong by Mr. Keith Hon, Section Head of the Business Innovation and Fintech Development. He introduced the BEA development transforming from traditional branch services to a digital one, and then showcased the bank's latest digital innovations and services in the zone, iCentre. Participants tried to interact with iTeller, which does what a bank teller does, via a live video chat and touchscreen interface while the bank staff handles inquiries and requests at a remote location. The use of paperless iWindow to sell complicated financial planning products, such as insurance and mortgages, was also demonstrated.

Mr. Hon shared the overall development of Fintech industry in Hong Kong and also their initiatives towards digital banking. After being digitalized, the Bank has saved operational cost on staff, paper and rent. The bank has also won various accolades, including Best FinTech Grand Award at the Hong Kong ICT Awards, and the Most Innovative Bank of the Year Award at the BAI-Infosys Finacle Global Banking Innovation Awards in Las Vegas, which earned the reputation as an innovative bank, and as well as the loyalty of customers.

In the Q&A Session, Mr. Hon also shared some of the difficulties and challenges met by the bank innovation team during the transition. He mentioned privacy issue is of great concern in Hong Kong which sometimes hindered the digitalization in a big data world.

## 12 March 2019

**Seminar on Innovation in Construction Industry**

Innovation has become a significant factor to achieve long-term growth and success in Hong Kong construction industry. It fosters improvement of construction safety, quality, productivity and environmental performance. A seminar was delivered by Ir Andy Wong, the general manager of Digital G Limited, on 12 March 2019 to share the insights on the current status, opportunities and challenges of innovation development in construction industry.

He shared the start-up mindset which consists of Trial and Error, Ask and Continuity. Since Hong Kong is facing various difficulties in the construction industry, the driving force of the innovation is strong. He mentioned 3 different innovation strategies that were applied in his company, Design for Manufacture & Assembly (DfMA/MiC), Integrated Digital Project Delivery (IDPD) and 10D Building Information Modelling (BIM).

Ir Wong highlighted two advanced inventions currently used on the construction sites. The first invention was unmanned AI Security system which applied in the Ocean Park's Water Park construction site (figure 1). The system was not expensive and could replace the expense of security guard with simple setup. This example illustrated that invention/innovation might not necessarily need to be very high-tech but has to be valuable.

The second invention was mesh network sensor which aimed for real-time true knowledge of structural effects to streamline/optimize construction process (figure 2). It was very useful


Figure 1 Image Deep (Unmanned AI Security system)


Figure 2 Mesh Network Sensors

for recording and monitoring the changes of the environment next to the site. It could also save huge amount of man-hour to record the changes as well as increasing the accuracy of the data.

Owing to the increasing amount of BIM adoption in the construction industry, large amount of draughtsmen, skilled labour and BIM-equipped management level could enhance the innovation in construction industry. Ir WONG concluded the talk as all parties have to cooperate and communicate to each other and overcome the challenges in the application process of the innovation.

## 14 March 2019

**Visit to CoCoon - Community For Entrepreneurs Incubator**

CoCoon was founded in 2012 and since then it has developed and grown to provide entrepreneurs a full ecosystem of resources for starting and propelling their businesses. It is currently a leading entrepreneurship network and incubator which focuses on early stage investments. With its broad network of partners and ventures, it helps talents turning ideas into reality and guides entrepreneurs to the journey of success.

CoCoon is also an office space for talents. It owns 9,000 square feet working space with creative and collaborative environment which is shared by various startups and freelancers. It features functional interiors, free high-speed Wifi, an indoor café, modular hot desk seats and conference rooms.

The visit started with a CoCoon Pitch Night, which is designed as a platform for talent to showcase the ideas to investors, corporate partners, potential users and attract talent to your team. According to the voting and decision made from judges, the

winner from the Pitch Night could enter the CoCoon incubation programme which is designed for entrepreneurs from ideation to product development and product growth.

The speaker shared the journey of building a startup and the process before succeeding. The typical journey started with initiating a tech crunch which sees an increase in amount of enthusiasm. It follows a rapid drop to a long period of hard work with little results known as trough of sorrow. A crash of ineptitude could be a low point in the trough of sorrow such as a failed product launch. This experience is genuinely described and commonly resulted in learning that hold the key to an initiative's ultimate success. It is also the turning point that it is important to reveal that a strategy is completely flawed and hence improvement should be implemented. It is believed that the process of surviving a crash of ineptitude is often described as a simplification of strategy which the bare essential value is ultimately expressed.

In general, during the growth journey, the entrepreneurs need to work hard and engage with investors and businesses on monthly basis. The process and development sometimes need to adapt changes as well. Team and roadmap evolvement in strategies at every stage would be required. Processes might need to be reiterated again towards market fit and investment need to be raised to grow business exponentially and globally. CoCoon Ignite Venture currently invests in early stage entrepreneurs who have a unique vision of the New Economy.

CoCoon sees an increase in teenagers starting up companies after graduation. Cocoon is therefore set up to educate teens and provide mindsets to them in setting up startup. Speaker shared the situation when entrepreneurs experienced failures in startup which majority of them tend to restart again based on experience gained, or some may give up in pursuing their previous career goals. There is also a distinctive difference in the investment culture between Chinese and Western cultures since, in Asia, there might be pressure from family in setting up start up and generally are more preservative in investing and not likely to build up own company.



Figure 3 Process of Start Up
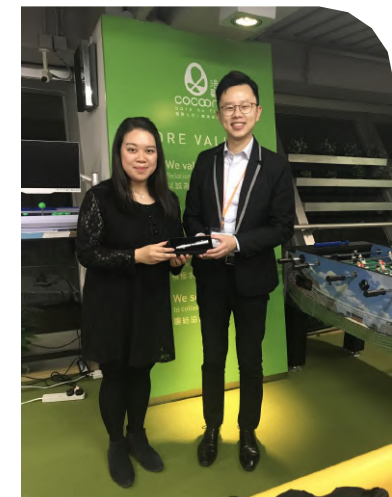
## 8th April 2019

**Visit to Hong Kong Productivity Council on Industry 4.0**

The Hong Kong Productivity Council (HKPC) is a multi-disciplinary organization established by statute in 1967, to promote productivity excellence through integrated advanced technologies and innovative service offerings to support Hong Kong enterprises. HKPC is focus on facilitating Hong Kong's reindustrialization empowered by i4.0 and e4.0 - focusing on R&D, IoT, big data analytics, AI and Robotic technology development, digital manufacturing, etc., to help enterprises and industries upgrade their business performance, lower operating costs, increase productivity and enhance competitiveness. The captioned technical visit was organized by YMC and CPDC jointly on 8th Apr 2019.

The tour first starts with a talk introducing the concept of industrial 4.0. Partner with Fraunhofer, HKPC is the only certify organization to provide official training. The definition of industries 4.0 including value chain, product life cycle and collaboration and data. Instead of focusing on automation and robotics, industrial 4.0 provides real time control and monitoring using internet and data. However, such approach requires collaboration between input and sensor, protocol and standard, bit transfer and energy consumption, data management, data analysis, output and actuator. In order to transfer the company into e4.0 industry, company's mindset, organization and strategy should be adapted to new approach. In the near future, blockchain technology and 5G network can be integrated into industrial setting and further increase the power of industrial 4.0.

After the talk, we visit the HKPC inno space and their workshop. With the support from government, inno space equip with multiple advance equipment in a wide variety of areas. Apart from advance digital manufacturing technique such as 3D printing, CNC and laser cutting, traditional method such spaying, casting and milling are also included in the workshop. The workshop in inno space provides great flexibility for members to develop their products.

## 5th May 2019

**Discovering local Synagogue and Mosque of Judaism and Islam**
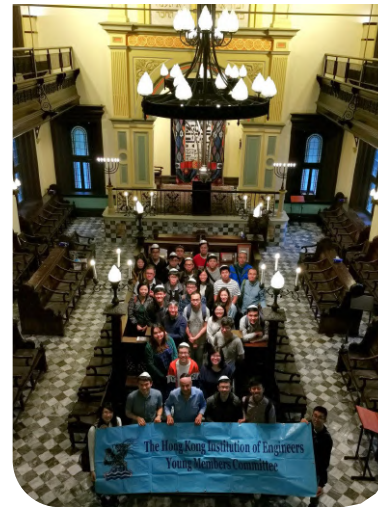
Hong Kong is a city embracing cultures, beliefs and religions. Not only can historical religious buildings such as Buddhist temples and Christian churches be discovered, Jewish synagogues and Islamic mosques can also be found in Hong Kong. According to a study conducted by Pew Research Center, Hong Kong is considered as one of the most religiously diverse cities. The Overseas Delegation of YMC this year has visited Israel where Judaism and Islam are the two major religions in the country. YMC also took the chance to organise a cultural tour in Hong Kong to step out and discover heritage of Judaism and Islam existence in Hong Kong.

Ohel Leah Synagogue is Hong Kong's primary Jewish centre and Jamia Mosque is also Hong Kong's first mosque. Hence these historical religious buildings are valuable and meaningful to both of the religious groups and to Hong Kong history. The tour started with the introduction of Judaism from Rabbi Asher Oser and Mr. Alan Goldstein from Ohel Leah Synagogue. The speakers introduced the history and development of Jewish community in Hong Kong. When sharing the establishment and preservation of Ohel Leah Synagogue, they also showed valuable books and photos recording past stories of the synagogue to the participants. The

participants also get the chance to walk around the synagogue to understand more about the building, architectural and cultural features of the synagogue. The tour then continued with the visit to Jamia Mosque, where Mr. Mufti Abdul Zaman, the main Imam of Jamia Mosque, shared insights regarding life of Islamic community in Hong Kong. Mosques are places where Muslims pray and study The Quran. Although Islamic community is not uncommon in Hong Kong, the majority of the Hong Kong residents may not have a clear understanding on Islamic culture.

Hence Mr. Mufti offered the participants an open discussion session whereby the participants were able to ask questions that they were interested in regarding the community. The visit was very interactive and informative. The heritage tour allowed participants to experience special religious cultures in Hong Kong. While appreciating the construction elements of the heritage buildings, the participants could also learn about the diverse cultures in Hong Kong by direct conversation with these communities.

OVERSEAS EVENTS

## 19 March am



### ⚠ Visit to Israel Innovation Authority

Israel Innovation Authority (formerly known as Office of the Chief Scientist of Israel's Ministry of Economy) was a government body founded 45 years ago. With the goal of reinforcing the industry and strengthening the economy, its innovation policy has been set under the principle of enabling the market instead of leading the market. Such policy embraces all technologies and sectors and supports them in a neutral bottom-up approach. As long as the technology itself could demonstrate a prospect to the betterment of mankind, the government would offer support to the project. No industry is particularly in favour where the neutrality of the Authority is being manifested. Given that many bright minds moved out from Israel to places such as the Silicon Valley and Berlin for their own career development, the Authority introduces negative incentives to export IP and R&D activity for the interests of Israel.

The Authority provides support to facilitate the development of innovation ecosystem through various aspects. For technological infrastructures, research infrastructures and disruptive technologies are supported by the Authority. It also maintains a deal flow of tech startups and helps them to reach fundable milestones. Israeli companies with potential prospect can be supported from cradle to company growth and funded by private venture capitals. For example, in 2017, many tech startups exit as a unicorn. They include Mobileye, NeuroDerm, Plarium, Argus cyber security, and more.

Although the Authority virtues the free market mechanism, market failure is the sole condition for government subvention to promote innovation projects in Israel. Two areas of prominent market failures have been highlighted:

1. Knowhow and technology spillover
Stemming from joint company R&D projects and due to the transfer of employees, the Israeli company that developed a certain knowledge will

not get the full return for the effort they invested in R&D.

2. Risk and uncertainty
R&D projects involve a high level of uncertainty. Technically, risk exists when ideas and theories are being implemented. Business-wise, a new niche market that the R&D outcome enables could not be proved existent in advance. These projects can fail and might fail.

As a result, Israel Innovation Authority would provide governmental intervention to the market in the form of funding.

A 50-50 government funding is provided to Israeli companies for carrying out R&D projects. A pool of over 200 experts from a diverse spectrum of industries would provide professional evaluation on R&D project proposals. With reference to the evaluation from experts, funding to R&D projects are at the discretion of the Board under the Innovation Authority. The technology level threshold to entitle the grant is strictly maintained. In 2018, only around 1500 projects of over 3000 applications from more than 920 companies were granted approval for the funding. The overall annual funding by value reaches HKD 3.5 billion on average.



## 19 March pm

### ⚠ Visit to the Center for Israeli Innovation

The Center for Israeli Innovation was established in 2016 to showcase Israeli leading technology companies in different fields and provide a holistic view of the Israeli innovation ecosystem and its impact all around the world. The visit includes a tour around the exhibition hall and a discussion on the ecosystem.

The guide first introduced Israeli advanced technology in various industries, including health, science, safety and security, agriculture, space and transportation. He then demonstrated the atmospheric water generator developed by Watergen Limited that extracts water from air and turns it into drinking water, as well as the artificial vision device developed by OrCam Technologies Limited that helps visually impaired people understanding text, identifying objects and recognizing faces through audio feedback. Delegates were given time to walk around the exhibition and explored various advanced technology from over 80 Israeli companies.

After the exhibition, the delegates were given a sharing about Israeli innovation ecosystem, which covered education, government investments, experience in Israel Defense Forces and the "OK to fail" attitude and flat hierarchy of Israeli people. These elements were believed to be the successful factors to bring Israel to be the world's number one country in terms of startup density and venture capital investment per capita.
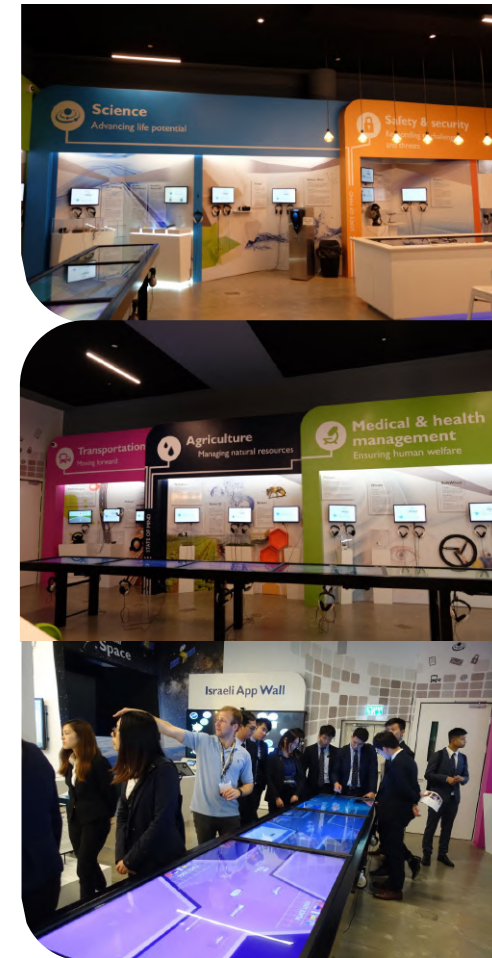
# 20 March am



### ▲ Visit to Sorek Desalination Plant

Sorek Desalination Plant, located about 15km south of Tel Aviv, Israel, became operational in October 2013 with a seawater treatment capacity of 624,000m³/day, which makes it world's biggest seawater desalination plant.

Israel has suffered from a chronic water shortage for years. The causes of the water crisis are both natural and man-made. It only rains in the winter, and largely in the northern part of the country. The increase in demand for water for domestic uses is caused by population growth and the rising standard of living. In order to solve the problem for the country's economic survival and growth, large scale projects to make optimal use of groundwater have been undertaken. One of the most striking water supply projects catching eyes over the world is the Sorek Desalination Plant. It provides clean, potable water for over 1.5 million people, comprising 20% of the municipal water demand in Israel.

The visit starts with an introduction of the use of seawater reverse osmosis (SWRO) process providing water to Israel's national water carrier system, together with the mechanism of each water treatment process, followed by on-site visit of plants in each process.

It starts with drawing water from the sea along 4-km pipelines to the plant. The seawater then undergoes pre-treatment to clog and remove
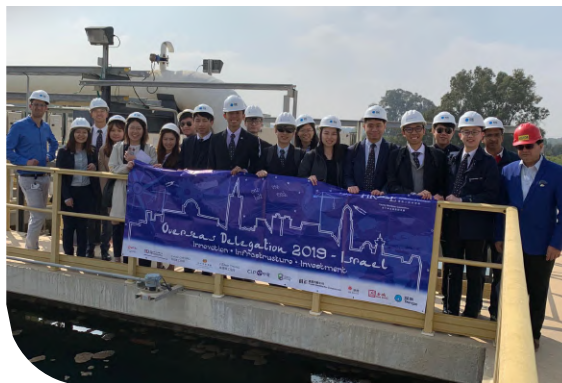
particles, SWRO process to remove salinity, 1st post-treatment to change the pH value of the treated water as to charge boron and remove boron by another RO process and 2nd post-treatment to add calcium from limestone. The pre-treatment is to prevent clogging of the membrane which hinders efficiency, increases time for replacement and money for excess energy and chemical input during the water treatment. The post-treatments are to meet the government water standard.

The SWRO technology drives the new trend of water supply development, particularly the Sorek Desalination Plant which delivers the industry's lowest water costs under BOT (Build, Operate, Transfer) contracts and with low energy consumption. The contributing factors are Customized Pretreatment systems which assure maximum efficiency and lifespan of the plant; Optimized Pressure Centre Design which uses extremely efficient high-pressure pumps and process design to maximize membrane throughput and salt rejection; Energy Recovery System (ERS) that enables the plant to offer the industry's lowest desalination energy consumption and; the most advanced membranes which raising efficiency while minimizing investment.
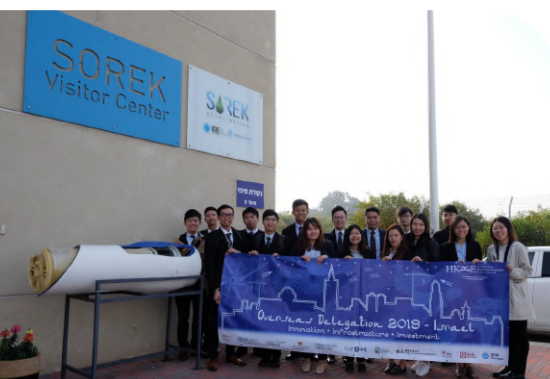
# 20 March pm

### ▲ Visit to Loginno

Startup industry in Israel is formed by many SMEs, which strive to provide innovation solution in different sectors of our life. Loginno is one of those among thousands of its kind based in Israel. Loginno's focus is on enabling the Shipping Container IoT infrastructure in order to provide the logistics chain with valuable data and software products, which could improve or even disrupt the current logistics processes. The disruptive solution provided is to convert normal containers into smart IoT containers and enable the transmission of crucial real time data as an industry standard.

Our delegates were welcomed by the CEO of Loginno, Mr. Amit Aflalo, who introduced the vision "Contopia" (Container Utopia) of the company. Founders of the company paid attention to the insufficiency in information flow along the supply chain, which could lead to billions of dollars of waste due to information blindness and low security level. Therefore, they also foresaw the potential in applying Internet-of-Things to nearly 30 million containers with more than 110,000,000 container trips per year in the world. Its business model is to establish an IoT network for container with lowest cost and least modification.

The prototype of the smart device was also displayed to the delegates during the visit. It is a simple, small e-tag that could be installed inside the plastics cover of container vent. Each e-tag costs around US$ 100 and less than a year of Return of Investment. It is capable to communicate with other devices through technologies such as Wifi, NFC,



Bluetooth, SIM card, etc. Key components of the device include a GPS receiver for positioning and tracking; a motion sensor for movement & shock detection; an acoustics sensor for intrusion detection; a data black box to store all data; as well as a thermometer for temperature monitoring. A solar power panel is also attached on the plastic cover in the new design so as to reduce the energy consumption of the battery and achieve long battery life expectancy of around 10 years.

For the virtual side of the e-tag, the real-team data transaction is protected from cyber intrusion by blockchain technology with encrypted transaction in device. To achieve the real-time monitoring, the e-tag could be integrated with software applications in a cloud-based server. Its functions include "cyber seal" for customs clearance purpose, scale-less weight measurement, and schedule analytics for Just-in-time delivery. The gathered data and information are then able to be processed by Big Data Analytic Tools and AI Applications.

## 20 March pm

### ▲ Visit to Stratasys



Stratasys is one of the biggest companies in 3D printing equipment manufacturing. As an Israeli manufacturer focusing on office-based rapid prototyping and direct digital manufacturing solutions, Stratasys products are used by engineers to produce complex geometry with a wide range of materials.

With the increasing attentions on 3D printing technology,this technology is being used in different applications with different materials and designs. However, 3D printing suffers from multiple technological challenges, such as choices of materials and color printing. Traditional additives manufacturing technique is only able to use one or two materials for any given single print job. Besides, client requires higher and higher standard and resolution on their 3D printing parts than before. Old technologies such as FDM and SLA can no longer satisfy the needs for customer. Therefore, Stratasys develops a new generation of printing method call PolyJet to cope with customers' demand and focus their development in Israel office.

The visit starts with an introduction of 3D printing and PolyJet Technology, followed by a session on medical application with actual 3D model showcase. After that, we are invited to visit their workshop which installed a few PolyJet based 3D printers.

PolyJet is a powerful 3D printing technology that produces smooth, accurate parts, prototypes and tooling. With microscopic layer resolution and accuracy down to 0.1 mm, it can produce thin walls and complex geometries using the widest range of materials available with any technology. PolyJet can also incorporate the widest variety of colors and materials into a single model for unbeatable efficiency. PolyJet also allows the use of multiple materials in the same print such that different segment of the print can present different properties.

In addition, 3D printing in medical usage is being popular in recent years. As medical application often requires customised equipment and models for patients and doctors, 3D printing can assist traditional manufacturing method to obtain the greatest profound effect in medical implants and human models. Special material is used in those models which simulate the actual texture and physical properties of human tissues which FMD and SLA cannot be replicated.
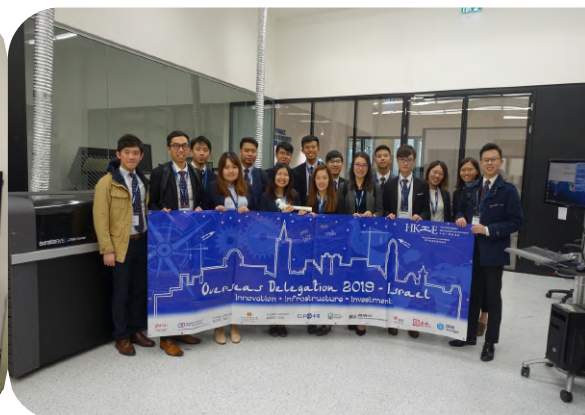



## 20 March pm

### ▲ Visit to Paykey



Financial technology is a growing industry in Israeli innovation market. In 2018, the record number for funding and investment deals in Israel in the first six months is more than $400 million raised in 45 deals which significantly exceeded the previous half year investments (Startup Nation Central, 2018). To explore the new era in Fintech industry, there are lots of challenges from the technology itself and also from the security and privacy issues, which may hinder the development.

The delegates visited the shared workspace of Paykey in one of tallest buildings in Tel Aviv. PayKey is a fintech startup bridging the gap between social apps and traditional financial services, enabling banks, telcos, digital wallets, and more to gain control of the customer interface and have their brands become a part of their customers' social and messaging experience. PayKey enables service providers to offer their customers the ability to initiate and complete a range of financial services, including P2P payments, balance check, credit top-up and transfer, cardless withdrawal, and more, from within any mobile app, including all social and messaging applications.

The speaker introduced the company briefly and pointed out that its customers are mainly from global markets, e.g. HSBC UK and ING Polland. It has raised successfully a total of $16 million in funding from strategic investors such as Mastercard, Santander InnoVentures, SBI Group, Digital Ventures – the fintech subsidiary of Siam Commercial Bank, as well as from leading VCs Magma Ventures, e-ventures, and MizMaa.

In August 2017, Korea's biggest messenger app launched Kakao Bank which has attracted over a million in 5 days, while in March 2018 WeChat Pay has been used by 80 million active users and has been accepted at over 300 thousand stores. The speaker's team suggested that social platforms and tech giants are capable to be the next banks. As his team found that millennials spend 2.5 hours on average on mobile communication application every day, an integration of daily actions and the mobile apps would be useful and attractive to users. Therefore, they created a personalized white-label experience tailored to banks. The PayKey serves as an interface between the front-end keyboard and backend banking app. No changes are required in the customer service flows, payment rails and security parameters. The users can pay by Paykey without leaving the messaging app.

The speaker suggested that banks can increase the bank customer acquisition and transaction volume and create frictionless operational services with Paykey. Adoption of Paykey could also enhance brand equity and position the bank as innovation leaders.

Reference:
Startup Nation Central. (2018). *Fintech Report 2018. Retrieved from https://lp.startupnationcentral.org/fintech-report-2018/*

## 21 March am

**Visit to 3DSignals**

3DSignals is a startup company founded in 2017. It offers an unique sound-based predictive maintenance system. By installing the sound sensor to the machine, any sound produced by the rotating industrial equipment, likes motors, pumps, turbines etc., will be captured. The generated data will then be uploaded to the network and analyzed. The system will be alerted for any detected inconsistency. The user can classify and predict the equipment failure before production is interrupted by reading the automatically generated report through his/her mobile phone.

Mr Ariel Rosenfeld, CEO of 3DSignals, said that industry 4.0 is the trend of today's world, however, he recognized that there is a huge gap for most of the factory to achieve the final stage of industry 4.0 due to the lack of connectivity and recordable data. Many companies, especially those who are still using the old machines, could not record and digitalize the data from the machines. Buying new machines requires large investment, and the transition period of shifting to new machines may also reduce the production rate of the factory that lead to money loss. Therefore, he comes up with an easy to use and cost effective device for those factory owners. The sound-based sensor covers both new and old machines, across all vendors and machine types. Sound is recorded and transformed to digital data, and a real-time report will be generated for the customers to monitor their machines performance.



He also shared how he managed his startup company. A flat hierarchy of business model is implemented which not only could fully utilize the potential of the team, but also encourage brainstorming new ideas, especially when the team is still small. He allows? failure and treats it as kind of experience which people could learn from it instead. Moreover, he said that the experience in IDF helps him in developing practical and professional skills on specific sector and building interpersonal network to prepare the need for future business.



## 21 March pm

**Visit to the Association of Engineers, Architects and Graduates in Technological Sciences in Israel**



The Association of Engineers, Architects and Graduates in Technological Sciences in Israel (AEAI) was established in 1958. According to the introduction by Prof. Ehud Menipaz, Chairman of AEAI, AEAI is a learning organization for lifelong learning. The goal is to represent, ma promote and unite all those involved in technology and to support their professional development as innovative entrepreneurs.

Dr. Yael Dubinsky, Member of the data Science Society Management shared us the innovation in Israel and the activities of the startup incubator at the Data Science Society at AEAI. She mentioned a new business model emerged because of the innovation solution in data collection. Today, things can connect to the network with sensors. Real-time contextual data are collected and through cross vertical analytics, real-time decision making is done by the user according to the feedback from analytic engines such as machine learning. This can affect the revolution in different industries including waste treatment, healthcare and organization network.

Next, Mr. Haim Rousso, Member of the council of Israel Innovation Authority, presented on the new trend in the technology-based industries. The global trend is highlighted in the areas include Technology explosion, Globalization and lack of human capital, the presentation mainly focuses on technology explosion and lack of human capital.

1. Technology explosion – Continuous upgrade of existing technologies at a very high rate. For instance, Moore's Law predicted that the number of transistors in a dense integrated circuit doubles about every 18

months, this prediction proved accurate for several decades and it has been used in the semiconductor industry for target setting and long-term planning. Many emerging disruptive technologies emerged such as 3D printing, artificial intelligence and Nanotechnology. Most of the emerging technologies impact a wide range of applications and they interrelated to a large extent.

2. Lack of human capital – There is a need for people to be multidiscipline because things have become interrelated with each other. Furthermore, in the age of automation and technologies explosion, lifelong learning is significant because knowledge today might not be related to the need of the future. The traditional education system is not suitable for the next generation. Apart from education, Mr. Haim Rousso also mentioned the importance of open innovation in different industries. Traditional close innovation is to achieve innovation within a company's own Research & Development Department out of external reach. Close innovation has shortcomings such as large investment, high patent cost and slow innovation process. Companies cannot afford the cost of innovation on their capability to be competitive in the market. Open innovation is about exchanging knowledge and ideas between different parties including business partners, customers, university and public institution.

# 24 March am



**Visit to the Ministry of Economy and Industry**

The Ministry of Economy and Industry is one of the operational government ministries responsible for providing tools and support mechanisms designed to advance the Israeli economy and encourage financial growth. The ministry provides services and information in development and investment, foreign trade, regulation and enforcement, domestic trade and standards. Our speaker, Mr. Oded Distel, is the Head of Israel NewTech, which was founded on the belief that the Israeli water and renewable energy sectors have the talent and capability to be strong growth industries for the country, and to play an important part in establishing the "next generation oasis" for the world's rising needs. This national program is led by the Ministry of Industry, Trade and Labor, and is supported by a number of additional Israeli government agencies. Israel NewTech helps to advance the water and renewable energy sectors by supporting academia and research, encouraging implementation in the local market, and by helping Israeli companies succeed in the international arena.

During the visit, the speaker shared his view on the current trend of technical development around the world. Things around us are changing, like higher standard of living, climate change, etc., and the pace of changing is going fast. Business is not an only option. We should change our mindset of what we usually do. The development is not just country-to-country, but city-to-city. It was known that Hi-tech is one of the developing industries. However, Hi-tech is not a sector, but everywhere in our daily lives, financial services, health care, food, water, education, automotive,

agriculture, energy and so on. Hi-tech is developed, as there is need of transforming existing industries into a new chapter. Some industries have to be changed and thus new technology comes up in order to make a better world as well as to reduce impact to the environment and save the resources. For example, Construction-Tech is developed because the construction industry nowadays creates lots of wastes and dangerous everywhere.

The speaker believes that Israeli has characteristics that make Israel to be a perfect match of new technology development and they are the key factors changing Israel into a startup nation. They like breaking boundaries. They are accessible, agile, with limited hierarchy, diversified, advocated excellence, creative and entrepreneurial. All of the above-mentioned play an important part of generating innovative new ideas, turning it into a reality and bring the new technology into our daily lives. Israel takes its small-scale as an advantage. The hierarchy in Israel is low, thus everyone is accessible and the process of delivering and developing idea is faster.

The foundation of Israeli startups is based on a principle. People feel good to do a right work, but it has to base on a clear economic of business model that the technology researcher can make money from it, as the development of new idea and technology required the support of funding. Partnership is built without threatening the responsibility and benefits of each other, so that people can well corporate and work together. Moreover, it is all about the attitude and determination. There are 1,400 new innovative startups a year in Israel. Most of the startups are going to fail, but it's ok to be failed. Israeli treasures each failure and takes it as a chance to learn and gain experience. They learn from it and to do it again with improvements.



# 24 March pm

**Visit to Yissum - The Hebrew University of Jerusalem**
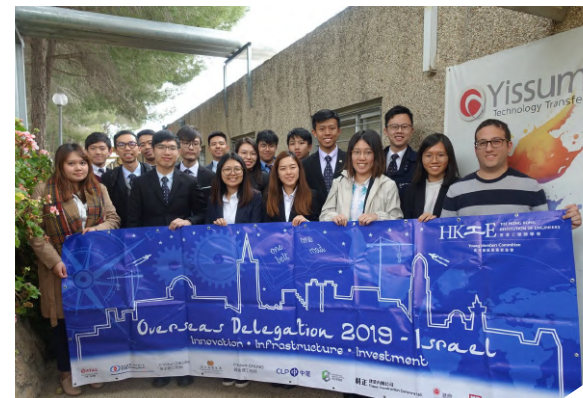



Yissum, a technology transfer company of The Hebrew University of Jerusalem (HUJI), was founded in 1964. It is one of the biggest tech transfer companies in Israel, commercializing scientific researches at Hebrew University. In Hebrew, "Yissum" means "Transfer". The mission of Yissum is to serve as a bridge between cutting-edge academic research and a global community of entrepreneurs, investors, and industry organizations.

The speaker introduced a typical tech transfer procedure to all of us. After obtaining the research funding, the researchers of HUJI might come up with innovative technologies or inventions. Yissum would then protect the Intellectual Property (IP) by registering patents and commercialize these potential inventions. Industry organizations which are interested in applying the technologies might pay Yissum for license to use the IP. Hence Yissum would pay back royalties to researchers.

Yissum has also sponsored, participated and launched various programs to support entrepreneurs and ideas in their earliest stages, including Spark HUJI, HUGROW, Labs/02, by providing professional guidance and feedback. Yissum also promoted business collaboration through program such as Enterprise Directed Research (EDGES). Industry partners may approach Yissum with a defined technological problem, and the parties will collaborate with some of the HUJI researchers. The

industry partner could select the suitable proposal to fund. The funded research outcomes would then be accessible to the industry partner.

The top level education and research background of the HUJI and Yissum allows them to provide continuous support to the startup ecosystem in Israel. Numerous reputable and influential startups are the spin-off companies of Yissum, including Mobileye, Orcam, Collplant, Qlight, and Briefcam. It is also grateful to see more and more technology transfer institutions are set up to connect the academia and industry and to allow innovative inventions to be used for public benefits. The HKU Technology Transfer Office, the Technology Transfer Office of PolyU and the Technology Transfer Center of HKUST are some examples showing that the Hong Kong academic institutions are also keen to transfer technologies worldwide.

## 24 March pm



### Dialogue with Israeli Youngsters

Israel Defense Forces (IDF) is the military forces of Israel. They consist of the ground forces, air forces and navy. It is the sole military wing of the Israeli security forces. All citizens reaching the age of 18, no matter what gender, are mandatory to serve the force for more than two year. IDF has been specifically designed to match Israel's unique security situation. The military developed several technologies to match the IDF's needs, such as the Iron dome missile defense system, cyber security defense system etc. The IDF is one of Israeli society's most prominent institutions, influencing the county's economy, culture and political scene.

The delegates had a causal dialogue with two Israeli youngsters to understand their lives in IDF. After entering the military force, they received a training called "boot camp", which was a tough training for all new comers, but a good opportunity for them to understand each other. They were then assigned to different roles and took up

responsibilities that required critical thinking and independent problem solving. They highlighted that the experience in IDF would build up a mindset of not afraid to fail, which was critical for innovators.

In their opinions, IDF is a good place to allow youngsters to understand their strengths and weaknesses and nurture themselves into a person they want to be. The IDF also provides a comprehensive professional network for them to connect with different people and allow them to seek for help when they leave the force and pursue their dreams, no matter having a start-up or working in fully developed and mature companies. More importantly, serving in the IDF changed their mindset and taught them not to be afraid to fail. This is an important making Israel a Start-up Nation because Israeli people are willing to take up risks and strive for the result they are looking for.

## 25 March am



### Visit to The Floor

The Floor is a platform sourcing and developing fintech for Tier-1 banks worldwide. Headquartered at Tel Aviv Stock Exchange (TASE) Building, The Floor offers bespoke solutions by matching global banks with Israeli expertise. The Floor believes that many of the banking challenges faced by the industry today can be solved through their co-innovation approach. Banks can safely co-design solutions in non-competitive technological areas, allowing them to join forces to solve common key issues for the global banking industry. They work with their strategic partners to pinpoint collaborative opportunities and select key challenges that have the greatest potential for impact on the industry.

Delegates had an overview of the FinTech Ecosystem of Israel. There are over 500 Fintech startups in the country. Approximately 1 billion ILS was invested in Fintech Startups in 2017. Unicorn Fintech startups have been boomed from their success stories, such as the Lemonade Insurance Company who digitally offers AI-driven renters and home insurance.

The Delegation dug deep by seizing the opportunity to learn from one of the startups at The Floor, a company name PAI-Tech. PAI-Tech provides a development platform and a marketplace where users can develop, sell, and buy decentralized apps,
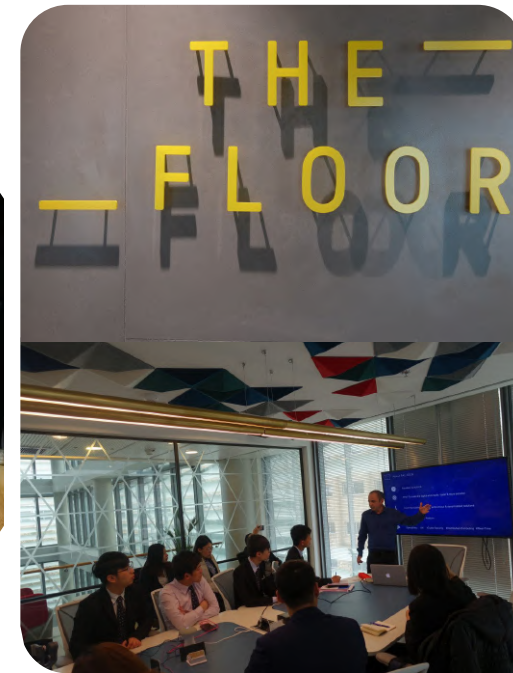


AI algorithms, and data. PAI-Tech helps the end user build decentralized apps for any business requirement, simply and affordably.

The company addresses the challenges faced by developers and businesses to incorporate decentralized applications in their projects or organizations. It does this by drastically reducing the cost and risk faced by these entities to take their platform to market, helping democratize access to technology.

The mission of The Floor is to bridge the gap between the human and digital world though helping businesses adapt to the Fourth Industrial Revolution (4IR). With the growing importance of online company assets, cyber security protection has become critical to the company. PAI offers quantum protection including the adoption of counter measure cloning approach by switching data storage locations with a replacement bot when being hacked.

## 25 March pm



### ⚠ Visit to Construction Technology Hub

The Construction Innovation Zone is a dedicated platform bringing startups, entrepreneurs, investors, corporations and governmental entities together, aiming to redefine the construction industry through disruptive, new technologies. Its unique partnership with Israel's government helps to expedite the utilization of these technologies on the ground. Corporations are then able to gain critical access to innovation that will disrupt the construction and infrastructure industries, along with other related fields.

Israel is one of the world's most active sources of technology innovation, with a growing number of startups focused in the construction industry. Construction and infrastructure innovation is undeniably prioritized on the public agenda.

Complex projects, tight timetables and increasing demand for massive construction all require a lasting change in the Israeli construction industry.

These needs create enormous opportunities in Israel and around the world. Entrepreneurs are creating

software solutions for optimizing the site, organizing projects, shortening schedules and building innovative materials and tools.

Construction Innovation Zone aims at building a unique ecosystem and making Israel a leading global Construction Tech Hub with Israeli technologies, governmental support and the spirit of Israeli entrepreneurship.

Israel construction industry accounts for 25 Billion of the gross national product (10% of Israel), and there is about 60k apartments in Israel currently. It is about to double the population in 25 years. Hence, the need for the building construction to accommodate more and more population is rising. In other words, the opportunities for applying the construction technology seem to be a great sandbox to attract the foreign capitals and technology investment.





## 25 March pm

### ⚠ Visit to ECOncrete

The construction industry worldwide has been criticized for its old-fashioned culture. Now, the Israelis determine to change this dinosaur. Numerous start-ups enter the market and bring new materials, digitalized management system, innovative programs etc. revolutionizing this industry.

ECOncrete, founded by two marine ecologists namely Dr. Shimrit Perkol-Finkel and Dr. Ido Sella, is a company offering solutions of high performance environmentally sensitive concrete. We were hosted by the co-founder Dr. Ido to tell us the successful story of ECOncrete.

Dr. Ido firstly introduced the critical problem the world is facing. It is the severe impact on natural ecosystems along the coastlines due to the inevitable coastal development. Concrete accounts for a large portion of construction materials for coastal and marine infrastructure. Due to its nature of poor substrate for biological recruitment, it is considered as toxic to many marine organisms.

To tackle the problem, a series of biochemical processes are introduced by the ECOncrete team into the concrete elements which establish an environment encouraging the growth of targeted marine organism and reducing carbon footprint. A set of high quality and cost-effective products were produced based on this principle to reduce ecological damages caused by the construction of coastal infrastructures and urban waterfronts. Moreover, its environmentally sensitive technologies allow the integration of marine organisms such as oysters and



corals, and precast concrete delivering a result of structural integrity enhancement. Their products include bio-enhancing concrete admixtures, science-based forms and form liners and designed precast concrete elements. These products bring harmony between the development and environment.

The company was recognized internationally. The products of ECOncrete is widely adopted in the world, including Netherland, Israel, Monaco, USA and Hong Kong.

Lastly, Dr. Ido shared their journey as a start-up company. It took the team two years for the Research and Development stage. During this period, it developed the core technology and initial product lines. After three years of business development, the company started to expand and establish global partnership with the growth of revenue. When we asked Dr. Ido the key factors for breaking the wall between conservatism in the construction industry and innovation, he gave us an insightful answer - approaching the right audience with scientific product performance.

## 26 March am



### Visit to Zebra Medical Vision

Zebra Medical Vision is a software company providing medical imaging processing algorithm with AI technology to increase the diagnostic accuracy of medical images such as MRI and X-ray. Its mission is to provide radiologists with the tools they need to make the next leap in patient care. The demand for medical imaging services is continuously increasing, outpacing the supply of qualified radiologists and stretching them to produce more output, without compromising patient care. Only by adopting new technology that significantly enhances the capabilities of radiologists, can this crisis be mitigated. Zebra is empowering radiologists with its revolutionary AI1 offering which helps health providers manage the ever-increasing workload without compromising quality.

The tour starts with a company tour of their office space. Different from a traditional company, Zebra Medical Vision office adopt open office concept with colourful and bright internal design tone. Entrainment equipment and pantry are highly accessible and employees are free to use during office hours.

After the office tour, our team has a discussion session with one of the founders, Elad Benjamin, of Zebra Medical Vision. He walks us through his start-up journey with multiple companies. With his expertise in machine learning and capital earn from the previous companies, he founded Zebra Medical Vision. In order to produce a reliable model with machines learning, huge amount of data must be obtained to train up the model. However, patient medical information and history are very personal and sensitive data across the world which cannot be shared towards third-party easily. After numerous attempts in seeking patient data, he successfully gathers medical imaging data and establishes the foundation of Zebra Medical Vision. We also discuss the exit strategies of startup founders. However, he confirms that there is no exit pathway for founders except for success.



## 26 March pm

### Visit to Grove Ventures

In Israel, venture capital provides to early-stage, high-potential, high risk, to growth startup companies based in Israel. Israel's venture capital (VC) industry was born in the mid-1980s and has rapidly developed since. Israel's venture capital and incubator industry play an important role in the booming high-tech sector that has been given the nickname "Silicon Wadi", considered second in importance only to its Californian counterpart, the Silicon Valley.

One of our visits in investment this year, are to one of the VCs in Israel, Grove Ventures (Grove), which was founded in January 2015, by Dov Moran, Managing Partner, the Inventor of the USB flash drive. It is a $US100 million venture capital fund primarily investing in early-stage startups with cutting edge technologies and deep technologies such as semiconductor, sensors, clouding, artificial intelligence and Digital Health. It is our great honor to meet Mr. Dov Moran and Mr. Tal Ben-Moshe, Director of IR & Strategic Partnerships, to discuss the current situation and development of VC in Israel, and its benefits to economy of the nation.

Grove, as a general partner in the investment, is in charge of managing VC funds and making portfolio companies run smoothly and will be on the board of a few portfolio companies. They network and identify interesting opportunities for the fund to negotiate terms of acquisitions, and exit portfolio companies successfully at the same time. The investor, known as limited partner, invests capitals to the VC funds and owns the funds. A typical VC firm manages 10 companies at a time, however it can vary to 15-20 depends on fields. Typical it expects two to three investments to have major breakthroughs and successes.

For selection of investments, Grove shared that they typically receive around 1000 applications each year and, after consorting with specialists like engineers and programmers in certain fields, 500 companies will be shortlisted and will be further evaluated the opportunities to be invested by VC firm. Grove will





help building financial support and helping them to set up company, which is important that the VC can meet with the portfolio companies regularly to discuss the development and to make sure it is aligning the mutually agreed strategies. VC has also set milestones for portfolio companies to achieve and provided key performance indicators to keep track of their business.

Currently, VC expects to have the returns roughly three times the investment in 10 years time. If IPO is offered in the stock market, VC firm normally will sell the shares and will not treat as a long term investment, as it is actually for the benefits of the VC and the operation of the whole ecosystem. There is a competition in VC business however sometimes they work friendly with each other and cooperate in some cases with local VCs or foreign VCs.

For quitting strategies, if the portfolio companies fail to perform as expected, the VC can choose to sell the firms to other major companies, or sell shares to other private equities. The portfolios can also choose to exit however it requires approval from VC.

INSIGHTS

## Innovation

Innovation is generally defined as the introduction of new or improved products and services to provide better solutions to a problem. It is the key of development, economic growth and social welfare. During the technological explosion and globalization era nowadays, the competition in innovation and technology is getting stronger and more international. It is necessary to formulate ways to enhance innovation development in Hong Kong so as to maintain our competitiveness in the world.

### Why Need Innovation?

Technology Explosion and Globalisation
The scientific and technical knowledge production has been growing rapidly in the 21st century. According to figure 1 and 2, the patent applications and patents granted in the world per year have increased by 70% and 81% respectively from 2007 to 2017 (WIPO, 2018). The explosion of new technology not only brings benefits to people and the society, but also brings about keen competition to a business and a country's economy. Taking social media as an example, while radio took 38 years to attract 50 million listeners, Facebook obtained 6 million users in its first year of launching and the number grew by 100 times in the next five years (Ernst and Haar, 2019). Another example is the introduction of smart phones. It not only dominates the market share of mobile phones after
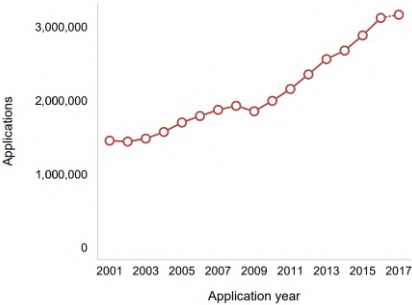


several years, but also occupies the market of many gadgets such as music players, cameras and game consoles. This shows that technology explosion can affect people, market and society significantly and widely nowadays.

The technological advancement such as the Internet, microprocessor and better transportation has also driven globalization and thus global competition. With more convenient communication and transportation, the new technology can easily reach out to overseas markets around the world. It can be seen that technology competition is happening across the globe.



Figure 1: Patent applications worldwide (WIPO, 2018)
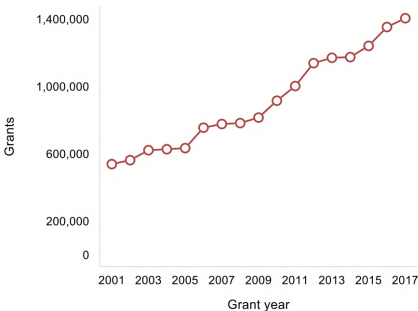


Figure 2: Patent granted worldwide (WIPO, 2018)

Hong Kong's Competiveness
Hong Kong was ranked 7th in the world and 3rd in Asia for global competitiveness in 2018, lagging behind Japan and Singapore as illustrated in table 1. In particular, Hong Kong performed relatively less well in innovation capability, with a score of 61.9 out of 100 and a ranking of 26th in the world (World Economic Forum, 2018). In 2018, the gross domestic product (GDP) of Hong Kong was surpassed by Shenzhen for the first time (HK Census and Statistics Department, 2019) due to Shenzhen's rapid economic growth brought by the hi-tech sectors. These figures imply that Hong Kong's competitiveness is slipping, especially in the innovation and technology aspect. This section will share the insights from Israel on how to drive innovation in the aspects of education, open innovation and re-industrialization.

### Education

Education is one of the key elements to drive innovation, including nurturing talents and cultivating an innovative culture. While Hong Kong has a number of high ranking universities in science, mathematics and engineering subjects, there might be some missing links between university study and industrial application, and thus weakening Hong Kong's innovation capability and entrepreneurship.

Hong Kong's University Education
In Hong Kong, undergraduate study typically covers lectures, laboratory experiments and thesis. Many universities offer industrial training and coopted programmes with the industrial sector for students to obtain practical experience, and

| Rank | Economy | Score | Rank Difference from 2017 | Score Difference from 2017 |
|---|---|---|---|---|
| 1 | United States | 85.6 | - | +0.8 |
| 2 | Singapore | 83.5 | - | +0.5 |
| 3 | Germany | 82.8 | - | +0.2 |
| 4 | Switzerland | 82.6 | - | +0.2 |
| 5 | Japan | 82.5 | +3 | +0.9 |
| 6 | Netherlands | 82.4 | -1 | +0.2 |
| 7 | Hong Kong | 82.3 | - | +0.3 |
| 8 | United Kingdom | 82.0 | -2 | -0.1 |
| 9 | Sweden | 81.7 | - | +0.1 |
| 10 | Denmark | 80.6 | +1 | +0.7 |

Table 1: Global Competitiveness Index 2018 Top 10 Ranking (WEF, 2018)

university students also spend time in classrooms and on textbooks studying technical theories.

Israel Defense Forces
In Israel, almost every civilian, both male and female, has to join Israel Defense Forces (IDF) at the age of 18. The normal duration of compulsory service is 2 years and 8 months for men and 2 years for women. The new recruits will first undergo basic training to familiarize the values and fundamentals of combat soldiers, including physical training, military discipline, weapons training and then be assigned a role in different units, working as a team to handle various obstacles (IDF, 2017). During that time, the soldiers can extend their networks and learn to cooperate with different people. After serving for certain years, the soldiers can be promoted to become officers in the army. They not only can gain experience in technical areas such as weapon utilization and tactics, but also soft skills including leadership and problem solving. The networks and soft skills gained in IDF can support them to become entrepreneurs.

IDF is also a place for practical application of science and engineering. The soldiers need to utilize their knowledge and creative thinking to solve real-life problems. For instance, in the largest unit of IDF, Unit 8200, soldiers are responsible for signal intelligence and code deciphering. They need to apply computer coding and hacking skills to gather and disseminate actionable intelligence to strengthen national security. Those experiences in the unit can help nurture research and development (R&D) talents and support innovation development in Israel. It is noticeable that the founders of many IT companies, such as ICQ that developed instant messaging application, are the alumni of Unit 8200 (Goldberg, 2012).

## Open Innovation

### Lack of Resources for Innovation

Hong Kong has a small pool of technology talents and a low level of investment in R&D activities. The number of R&D personnel per million population was 2,925 in 2015, far below the world's average as illustrated in figure 3 (Our Hong Kong Foundation, 2015). The R&D expenditure in 2017 only consisted of 0.80% of the GDP, which is lower than most of the developed countries and Asian peers (OECD, n.d.). The lack of talents and investments is believed to be one of the major hurdles for promoting R&D in Hong Kong. While the government has started to increase funding to support R&D activities, the resources utilization shall be optimized to effectively enhance innovation.

### Soft Skills and Practical Training

Based on the above analysis of IDF training, it can be seen that IDF plays a key to equip Israelis with soft skills and practical experiences for R&D and entrepreneurship. While technical theories provide a solid foundation for R&D activities, it is worth to consider reviewing the university programmes in Hong Kong and putting more emphasis on industry applicable knowledge such as programming and building information modelling as well as general professional training including leadership camp and model entrepreneurship programmes, in order to nurture more R&D talents and entrepreneurs. It is also recommended that more university-industry collaboration could be established to bridge the academic study/research and the industry.

Under the conventional understanding, innovation is achieved within a company's in-house R&D department, based on the organization's complete control over the whole innovation process. The company invests in human resources and R&D facilities to foster technological invention and then creates innovative products and solutions to generate profits in a self-contained environment. Although this kind of closed innovation can protect the company's patents and intellectual property (IPs) from the theft of ideas by other companies, it requires huge investments to support internal R&D and a long time to develop innovation, as well as limiting the application of research findings and the market coverage.

### Open Innovation – A possible way out

To better utilize the resources and leverage the research findings, the concept of open innovation has become popular in recent years. Open innovation refers to opening up the innovation process beyond company boundaries to increase the innovation capability as displayed in figure 4. In the research stage, the company can import ideas and technology developed by other companies, and export its research findings that are not strategically relevant to its core business to other companies. In the development stage, the ideas

and technology are converged into several viable projects. The company can invest in those developed technology in the form of intellectual property licenses to advance the project. In the commercialization stage, the company can either create its own product internally, or buy in and modify existing products in the market. Through open innovation, the research costs can be reduced and the innovation can be brought to the market more quickly (World Economic Forum, 2015).

To increase innovation capability, Hong Kong can consider adopting open innovation to optimize the use of resources and R&D findings. This would require a coordinator to connect different parties in the innovation ecosystem to explore collaboration opportunities. It can be observed that there are already a number of third-party innovation
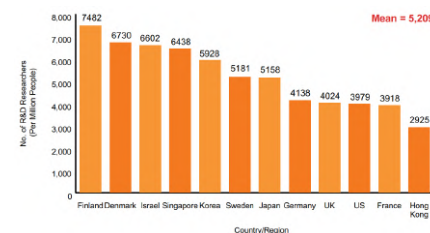


Figure 3: Number of R&D personnel per million population (OHKF, 2015)

## Re-industrialization and Industry 4.0

### Importance of Re-industrialization

Hong Kong's economic growth has long been relying on the four key industries - financial services, trading and logistics, tourism, and professional and producer services, which in total share 57.1% of value added in GDP in 2017 (Hong Kong Census and Statistics Department, 2019). These industries can be significantly affected by external economic conditions. To enhance competitiveness and overcome challenges posed by economic fluctuation, Hong Kong needs to boost innovation and technology development and identifies new areas of growth.

facilitators such as the Floor and Contech in Israel and CoCoon in Hong Kong taking this important role. By strengthening the exchange of ideas and knowledge, it is hoped that Hong Kong can build a stronger innovation ecosystem and increase its innovation and technology output in the future.
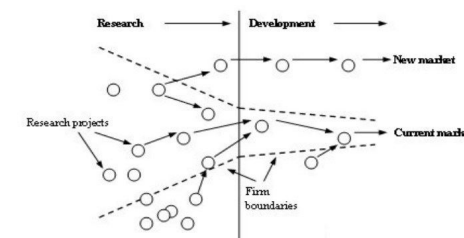


Figure 4: Open vs Close Innovation (Chesbrough, 2003)

Re-industrialisation, which aims to attract high value-added technology industries and smart manufacturing process, is a potential direction to enhance competitiveness for Hong Kong's innovation and economic development. Expediting re-industrialisation was one of the innovation and technology initiatives in Chief Executive's 2018 Policy Address and a $2 billion Re-industrialization Funding Scheme was proposed to help manufacturers set up smart production lines in Budget 2019-20. Through the promotion of re-industrialisation, Hong Kong can not only diversify its

economy, but also address labour workforce shortage in labour-intensive industries.

### Industry 4.0

Industry 4.0 is an important concept to help achieve reindustrialization. While reindustrialisation strives for advancement in efficiency and flexibility of manufacturing process, product quality, cost control and workforce management, Industry 4.0 enhances the physical-digital integration of human, process, systems and machines to enable smart and optimized production.

Industry 4.0 refers to the networks of manufacturing resources that are autonomous, capable of controlling themselves in response to different situations, self-configuring, knowledge-based, sensor-equipped and spatially dispersed and that also incorporate the relevant planning and management systems (German Industrie 4.0 Working Group, 2013). The strategies and roadmap of Industry 4.0 transformation can be illustrated by the maturity level in figure 5.

Computerisation & Connectivity (0i) is the preparation stage which paves the foundation for climbing up the i4.0 maturity ladder. Deployment of computer for performing single production process and the connection of silo business administration system to the company's management information system would fulfill the criteria for computerization. Connectivity is featured by the communication among production units and linking up of certain parts of isolated business administration systems.
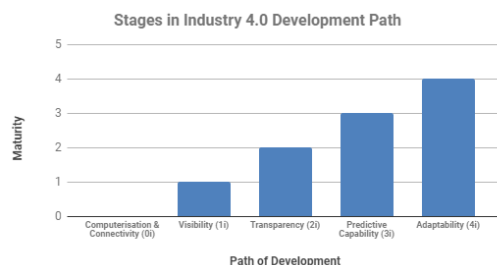


Figure 5: Stages in industry 4.0 development path

Visibility (1i) is the first level of maturity. Large and numerous of data points are probed at the entire value chain within the factory to enable a real-time digital model of a factory. The real-time data are made available for analytics to take place through semantic linking and aggregation. The creation of analytic hierarchy that provides meaningful insights for management purpose would provide the transparency (2i) of the factory.

While 2i reveals the present operation, 3i offers predictive capacity to simulate different future scenarios and identify the most likely ones. Development towards 3i requires a properly constructed digital model combined with knowledge of the relevant interactions inside a factory for producing meaningful predictive simulation results.

Adaptability (4i) is currently the highest level of maturity in Industry 4.0. 4i involves the use of simulated results for the formulation of automated decision making and automated actions. A feedback mechanism is formed to adjust and reschedule orders relying on the data from digital model without human assistance for having the best possible outcome in the shortest possible time.

### Industry 4.0 in Hong Kong

Hong Kong is at an early stage of Industry 4.0 development. Currently, most of the Hong Kong based companies are not ready for Industry 4.0 or at the 0i stage (Law, 2019). Only a few Hong Kong entrepreneurs have developed 1i in their factory situated in the Greater Bay Area (GBA), where they are ready to climb higher up the i4.0 ladder for enhancing production in their corresponding industries.

Knowledge and experience are required to further develop Industry 4.0 in Hong Kong. Nowadays, manufacturing industries are mainly located in the mainland China due to lower rental and labor cost. Talents in Hong Kong have the difficulty in obtaining practical experience in a local setting. Since innovations in Industry 4.0 often build on the shoulder of the existing technical know-how, talents in Hong Kong are encouraged to embrace opportunities in the Greater Bay Area. At the same time, it is important to find the niche of Hong Kong

in the innovation development initiative in GBA. The educated engineers from Hong Kong are good at initiating changes and innovations. Those who wield the practical experience and technical know-how would become the entrepreneurs in the advanced re-industrialized manufacturing industry in Hong Kong. This would unleash more opportunities for other local engineers, technicians and innovators who have the educational background and technical literacy to succeed in high value-add advanced manufacturing industry.

**References**

Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Brighton, MA: Harvard Business School Press.

Ernst, R.&Haar, J. (2019). *Globalization, Competitiveness, and Governability (1st ed.)*. London:Palgrave Macmillan.

German Industrie 4.0 Working Group.(2013). *Final Report of German Industrie 4.0 Working Group.* Retrieved from http://www.plattform-i40.de/finalreport2013.

Goldberg, U. (2012). *What's Next for the Startup Nation?: A Blueprint for Sustainable Innovation.* Bloomington, IN: AuthorHouse.

Hong Kong Census and Statistics Department.(2019). *Gross Domestic Product (GDP), implicit price deflator of GDP and per capita GDP*. Retrieved from https://www.censtatd.gov.hk/hkstat/sub/sp250.jsp?tableID=030&ID=0&productType=8.

Hong Kong Census and Statistics Department. (2019). *Percentage share of value added of the Four Key Industries in GDP*. Retrieved from https://www.censtatd.gov.hk/hkstat/sub/sp80.jsp?tableID=189&ID=0&productType=8.

Israel Defense Force. (2018). *From Civilian to Soldier: The Combat Training Process.* Retrieved from https://www.idf.il/en/minisites/soldiers-of-the-idf/from-civilian-to-soldier-the-combat-training-process/.

Law, L. (2019). OD2019: Technical Visit to Hong Kong Productivity Council on "Industry 4.0". Seminar presented in the Hong Kong Productivity Council.

Organisation for Economic Co-operation and Development. (n.d.). *Gross domestic spending on R&D.* Retrieved from https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm

Our Hong Kong Foundation. (2015). *The Ecosystem Of Innovation and Technology in Hong Kong.* Retrieved from https://www.ourhkfoundation.org.hk/sites/default/files/media/pdf/ScTech_full_report_eng.pdf

World Economic Forum. (2018). Global Competitiveness Report 2018.Retrieved from http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf.

World Economic Forum. (2015). The benefits of open innovation. Retrieved from https://www.weforum.org/agenda/2015/02/the-benefits-of-open-innovation/

World Intellectual Property Organization. (2018). World Intellectual Property Indicators 2018.Retrieved from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2018.pdf.

## Infrastructure

Infrastructure is the foundation supporting the standard of living in Hong Kong, which provides the access to a broad range of basic necessities and improves the quality of people's life. While Hong Kong is looking for solutions to diversify the source of town water supply, desalination could be an alternative to increase our local supply. With the application of advanced technology, construction can become more efficient, flexible and environmental friendly, and logistics and transportation can become traceable and data-driven. This study looks for inspirations for desalination technology, construction innovation and technological revolution in logistics industry.

## Water Supply

### Water Supply and Demand

Water is a necessity of our daily life. In Hong Kong, there was a rising trend of annual water consumption (including seawater flushing) over the last few years as shown in figure 6, though the value dropped slightly to 980 million cubic metre (MCM) in 2017. On the supply side, only 26% of the water was sourced from local catchments in 2017, while 52% of the water was from Dongjiang water and the rest is from seawater for flushing (WSD, 2018). In view of challenges of fresh water supply in Hong Kong, including increasing local water demand arising from population and economic growth, fluctuating water supply as a result of climate change, current fresh water sources and keen competition for Dongjiang water, Hong Kong needs to diversify its water sources to strengthen the supply (CHAN, 2018).
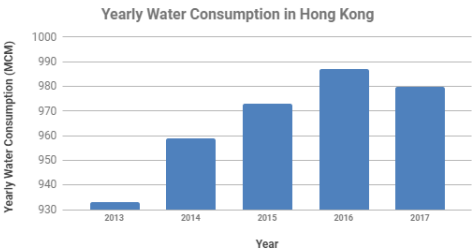


Figure 6: Yearly water consumption in Hong Kong (WSD, 2018)

### Desalination

Desalination is one of the alternatives to produce clean water and is currently applied in more than 150 countries. The major technologies available are thermal desalination and membrane desalination. Thermal desalination operates by evaporating water and condensing vapors, while member desalination refers to the use of reverse osmosis (RO) to filter salt and other dissolved ions from the seawater. In 2017, RO accounts for over 60% of the market share, due to its low energy consumption when compared to thermal desalination (Reuters, 2018).

Similar to Hong Kong, Israel has limited local water resources to satisfy the overall water demand. The water consumption in 2017 was 2030 MCM while the natural water refill was only 1170 MCM.

(Frenkel, 2017). In face of water scarcity, Israel has built 5 desalination plants to supply more than 600 MCM of portable water each year, which accounts for around 30% of the total water demand. The largest seawater desalination plant in Israel, called Sorek Desalination Plant, is able to process 624,



000 cubic meter of seawater using RO every day, supplying Israel with over 20% of the population's potable water needs. The production cost of water is around US$0.64 (HKD$5.0) per cubic meter, which is lower than that in most of the desalination plants in the world. (World Bank Group, 2019).

In Hong Kong, the Water Supply Department (WSD) has introduced Tseung Kwan O Desalination Plant Project (TKODP) with the use of reverse osmosis (RO) as a viable technology to produce potable water to prepare for the upcoming challenges. The initial capacity is 135 million cubic per day, which is equivalent to about 5% of the annual fresh water consumption in Hong Kong. The plant can be further extended to double its capacity in the future. (WSD, n.d.). The estimated cost of water production distribution and customer services costs before and after extension are $13 and $10 per cubic metre respectively.

### Desalination Plant Design

Desalination requires energy and maintenance of membrane elements. According to table 2, the cost of energy and filter and membrane replacement in a desalination plant typically accounts for 55% and 11% of the total operation and maintenance (O&M) cost, respectively (WateReuse, 2012). This section will share the insights from Israel on how to lower the energy and maintenance cost in the plant design perspective.

Pressure Center
Sorek Desalination Plant adopts a pressure center design that allows flexibility to increase and decrease production together with high efficiency and low cost. The center consists of the RO membrane segment, high pressure (HP) pumping and energy recovery system. The HP pumps feed HP seawater to a common manifold which in turn feed to a bank of RO membranes. After desalination, the energy recovery system collects pressurized brine from the RO banks and transfers the energy to seawater. The pressurized seawater is fed into the common feed line to the RO banks. This pressure system design has two benefits. It enables selection of a minimal number of HP pumps working at the highest efficiency rates and best operation conditions, and also allows continuous running of all of the RO banks during decrease in production by decreasing the feed pressure to the RO trains. If Hong Kong needs to build large-scale desalination plant in the future, the design approach can be considered to increase flexibility and reduce energy cost.



| Cost Item | Parameter | % of total O&M cost |
|---|---|---|
| Maintenance | Instruments | |
| | Pump upkeep | |
| | Facility upkeep including intake pipeline pigging | 6% |
| | Minor equipment replacement | |
| | Video/CCTV intake/wells and associated cleaning | |
| Legal/ Permitting | Environmental monitoring | 2% |
| | Permit compliance | |
| Operations | Labor | 6% |
| | Sludge and solids waste disposal; Bar rack and band screen solids waste disposal | 4% |
| | Cartridge filters and RO membrane replacements | 11% |
| | Energy | 55% |
| | Chemicals | 6% |
| | Other related | 10% |

Table 2: Operation and Maintenance Cost Breakdown for Desalination Plant (WateReuse, 2012)

### Large Membrane Diameter

Other feature of Sorek Desalination Plant is the use of 16-inch membrane elements in a vertical array. Comparing to the typical horizontal arrays of standard 8-inch membrane, the 16-inch membrane has a larger effective membrane area and water production capacity, resulting in a smaller plant footprint. With a reduction in the number of membrane elements required, the number of connections and piping and thus the capital investment can be reduced. A larger membrane also results in a higher feed water flow, which can lower the tendency for membrane fouling and reduce maintenance cost.

### 🏢 Construction Innovation

Construction Industry is a traditional industry with huge work force and long processing time. To enhance the working efficiency, the industry aims to transform the process into automatization and digitization with innovative solutions.

The concept of transformation is to monitor each step of construction works continuously and make correct decisions. The system shall be able to collect data from different disciplines and perform group analysis which provides an action plan to cover the overall needs. One important element contributing to this is Internet of Things (IoT). IoT is a platform collecting all designated database and transferring to server/ clouds for analysis and then providing feedbacks to corresponding system to action. Operators can obtain real-time information and change the settings remotely. Since the structure is modular design, it brings flexibilities for operators to customize their options. It also welcomes the non-construction related technologies developer to introduce their inventions, which opens a new business opportunity and market. This also provides incentives for construction companies to develop their own innovation ideas and turn into their assets. As such, a new ecosystem is created to expand business diversity and bring the whole industry to the next level. As this trend is growing globally, both Hong Kong and Israel are

### Multiple Energy Sources

The Sorek plant has two energy sources to minimize the cost of energy and increase reliability. It primarily uses natural gas to generate energy in a self-generating energy supply system, while consumes less expensive electricity during the off-peak time via a 161kV overhead line. By the combined use of natural gas and electricity, the overall water production cost can be reduced. As Hong Kong is exploring the introduction of differential electricity pricing in peak and off-peak period, the use of multiple energy sources might be

establishing the innovation development plan to catch up with the local needs.

In Hong Kong, Development Bureau is working with Construction Industry Council (CIC) and providing "Construction Innovation and Technology Fund" (CITF) to encourage wider adoption of innovative construction methods and technologies to boost productivity and nurture practitioners and students to embrace new technologies. Contractors, academic institutions and small and medium enterprises (SME) are all welcomed to participate. The program was launched in late 2018 and over 200 projects were approved in the first 6 months. One of the examples is Gammon Construction Limited, which has actively participated on advanced construction technologies. They invested in robotics, AI and other smart technologies and successfully applied to construction site, which has proven that man power and working time are highly reduced. They also turn into a startup company to provide advanced technology solutions to other industry practitioners (CITF, n.d.).





### △ Examples of Construction Innovation in Hong Kong

#### Integrated Digital Project Delivery (IDPD)

IDPD has been recently introduced in Hong Kong. It is also currently being practiced in Singapore, the UK, Finland and Sweden, where it is known as integrated digital delivery. The digital tools underlying IDPD – Building Information Modelling (BIM), laser and drone data clouds, communication platforms, IoT sensor output, etc. are already in use in the local construction industry. IDPD ties all of these tools together to achieve greater efficiencies in construction as well as increased communication and collaboration. It is an approach for managing construction projects that fully integrates processes and people over the entire course of a project, from the initial planning and design stages through to facilities management.

The backbone of IDPD is BIM, which enables us to plan for a project more efficiently, track its progress and share information with clients up to the end of construction. The BIM model is then handed over as a digital asset – rather than a paper one – to the client for managing and maintaining the finished project.

#### Case Study - IDPD and the Lyric Theatre Complex

One of the most compelling examples of IDPD in action is the HK$1.5 billion contract for the Lyric Theatre Complex and Extended Basement of the West Kowloon Cultural District (WKCD) development, a world-class cultural center on the Hong Kong waterfront.

BIM, DfMA, 3D scanning and printing, drones, sensors and more, all integrated under the IDPD approach to construction. BIM model acts as the key to find problems with the design such as clashes and record the as-built situation. Using the BIM Model, a 3D model which contains all the critical elements of the project and sits on a table at every meeting which help subcontractors to visualize the whole project.

### △ Challenges and Solutions

#### Hong Kong

There are several challenges hindering the application of innovation technology in construction industry in Hong Kong. Hong Kong has insufficient technology know-how in different levels of construction parties, including the management and draftsmen, to implement BIM as an important step to digitalize the physical and functional characteristics of a building. The subcontractors have low incentive to adopt or learn new technology as innovation might not bring cost benefits to them. The regulatory bodies also have reservation on the new trials and unproven technology, which make the approval of innovation technology conservative. These factors slow down the development of construction technology development in Hong Kong.

#### Israel

The construction innovation ecosystem in Israel is shown in figure 7, which can be divided into threefold. Firstly, to build an ecosystem through industry events, demonstration, round table etc. to form the ecosystem, gather all stakeholders in the system and enhance the coordination between them. Secondly, to invest in potential construction technology through incubation programs. Last but not least, to cooperate with industry partner: the developer, construction equipment provider and the material provider.



DEAR PAST, THANKS FOR ALL THE LESSONS.
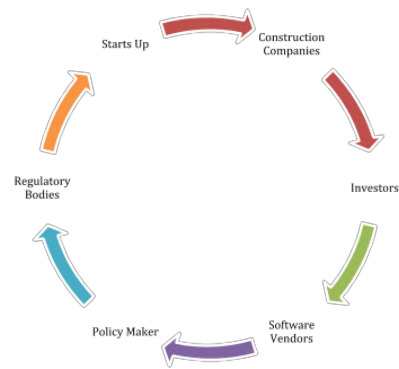
DEAR FUTURE, I AM READY.

Figure 7: Construction Innovation Ecosystem in Israel

Similar to Hong Kong, Israel also faces problems in convincing regulatory bodies and sub-contractors to apply construction innovation due to high risk and low cost incentives. Although Israel has many startup companies, the companies do not know how their technology can be applied in the construction sites. The introduction of new technology relies heavily on young generation and it takes a long time to for the contractors to adopt the innovation.

To drive construction innovation, Israel has launched an innovation management system called Innovation360, where the construction companies can present the pains and challenges to the startups. The startups can thus identify the gap, build bridges between themselves and the construction companies and apply their technology to improve construction activities. The government also requires contractors to apply BIM in government projects and provides incentives of 15 million to encourage application of new technology in construction industry. These practices could be considered to apply in Hong Kong to boost construction innovation.

### ⚠ Case study - ECOncrete

Case study - Econcrete
ECOncrete brings concrete infrastructure to life by a unique combination of propriety bio-enhancing concrete admixtures, complex surface textures and innovative science-based designs, while improving structural performance. The products are tailored to encourage growth of flora and fauna, which provides valuable Bio-protection. Be it oysters and corals that physically protect the concrete from scour and chloride attacks, or plant canopy capable of buffering temperature changes and humidity level on the concrete surface. Apart from the highly valuable ecological and structural advantages, bio-protection also provides economic advantages associated with increased stability and longevity, as well as a reduction in maintenance cost.

ECOncrete has successfully convinced the regulatory bodies and applied in many countries including Israel. Technically, the technology was developed based on strong academic research by marine biologists. To identify ways to apply the technology in the local context, the company cooperated with local universities to conduct research and found partners such as companies offering technical help, reliable material supply and logistics. Mock-up performance checking was conducted to demonstrate that the products are applicable and of satisfactory performance. To convince the regulator, laboratory and field tests were conducted to prove the feasibility of the technology.

### 🧱 Logistics and Transportation

The use of information technology in logistics and transportation is a current trend to enhance transport facilities and efficiency. It includes continuously implementing new information management system, consolidating Hong Kong's position as a regional logistics hub, embracing new technologies and promoting automation. Therefore, our infrastructure has to be improved to successfully grab the opportunities brought by this trend. More logistics facilities, greater transportation network and adopting digitalization become part of the requirements.

### ⚠ Technological Trend

Over the past decades, the logistics industry has evolved from an offline, archaic industry to an online, modern innovative industry. E-commerce in Hong Kong has received a continuous growth in sales and market share, the number of online shoppers is expected to grow from 3.6 million in 2015 to 5.3 million in 2021 as displayed in figure 9 (Statista, 2018).



Figure 9: Number of online shoppers in Hong Kong (Statista, 2018).

Companies need to be better equipped to handle the changing business pattern with high volume of transactions placed over the Internet and extra demand on customized service. Referring to figure 10, 37% of consumers faces challenges in potential discrepancy of the size and color and 34% of consumers with insufficient product information (Statista, 2018).



Figure 10: Key challenges of online shopping in Hong Kong as of October 2018 (Statista, 2018).

### ⚠ Development in Hong Kong and Israel

With the ever-changing business demands, the industry has to tackle hundreds of new challenges leveraging the latest modern infrastructure with revolutionary technology solutions such as, robotics, IoT and big data analytics. At the age of automation, the traditional operation model has been transformed by latest logistics infrastructure.

Robotics solutions were implemented to mimic and reduce the reliance on manual labor involved in warehouse operation.

Local e-commerce retailers, HKTVmall, has leaded the first large scale warehouse automation implementation in Hong Kong to reduce the picking inaccuracy and inefficiencies in their warehouses. In the fourth quarter of 2017, a robotics system has been introduced into their facility in Tsing Yi to tackle the bottleneck in fulfilment process. The

system could autonomously track and transport goods from storage to cut down on the time lag of humans searching the warehouse floor in fulfilling orders. By implementing such technology into the warehouse, HKTVmall was able to triple its order handling capacity, while achieving 1/3 of headcount saving (HKTVmall, 2019).

In Israel, startups like Commonsense Robotics is building a network of automated Micro-Fulfillment Centers in dense urban areas that combine the speed of local delivery with the efficiencies and economics of automated fulfillment and re-defining the way of goods are delivered to online customers within cities.

The system could be accommodated in basements or underutilized spaces in urban areas with high density storage. Each fulfillment center is only staffed by a handful of employees and a few hundred robots. Making use of artificial intelligence algorithms to manage the inventories and learn from patterns of customer orders, it could reduce operational costs and provide operational scalability.

Researchers in the industry have also been developing more sophisticated robot arms that could theoretically do the job of item picking on par with the speed of a human worker, by using machine learning to recognize and handle thousands of items soon.

Apart from the physical flow of goods, advanced IoT and network infrastructure brings possibilities in the management of logistics information to meet the requirements of consumers. The cost of processing documents and information is estimated to be double of the actual cost of transportation, therefore innovative ideas were generated to smoothen the information flow. Behind the automated fulfillment system of

HKTVmall, it is also supported by a well-established infrastructure including online platform and associated database with data gathered from sensors and web-based/ mobile based applications. The use of data and predictive analytics was developed to study consumers' past shopping behavior, stock availability, system performance, etc. The information helps to digitalize the process and tackle logistics challenges, providing online delivery tracking, big data analysis to study customer behavior for products promotion, personalized service and picking assignment.

The Israeli start up, Loginno proposed a way to enable simple Shipping Container IoT infrastructure to support the information exchange along supply chain. The unique solution is to convert normal containers into smart IoT containers with a small tag with functions include shipping containers tracking and cargo conditions monitoring. It provides the supply chain with blockchain based real time data exchange and software applications, which enables logistics digital transformation in enterprises and increases transparency between the dealers and customers (Aflalo, 2019).

From the experience in both Hong Kong and Israel, industry looks for new infrastructure with flexibility and cause the least impact on top of existing facilities. Companies like Commonsense and Loginno bring infrastructure convenience with plug-to-use robotics and IoT devices. Their products also tend to improve the information management with Big Data and A.I. technology utilizing the underlying infrastructure. Industry in Hong Kong could make reference to these business models in applying information technology on existing infrastructure with an appropriate way for local industry.







**References**

Aflalo, A. (2019). *Visit to Loginno Logistic Innovation Limited*. Overseas Delegation 2019 to Israel by Young Members Committee of the Hong Kong Institution of Engineers.

Chan, T. Y. (2018). *OD2019: Technical Seminar on Tseung Kwan O Desalination Plant*. Seminar presented in the Hong Kong Institution of Engineers.

Construction Innovation and Technology Fund. (n.d.). *CTIF Background*. Retrieved from: http://www.citf.cic.hk/en/?route=background.

Frenkel, E. (2017). *WATEC ISRAEL 2017*. Retrieved from: https://embassies.gov.il/holysee/Documents/Israel%20water%20-%20Watec%20slides%20-%20Europe%20Tour.pdf.

HKTVmall. (2019). *OD2019: Technical Visit to HKTVmall's Robotic and Automated Pick & Pack System*. Visit to HKTVmall's Robotic and Automated Pick & Pack System by the Young Members Committee of the Hong Kong Institution of Engineers.

Reuters. (2018). *Global Water Desalination Market 2018-2025 Current Trends, Demand, Consumption Analysis, Key Insights, Business Overview and Future Growth Opportunity*. Retrieved from: https://www.reuters.com/brandfeatures/venture-capital/article?id=48863

Statista. (2018). *eCommerce - Hong Kong*. Retrieved from: https://www.statista.com/outlook/243/118/ecommerce/hong-kong.

Statista. (2018). *Main challenges regarding online shopping in Hong Kong 2018*. Retrieved from: https://www.statista.com/statistics/990309/hong-kong-key-challenges-of-online-buying/.

WaterReuse. (2012). *Seawater Desalination Costs White Paper*. Retrieved from: https://watereuse.org/wp-content/uploads/2015/10/WateReuse_Desal_Cost_White_Paper.pdf.

Water Supply Department. (2018). *Annual Report 2017/10 – Enhancing Water Security for a Better Future*. Retrieved from: https://www.wsd.gov.hk/filemanager/common/annual_report/2017_18/common/pdf/wsd_annual_report2017-2018.pdf.

Water Supply Department. (2018). *Desalination*. Retrieved from: https://www.wsd.gov.hk/en/core-businesses/total-water-management-strategy/desalination/index.html.

World Bank Group. (2019). *The Role of Desalination in an Increasingly Water-Scarce World*. Retrieved from: https://openknowledge.worldbank.org/bitstream/handle/10986/31416/W18059.pdf?sequence=5&isAllowed=y.

## Investment

Promoting innovation and technology development is not a simple task. It requires education and training to nurture talent, research and studies to create new ideas or improve solutions and R&D to develop products and apply the technology in the market. Therefore, different parties, including the government, universities and the industry, should collaborate together to create a strong startup ecosystem to boost innovation development.

A startup ecosystem involves a number of components, including government support, private investment, technology transfer, education and mindset as shown in figure 11 below. This section will introduce the startup ecosystem in Hong Kong and Israel with focus on the current situation of funding and support of the government, followed by the insights from Israel on how to create a strong ecosystem in Hong Kong.
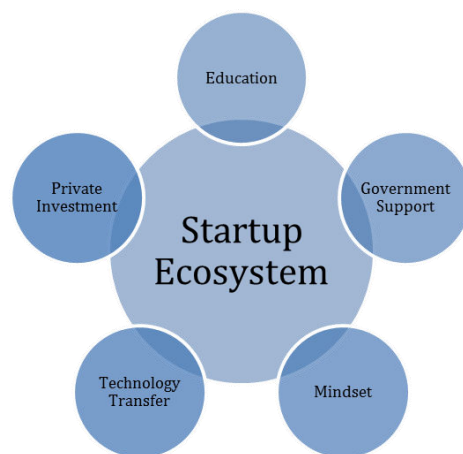


Figure 11 Startup Ecosystem

### Government Support

#### Funding
Hong Kong's government lags behind in R&D spending when compared to its regional peers and other developed countries. As shown in figure X below, the government spending on R&D activities only accounted for 0.4% of the GDP (Our Hong Kong Foundation, 2015).



Government R&D Spending as a Percentage of GDP
(Our Hong Kong Foundation, 2015)

#### Support to R&D Activities
##### - Hong Kong
Innovation and Technology Commission was established in 2000 and is responsible for policy matters on the development of innovation and information technology. As of 30 April 2019, the Innovation and Technology Fund has approved 10,186 projects and funded a total of HKD$16,607 million to support innovation and technology activities.

In 2018, the Inland Revenue (Amendment) (No. 3) Bill 2018 on tax reduction on R&D was passed. The expenditures of qualified R&D activities are eligible for 100%-300% enhanced tax reduction. This could encourage more R&D investment from private sector and reverse the ratio of public to private sector R&D investment to private-led (Innovation and Technology Commission, 2018).

##### - Israel
Innovation Authority is responsible for implementing the government policy to encourage and support industrial R&D in Israel. It provides a variety of support programmes. In 2018, it operated a yearly budget of about HKD$660 million ($300 million NIS) and funded 290 projects. The programmes helped Israel to break a new ground as hub for hi-tech entrepreneurship and to advance Israeli innovation, expanding its influence on the Israeli economy.

Angels Law, which allows angel investors to claim a deduction in taxation for investments, is implemented in Israel. It offers significant tax incentives to angel investors in Israeli start-up companies, in order to increase growth in the economy, as well as to encourage investments and supports to start-ups. The Law allows an individual to purchase up to HKD$10.9 million ($5 million NIS) of original-issue shares of a qualified Israeli R&D Company as an investment to support that company. The individual can then defer tax on up to HKD$10.9 million of income and pay the tax up to three years later at the capital gain rate of 25%.

#### Attraction and Cultivation of Talent
##### - Hong Kong
The Innovation and Technology Commission has established a number of schemes to attract and nurture talents. Under the Technology Talent Admission Scheme, the eligible technology companies or institutes can have a fast-track arrangement on employment visa to admit overseas and Mainland technology talent. The Commission also established Technology Talent Scheme in 2018 to foster R&D and reindustrialization development. Under the Postdoctoral Hub programme, the recipients of the Innovation & Technology Fund and innovation and technology tenants of the Hong Kong Science &



Technology Parks Corporation and the Hong Kong Cyberport Management Company can apply for a monthly allowance of HKD$32,000 per person for recruiting a maximum of 2 postdoctoral talents to support their R&D activities. The scheme also includes the Reindustrialisation and Technology Training Programme, which subsidies local companies on a 2:1 matching basis to train their staff in advanced technology related to "Industry 4.0" (Innovation and Technology Commission, 2018).

##### - Israel
Israel established the Back to Tech Program to help experienced Israeli high-tech employees who have accumulated knowledge and experience return from abroad to work in Israel, by finding employment through its database of companies and job opportunities that are tailored specifically for returning high-tech professionals. The program attracts ~500 tech professionals return to Israel every year.

In 2018, the Israeli Government also set up a special arrangement for obtaining a special tech visa for tech companies recognized by the Innovation Authority, which attracted more than 120 foreign experts in work in Israeli R&D field. (Israel Innovation Authority, 2019)

#### Start-up Incubators
##### - Hong Kong
Innovation and Technology Bureau (ITB) is set up to enhance support for nurturing talent and fostering development of innovation and technology to ensure a sustainable development in high-end manufacturing industry. There are 6 Incubation and acceleration programmes under ITB, notably the Cyberport Incubation Programme and Incubation Programmes by Hong Kong Science and Technology Parks Corporation (HKSTP). For instance, according to Expense Budget 2018/2019 (Mok, 2019), the Cyberport Incubation Programme received 677 applications and approved 108 start-ups, 16.7% of the received applications. 72% of those companies remained in the markets after three years. For HKSTPC, 78% of the startups which participated in HKSTPC's

program are still in business while four of them has launched IPOs. (HKSTPC, 2019).

The Cyberport Incubation Programme aims to support start-ups with resources to accelerate their growth. Incubates with business plan for a digital tech related product / service solutions to be ready for market in 12 to 18 months can be offered up to HK$500,000 financial assistance at different stages of their activities. They are free to use the facilities in Cyberport such as shared meeting rooms, conference rooms and co-working spaces.

Financial aid of maximum of HK$860,000 can be provided with help in strategic partners, investors and network establishment to incubatees. Promotion opportunities such as exhibitions, product launches, press releases and media interviews can also be offered to incubatees to bring their products and services out of the HKSTP to market.

The HKSTP's Incubation Programme aims to provide start-ups of electronics, green technology, ICT, material engineering and biomedical engineering streams support when working on business innovation during their inception stages.

- Israel
The establishment of the Innovation Authority aims to support technological enterprises in initial stages and assists in product development, raising initial capital and advancing to sales. This governing body also acts as a guardian to strengthen the Israeli technological entrepreneurial ecosystem, especially in emerging fields. There are 19 technology incubators operated throughout the country, 12 of which supported life science companies. Notable programme in Israel include Tnufa, Incubators Incentive Program, Early Stage Companies Incentive Program, Innovation Labs Program, which make Israel's hi-tech entrepreneurship world-renowned (Israel Innovation Authority, 2019). The success rate of incubators is around 30% of the companies to that graduate the incubators are active at least ten years after graduation. (Wylie, 2011)

### Training Support Programme

**Hong Kong**
To boost work power, maintain talent competitiveness and promote continuous education, Kong Hong government provided Continuing Education Fund and set up various vocational training institutions, such as Institute of Professional Education and Knowledge (PEAK) and Vocational Training Council (VTC), to train up its citizens and equip them with useful skills in workspace.

**Israel**
Israeli government has always believed that investment in human capitals fosters the development in R&D. The government hence focuses a lot in providing training support across different disciplines and professions as required by industries. For instance, an elite extra-academic training, coding boot-camps, is designed to train or retrain highly skilled individuals.

### Conclusion
It could be seen that the government of both Hong Kong and Israel have taken a number of initiatives to comprehensively support the startup ecosystem, including funding, talent schemes, incubation of startups and training support. To further promote innovation and technology development, Hong Kong can consider increasing its budget in R&D activities to catch up the pace of the countries around Hong Kong.

### ⚠ Private Investment

Other than funding from government, private investment is also an important source of funding for early stage companies and startups. This sub-section will share the important elements of venture capitals to support startups with reference to Israeli striving startup ecosystem.

Friendly Venture Capital Ecosystem
Venture capitals in Israel are not actually competing with one another. They work together and are happy to meet and share information with each other.

Comprehensive Support
The venture capitals not only provide funding to satisfy a startup company's budgetary needs, but also help the company to link up to the market, find strategic partners, hire the right employee, monitor the company's growth, etc.

Multiple Investment
Investing in startup companies is risky. If a company fails, all money will be lost. A venture capital normally invests in more than 10 companies and gain revenues from 2-3 of companies to make profits.

Government support
The Israel government launched the Yozma program in 1993. The program attracted investors to Israel by waived double taxation on foreign venture-capital investments in Israel and the government raise the matching fund amount to almost double. The successes of Yozma fund is shown from the expansion of the industry. The spending in VC rose from $58 million to $3.3 billion. This capital initiative leverages public money to attract private investment and boost the high-tech development and R&D industry (Gilder, 2016).

### ⚠ Education

Education plays a critical role to cultivate talents. Mandatory service in Israel Defense Force (IDF) provides leadership training and help build up different essential skills. It also acts as a strong social network among Israelis. After intensive training, strong bond in groups are built since trainees share same belief and experience. The connection is vital for business development as people would involve in different career fields and an entrepreneurial networking is formed, so different assistance and supports could be provided at a fast response rate.

The training in IDF not only helps develop an entrepreneurial network but also fosters a spirit to Israeli to take their ideas into action - to engage in entrepreneurship and start a startup, a thought that they are imperceptibly influenced by education. Instead of learning in classrooms and spending most of the time preparing examinations, students in Israel develop critical thinking through questioning. Meanwhile, STEM (Science, Technology, Engineering and Mathematics) education was implemented to enhance students the ability to think critically.

### ⚠ Technology Transfer

Commercialisation is the process converting extraordinary innovations or research results into commercial solutions for startups that suits the market needs. A few common challenges which startups might usually face during commercialisation process is that the prototype produced may not be ready for mass production or market launch due to different reasons such as incomplete product optimisation (HKTDC Research, 2017). With the assistance of technology transfer company, those innovations can be transformed into products more readily,

achieving the best cost/performance ratio and generate profit to sustain the business.

In Hong Kong and Israel, there are similar supporting units which perform the function in assisting commercialisation. For example, the HKUST Technology Transfer Center in Hong Kong and Yissum, the technology transfer company of the Hebrew University of Jerusalem in Israel, are set up to serve as a bridge between research community and business sector, identifying collaboration and investment opportunities in the local, regional and international market (TTC, 2019). These technology transfer company help researchers with any supports they need for start-ups, such as getting intellectual property (IP) right and provide connection to venture capital companies.

With China's Belt and Road Initiatives, there is a good opportunity for Hong Kong technology transfer companies to showcase the strength of Hong Kong innovation and technology sectors as well as bridging up investors in China and other Belt and Road Countries for investing Hong Kong's startups.

### ⚠ Mindset

The two mindsets of Israelis, okay to fail and flat hierarchy, are the key elements in a startup ecosystem. Israelis treat failure as the opportunity to learn from mistakes and make improvement. They constructively use their experience to try



again and believe failure is an important step to achieve true innovation. Flat hierarchy enables open communication and debates. Everyone is free to share views and propose innovative ideas to find the best solution. Besides, flat hierarchy increases the productivity of each employee as all of them are self-organized and self-directed. Each employee has a certain level of freedom and autonomy to do what they think is right. This also enhances the innovative ideas reporting from bottom to the upper line of communication.

### ⚠ Impact Investment

As Hong Kong is an international financial hub that retail, finance, banking and business services industries have already contributed to more than half the GDP (Census and Statistics Department, 2019). Investors and businessmen would usually be keen to look for capital investment opportunities with desirable returns. While alongside with a financial return, positive social and environmental impacts shall also be achieved during investment. This is the concept of impact investment, which aims to invest for a more sustainable future. Israeli companies have also invested internationally to seek for impact investment. For example, the Israeli company IDE has built several desalination plants in India to deliver more stable fresh water supply to Indian residents. While Hong Kong companies, investors and government could also try to influence the rest of the world by adopting the concept of impact investment.

**References**

Census and Statistics Department, HKSAR. (2019). *Table 036 : Gross Domestic Product (GDP) by major economic activity - percentage contribution to GDP at basic prices.* Retrieved from: https://www.censtatd.gov.hk/hkstat/sub/sp250.jsp?tableID=036&ID=0&productType=8

Census and Statistics Department, HKSAR. (2019). *Table 207 : Research and Development (R&D) Expenditure by Performing Sector.* Retrieved from: https://www.censtatd.gov.hk/hkstat/sub/sp120.jsp?tableID=207ID=0&productType=8

Hong Kong Business (2018). *FINANCIAL INSIGHT: Venture capital.* Retrieved from: https://hongkongbusiness.hk/sites/default/files/hongkongbusiness/print/HKB_2018_JUNJULY-16-18.pdf

HKTDC Research. (2017). *The Challenges Facing Hong Kong Start-ups: Commercialisation.* Retrieved from: http://economists-pick-research.hktdc.com/business-news/article/Research-Articles/The-Challenges-Facing-Hong-Kong-Start-ups-Commercialisation/rp/en/1/1X000000/1X0AB1DK.htm

Innovation and Technology Commission. (2018). *Enhanced tax deduction for R&D Expenditures* Retrieved from: https://www.itc.gov.hk/en/idri/index.htm

Innovation and Technology Commission. (2018). *Technology Talent Scheme - Reindustrialisation and Technology Training Programme* Retrieved from: https://www.itf.gov.hk/l-eng/TTS-RTTP.asp

Lee, G. (2018). *Dearth of venture capital a hurdle for Hong Kong start-ups.* South China Morning Post. Retrieved from: https://www.scmp.com/business/article/2148135/dearth-early-stage-venture-capital-could-hurt-hong-kong-start-ups-say.

Innovation and Technology Bureau, HKSAR. (2019). *Start-ups, 2019.* Retrieved from: https://www.itb.gov.hk/en/i_and_t_support/support_start_ups.html.

Israel Innovation Authority. (2019). *2018-2019 Innovation in Israel overview.* Retrieved from: https://innovationisrael.org.il/en/sites/default/files/2018-19_Innovation_Report.pdf.

OECD (2016). *Release of Main Science and Technology Indicators - Latest estimates of R&D investment in OECD and major economies.* Retrieved from: https://www.oecd.org/sti/DataBrief_MSTI_2018.pdf.

HKUST Technology Transfer Center. (2019). *HKUST Technology Transfer Center.* Retrieved from: https://ttc.ust.hk/index.php?p=3&sp=11

World Bank Group. (2019). *Doing Business 2019 Economy Profile.* Retrieved from: https://www.doingbusiness.org/content/dam/doingBusiness/country/s/spain/ESP.pdf

Department of Jobs, Enterprise, and Innovation, (2014). *National Policy Statement on Entrepreneurship in Ireland 2014.* Retrieved from: https://www.localenterprise.ie/Documents-and-Publications/Entrepreneurship-in-Ireland-2014.pdf

# Conclusion

Innovation, infrastructure and investment are inseparable issues for economic and social development. To address the challenges brought by technological explosion and globalisation, Hong Kong needs to enhance its competitiveness in the innovation capability and diversify its economy. To nurture R&D talents and entrepreneurs, universities can provide more practical and soft skills training to bridge the gap between academia and the industry and equip youngsters with leadership and problem solving skills that are essential for entrepreneurship. To leverage research findings and reduce R&D cost, companies can open up their innovation process beyond company boundaries to import, export and collaboratively develop technology. To achieve reindustrialisation, manufacturers can adopt the concept of Industry 4.0 to enhance connection between humans and machines to optimise the manufacturing process. They can embrace the opportunities in the Greater Bay Area to gain experience and knowledge.

Innovation not only can bring economic benefits, but also new infrastructure and construction methods. The application of seawater desalination can diversify the water supply source in Hong Kong. By the use of pressure centre and large diameter membrane, the capital investment and operational cost of a desalination plant can be significantly reduced. The multiple energy sources also improve the reliability of the plant and help shave the electricity consumption peak. In the construction industry, innovation can advance the planning, progress tracking and quality of construction

work as well as the integrity of infrastructures. Yet, one of the major hurdles for construction innovation is the reluctance of regulatory body. The technology developer can prove its feasibility by cooperating with local researchers and companies and conducting laboratory and field tests. While infrastructure can capture the benefits of innovation, it also supports innovation development. With the aid of advanced information technology infrastructure such as IoT networks, the logistics industry can manage supply chain and monitor goods delivery more effectively.

Investment can help to boost innovation and infrastructure development through government support, private investment, education and technology transfer. The government helps to finance R&D activities, attract talents and provide tax incentives to encourage innovation and entrepreneurship. The venture capitals provide not only invest money into the startups, but also work collaboratively with the companies to provide comprehensive support to link up the companies to the market and find them right employees and partners. While many new ideas and technology are evolved in the universities, technology transfer companies can assist the researchers to commercialise their innovations by formulating their marketing strategies and supporting their intellectual property application. The above elements, together with the knowledge and mindset of people developed through education, form the ecosystem to drive innovation and infrastructure development.

ANNEX

**Ir Ringo S M YU**
President, The HKIE

Ir YU is a Registered Professional Engineer in Civil, Geotechnical and Structural Disciplines. He is the Founder and Managing Director of Fraser Construction Company Limited.

With over 30 years of experience working for the consultants and contractors, Ir YU is actively serving the engineering profession and the Hong Kong community in different public bodies. He is also a member of the Construction Industry Council and Engineers Registration Board. In 2016, Ir YU was awarded the Bauhinia Leadership Volunteer Award by the Agency for Volunteer Service in recognition of his outstanding contribution and achievements in volunteer service.

**Ir Dr P L YUEN**
Vice President, The HKIE

Ir Dr P L YUEN joined the Hong Kong Hospital Authority in the 90s as engineering executive looking after full range of public hospital engineering services up to present. He has an EMBA degree and incited by the 2003 SARS episode an Engineering Doctorate by researching into strengthening of the hospital ventilation for infection control. Professionally he has been devoting on many public hospital construction projects in Hong Kong for nearly 40 years, and involved in recent time the 2016 and 2018 launched two multibillion 10-year hospital construction development plans in Hong Kong.

**Ir Edwin K F CHUNG**
Vice President, The HKIE

Ir Chung is a Director of Black and Veatch (Hong Kong) Limited and now is a Chief Resident Engineer administrating a major civil engineering project. He is a Profession Engineer and Fellow Engineer in the Civil and Geotechnical Disciplines of the Hong Kong Institution of Engineers. He was the Chairman of HKIE Geotechnical Division (2012-13) and was Council Member Division (2013 to 2014). He has over 40 yrs practical experience in both public and private projects in Hong Kong, the Pearl River Delta (PRD) and the Asia Pacific.

Ir Chung is enthusiastic in professional and community services. He was member of APRSE and GERC under the Buildings Department. Member of the Real Estate and Infrastructure Committee under the General Chamber of Commerce. He is Director and Board Member of Lam Tsuen Education Development, Executive Committee member of Lam Tsuen Village Committee. Engineering Consultant to Tai Po Rural Committee and Heung Yee Kuk.

**Ir Dr Otto L T POON
BBS, OBE**
Past President, The HKIE

Ir Dr POON is a Chartered Engineer with over 50 years of E&M engineering experience. He is the Founder and Chairman of ATAL Engineering Group. Over the years, he has been participating in public services both to the community and the engineering profession. He is a Past President of the Hong Kong Institution of Engineers, a Fellow of Hong Kong Academy of Engineering Sciences, and Life President of Hong Kong Federation of Electrical and Mechanical Contractors. Presently, he serves as the Chairman of Advisory Committee of the School of Energy and Environment of City University of Hong Kong, and a Member of Advisory Committee of the Department of Electrical & Electronic Engineering of the University of Hong Kong.

**Ir Paul Y C CHAN**
Chairman, CPDC, The HKIE

Ir CHAN is the Director of Wong & Ouyang (Building Services) Ltd. He has been actively involved in HKIE activities and is currently serving as the Chairman of Continuing Professional Development Committee and the Deputy Chairman of Fire Discipline.

He was also the Council Member of HKIE, Chairman of Building Services Discipline, Building Services Division and Fire Division and a member of Accreditation Board.

Profile of Advisors

**Ir Tak TANG**
Civil Engineering
Chairman, YMC,
The HKIE

Tak obtained his Master's degree in Civil Engineering and in Public Administration from Imperial College London and the University of Hong Kong, respectively. He acquired professional qualification from professional institutes of Hong Kong and the United Kingdom. He is currently working as an engineer in the Highways Department of the Hong Kong Government and is responsible for the development of new railway lines. He has represented Hong Kong young engineers at overseas events, such as Young Engineers of the ASEAN Federation of Engineering Organisations Conference.

**Mr Thomas LAM**
Chemical Engineering
Delegation Manager

Thomas obtained his Bachelor Degree in Chemical and Environmental Engineering from the Hong Kong University of Science and Technology in 2016. He is currently working in CLP Power Hong Kong Limited, responsible for the study and overhaul of fuel and material handling systems in power plants. He is the Honorary Treasurer of the Young Members Committee in Session 2018/2019.

**Ms Tammy LO**
Building Engineering
Deputy Manager

Tammy obtained her Bachelor Degree of Engineering in Construction Engineering and Management from the City University of Hong Kong. She is now working as a Management Trainee in Chun Wo Development Holdings Limited, working on a public housing development project and is responsible for project coordination.

**Mr Calvin CHENG**
Mechanical Engineering
Secretary

Calvin obtained his Bachelor Degree in Mechanical Engineering from the University of Hong Kong in 2016. He is an Associate Consultant in Hong Kong Productivity Council. He is responsible for new projects prospection & evaluation, technical research & development (R&D) projects implementation, consultancy services provision and financial resources management.

**Ms Eileen CHENG**
Environmental Engineering
Treasurer

Eileen obtained her Bachelor Degree in Environment and Sustainable Development from the Hong Kong Polytechnic University. She is currently working as a Graduate Trainee in the ATAL Engineering Limited, and is responsible for projects related to water and solid waste treatment.

**Mr Benny CHEUNG**
Electrical Engineering
Local Liaison Officer

Benny obtained his bachelor degree in Electrical Engineering from the University of Hong Kong in 2018. He is currently working in the Hongkong Electric Co. Ltd. as a Graduate Trainee and participating orientation training in the different division including Transmission and Distribution, Generation and Project.

**Ms Rachel WU**
Mechanical Engineering
Local Liaison Officer

Rachel obtained her Bachelor Degree in Mechanical Engineering and Master Degree in Building Services Engineering from Hong Kong University of Science and Technology and University of Hong Kong respectively. She is now working in CLP Power Hong Kong Limited as an Engineer and participating in project management of substation implementations, mainly in building services provisions.

**Mr John CHAN**
Logistics and Transportation
Overseas Liaison Officer

John obtained his Bachelor's Degree in Logistics Engineering with Management from the Hong Kong Polytechnic University. He is currently working in Hong Kong Logistics Technology & Systems Limited as an Associate Consultant and mainly participated in projects of logistics consulting and planning. He is also an engineering trainee currently undertaking the HKIE "Scheme A" training. As a delegate, he aspires to enhance his global vision in the engineering field.

Profile of Delegates

**Mr Terry IU**
Civil Engineering
Overseas Liaison Officer

Terry obtained his Bachelor degree in Civil and Structural Engineering from the City University of Hong Kong. Currently, he is taking a Master Degree in Infrastructure Project Management in the University of Hong Kong. He is a graduate member of the Hong Kong Institution of Engineers and a member of Chartered Institute of Arbitrator. He works as a Graduate Engineer in Leighton Asia.

**Ms Sharon MOK**
Mechanical Engineering
Overseas Liaison Officer

Sharon obtained her Bachelor Degree in Mechanical Engineering from the University of Hong Kong. She is an Assistant Engineer in Ove Arup & Partners Hong Kong Ltd. She is now working on a project of Architectural Services Department and is responsible for technical design of the E&M services and project coordination.

**Mr Tim CHAN**
Building Engineering
Logistics Officer

Tim obtained his Bachelor Degree in Construction Engineering and Management from the City University of Hong Kong. He is currently working in Hip Hing Construction Co. Ltd as Construction Officer. As a construction officer, Tim assists project management and monitors the site progress in a commercial building project.

**Mr Mike HE**
Civil Engineering
Logistics Officer

Mike obtained his MEng Degree in Civil Engineering at Imperial College London, U.K., in 2017. He is currently working as a Graduate Engineer at AECOM. He works under the team of Aviation and Highway which has projects in Hong Kong such as Terminal 2 expansion and Tai Po Road. His duties include BD submission and Structural design. Through this delegation, Mike wants to learn Israeli people's mindset to challenge the conventions and enrich his knowledge on innovative technology on engineering application.

**Ms Cheryl HO**
Civil Engineering
Logistics Officer

Cheryl obtained her Bachelor degree in Civil Engineering in the Hong Kong Polytechnic University. She currently works in Atkins China Limited as a Graduate Engineer and engages in government feasibility study of housing developments as a Project Coordinator.

**Mr Kasey CHIU**
Mechanical Engineering
Publication Officer

Kasey obtained his Master Degree in Mechanical Engineering from University College London (UCL) and Bachelor Degree in Integrated Engineering from Cardiff University. He is currently working in MTR Corporation Limited and is responsible for providing in-house design for modifications on rolling stock fleet and technical support in different areas related to the railway system.

**Ms Sally KONG**
Mechanical Engineering
Publication Officer

Sally obtained her Bachelor Degree in Mechanical Engineering from the Hong Kong University of Science and Technology. She is currently working in Ove Arup & Partners Hong Kong Ltd. as a Graduate Engineer who is responsible for the mechanical services system design, coordination, simulation & analysis in building complex, office fit-out and hotel resort projects in East Asia.
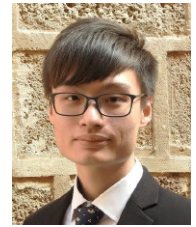
**Mr Thomas LUK**
Mechatronic Engineering
Publication Officer

Thomas is a final year student in the City University of Hong Kong and will get his graduation degree in the late 2019. He is a team member of CityU Solar Car Team and is responsible for research and development project. He is now the Honorary Treasurer of the Student Chapter, City University of Hong Kong in Session 2018/2019.

# Profile of Delegates

It's my first journey to the Middle East, a place is often portrayed as a land of mystery. I really treasure this experience as it has been a unique opportunity to understand the ancient culture and learn how the Israeli people upkeep their nation in the modern age. What struck me most is the enthusiasm and the courage of the people in trying new things. They are not afraid of failure. This requires good knowledge, careful thinking and determination. Indeed, success often comes to those who are prepared. They are also willing to re-invest their profit to their next venture. Even if they fail, they would offer valuable experience through a different position in this ecosystem. Therefore, there is a good flow of talents and capital within the industry.

I am thankful to have worked in a good team of young engineers. Together, we had lively exchanges of ideas, able to look deep into the current status of engineering in Hong Kong and arranged technical meetings to facilitate the study. This has truly been an event organised by young engineers for young engineers.

*Tak TANG*

"People often avoid making decisions out of fear of making a mistake. Actually, the failure to make decisions is one of life's biggest mistakes." – Rabbi Noah Weinberg

The first three words came to my mind when I heard of Israel is politics, conflict and Jews. After the 8-day delegation to this young yet spiritual country, another three words, inspiration, pride and heroic, leapt to my mind.

The Delegation was an eye-opening and inspiring journey to understand Israel in different perspectives. Israel is a country lack of natural resources and surrounded by unfriendly neighbours. They found different ways to strengthen their country. They emphasize on developing the most precious resources – talents. The training in Israel Defense Force trained their people to become fearless and strive for their dreams and goals. And this attitude is the key of making them known as the Start-up Nation. Giving the opportunity to visit different successful start-ups, operating infrastructure and Government departments, I was impressed the eagerness of Israeli to improve their society.

*Tammy LO*

Israel is a modern miracle. The country has converted the lack of natural resources and constant threat of wars to an advantage by relentlessly innovating, and developed a worldwide reputation as the Startup Nation in just 70 years. Through this delegation, we appreciated how the Israeli government, universities and the industry play their parts, together with practical training in the military and perseverance of Israelis, in creating a vibrant ecosystem for innovation and entrepreneurship. The insights captured in this report would be a great reference for Hong Kong to formulate our strategies to enhance innovation and technology development.

It was my great pleasure to work in a diligent and enthusiastic team of young members, who spent great effort to carry out local and overseas research, organized local seminars and visits that were open to all HKIE members and arranged a fruitful trip to Israel. This unique experience widened our horizons and boosted our passions to move Hong Kong towards a smarter and more innovative tomorrow.

*Thomas LAM*

*Calvin CHENG*

The Delegation was an eye-opening and inspiring exploration on the relatively young country by setting foot on the piece of land settled by the Jews and other populations, where mystery and sacredness co-exist. I had the answer to my several questions about Israel. Events in history had united the country under long years of pressure from its surrounding neighbours. The Israelis grew up in a locally isolated manner where they strived for a better chance of survival over decades. They were so determined that there is an R&D law to cultivate the innovation culture in the country. Funded in a bottom-up approach, the innovation ecosystem spans across very diverse industries. This provided very high degree of resilience to the country's economy by diversifying the risk and enabled the innovation ecosystem to surf pass the tsunami of financial crisis. Apart from its broadness, many start-ups in Israel go for deep technology where venture capital investors are expecting longer time for the return of investment. Some of these start-ups have grown into unicorns and are being listed on NASDAQ in the US.

Behind the breadth and depth of technology developed, I am impressed by three critical traits for the sustainable growth of the innovation ecosystem in Israel. First one is the flat hierarchy of the Israel society where anyone can get in touch with others to discuss and collaborate given that you have an interesting idea. Second one is the opportunity of real life operations where new technology can be tried out and tested, contributing to the training up professional personals. Last one is the confidence of start-ups where they always aim at exporting their services to the global market.

This Delegation is a fruitful experience that I am inspired from what I look, I see, I hear and I feel. I am very grateful to have met a group of lovely and energetic delegates who learnt and explored Israel with me.

Israelis believe that the greatest asset of the nation is their own people. Hence they emphasize on investing on their own talent through education, which makes Israel one of the world's most educated countries according to the Organization for Economic Cooperation and Development.

At the same time, startup is a high risk industry, with a high chance that most startups may fail and only few may succeed. On one hand the Israeli culture makes Israelis more resilient to failure. On the other hand the Israeli government has provided a lot of funding support and has assisted to build up a comprehensive startup ecosystem in Israel with not only startups, but also involves a large number of Venture Capitals (VC), technology transfer companies, incubators and accelerators, etc.

The delegation to Israel is a truly inspiring one as we looked into key elements for smart and innovative city through research, studies, conversations and exchange, allowing me to gain insights and experience culture that I would not have been able to obtain without this delegation. All the technical seminars and visits in both Hong Kong and Israel enable me to explore the joint effort from various sectors in the cities so that they could evolve into smart and innovative ones.

*Eileen CHENG*

Israel - a mysterious country with historical background and full of religious beliefs. This delegation makes me understand this country more and discover the vibrant and modern side of their culture and people. Walking along the seashore of Old Jaffa, you can see that harmony in the fusion of modern skyscrapers and ancient infrastructures. In Jerusalem, you can feel the peace of people from different nations and different religions together with same purpose – worshipping their lord.

When you know more about their history, you will find one important characteristic of every Israeli - fearless. When you have faced death and then overcame it, nothing can stop you from chasing your goal. This key feature drives Israel into startup nation and "Silicon Valley" of the Middle East.

*Rachel WU*

As the local liaison officer, I have the chance to contact with companies across different industries and know more about their innovation development. I found that from young startups to historic brands, they all believe that innovative solution is a way-out for making their business sustainable and enhanced. Their actions really inspire me, and I think this is a global trend of being "smart" and "sustainable".

Finally, I would like to express my gratitude to HKIE CPDC & YMC and all the delegates for all their support and making it safe and successful. It gives me a chance to widen my horizons of the engineering industry in both Hong Kong and Israel. I hope that our team's experience can bring the new vision to Hong Kong and give some inspirations to turn Hong Kong into a world-class smart and innovative city.

Israel is well known as a leading country in technology, innovation and start-up cultures. Struggling from geopolitical conflicts between neighbouring countries, Israel is often conceived as a dangerous place on earth. With the relatively short but rich history of the county, Israel successfully demonstrates its capability on the global stage with its leadership in directing the world towards a digital vibrant future.

The HKIE-YMC Overseas Delegation 2019 broadens my horizon by providing firsthand experience towards this secretive country. Within the 10 days trip, I was able to meet with people and listen to their stories which contribute to the overall success of Israel. By listening to their unique experience towards entrepreneurship, I empathize their difficult choice along their pathway towards success. Their determination and courage to undertake the uncertain are admirable. By truly believe in their work, they, Israeli citizens, create possible out of what's as long believed as impossible.
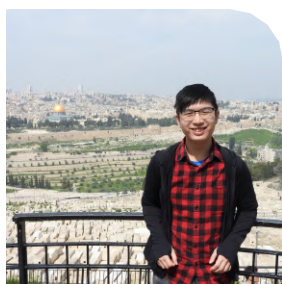
*Benny CHEUNG*

The mixture of religious culture and technological achievement provide unique insight for me to reflect upon the long debating question between the co-existence and conflict between science and religions. In Tel Aviv, it's a modern international city with a citizen from a different country. During the trip, we were even able to meet one of the citizens from Hong Kong and share her story about living in Israel. Meanwhile, Jerusalem, an hour drive from Tel Aviv, is a religious city and the origin of Christianity. It is very seldom to find such a contrast of cities within the same state. Israel demonstrates its inclusive mentality with its activities and practices.

I was very grateful to be a part of the HKIE-YMC Overseas Delegation. Besides the technical and cultural experience, I make friends and collaborate with other young engineers within this delegation from a different engineering discipline. I would like to express my gratitude towards HKIE-YMC, delegates as well as our advisors to allow the success of this year delegation.

The YMC Overseas Delegation 2019 to Israel was undoubtedly a memorable journey, where I have encountered with many nice people and stunning landscapes. Apart from technical knowledge, I have also achieved a significant gain in personal development through collaboration with teammates and different parties. These experiences would definitely broaden our horizons and enable us to become a professional engineer to create a better world.

Although this trip only last for a little over a week, I got a taste of the diversity and vibrancy of Israel. We have traveled through the historical remains and natural scenery of Israel. People with different ethnicity and religious background join hands to push this country forward. This delegation provided an engineering exposure with plentiful seminars and visits. Out of all the visit points, Loginno is my favorite one. Their vision to build an infrastructure to allow seamless information transition in logistics industry, which is called the "Contopia", is inspiring and has captured my heart. It is good to see that efforts have been put on traditional labour intensive industry to improve their operation efficiency through a small device with fast ROI and zero modification on existing infrastructure. I hope to leverage the knowledge and experience gained to contribute to the society of Hong Kong by introducing advanced technologies, especially in the logistics and transportation discipline.

*John CHAN*

It has been my pleasure to be a part of the HKIE-YMC overseas delegates. Friendship, collaboration and enthusiasm are the greatest gain for us joining this delegation. I must also show my gratitude to our advisors, delegates, Young Members Committee and everyone who have supported this delegation. Your full support and involvement are indispensable element for the success of this delegation.

The delegation to Israel was an inspirational and terrific trip. It revealed the secrets of success and unique culture of this mysterious country to me. The Israelis have demonstrated their resilience, creativity and unity through overcoming the internal and external challenges which I could hardly imagine before. Meanwhile, this beautiful country embraces diversity and freedom which are the foundation of prosperity and modernization.

During this trip, I saw how the Israelis look beyond survival and strive for excellence. I was amazed by their achievements and groundbreaking solutions. The things I learnt from them are far more than engineering. Their attitudes towards problem-solving gave me an important life lesson.

I highly recommend the delegation organised by the YMC and I am looking forward to participating in another one in the near future.

**Terry IU**

Israel, from my point of view, is an energetic, creative countries which has developed countless inventions and some of which benefits the globe and save many people's lives. For instance, capsule endoscopy technology helps the doctor to check the digestive tract without any surgery.

In this delegation, it further proved that Israelis are intelligent and brave. Owing to the historical and religious reasons, Israel is surrounded by his enemies. As to survive from those threats, Israel government established Israel Defense Force (IDF) as conscript army and involved in all the countries' major operations. IDF acts as an important training centre for Israel youngsters - they could learn different languages, programming, discipline, obedience and communication skills. Through numerous visits, seminars and workshops in Israel, we acknowledged that the IDF provided a fertile soil to enhance the growth of the Israel Start-up ecosystem.

Let me express my sincere gratitude to HKIE YMC and all of the delegates for all the supports. I am glad to be involved in such meaningful and extraordinary delegation trip which brought me to many successful start up stories. We, as the new generation of Engineers in Hong Kong, could input what we observed and learnt into our workplace, be the change in Hong Kong engineering profession.

**Tim CHAN**

Religions, historical churches and Dead Sea (For sure we had so much fun in Dead Sea with mud massages and floating to read newspapers) were all I knew about Israel. But the delegation totally changed my perception of Israel to a nation full of talents, opportunities and creativities.

Israeli made their way becoming a successful start up paradise. Rome is not built in one day, so does success. Israeli key to success is to treasure failure, which they see as a valuable experience.

In Israel, the mandatory Israel Defense Forces (IDF) training equips the youngsters with essential skills and leadership. It is the way Israeli nurture their human assets. IDF not only trains up their ability, but also forms a citizen's network. Like Hong Kong, there are only 8 million citizens in Israel. But with IDF, a great connection is built among Israeli. Even after the training they are still so close and will help each other whenever they need.

Through different visits, I am impressed how they are proud of their country, which I can truly feel from their hearts, by the way they presented their country and their identity. Thanks to all delegates I can be part of this memorable trip and got the chance to visit such an amazing nation and the people.

**Sharon MOK**

It was an incredible experience to visit a country like Israel. Like so many people, the first thing they thought about Israel is turmoil and religion. However, after visiting Israel, I found out more to this country than these topics. Under pressure from the enemy countries, and lack of natural resources, human resources become the essential resources in this country. To survive, everyone has simulated a sense of innovation, resilience, and internationalism. Israel becomes a start -up nation equivalent to the second silicon valley in the USA. I respect their courage to talk about failure and growth from the lesson they learned. I am so grateful to have the opportunity to take the trip with HKIE members.

**Mike HE**

Israel has long been a mysterious country which gives an impression of social unrest due to its unfriendly neighbours and complex affiliation of divided religions. I am curious on how Israel has turned into a brand new identity 'Start-up Nation'.

It was an interesting journey that provided us a precious opportunity to visit the successful start-up companies in Israel and share their experiences. The persistent character of Israeli and the trust between them were impressive and powerful which led Israel to a new era in my point of view. Perhaps there is no relation between the success in R&D development and the availability of talents or budgets but something to do with the trust within the community and the eagerness to improve our society.

*Cheryl HO*

Being one of the delegates to Israel with YMC and young engineers is truly a once in a lifetime experience. Israel is one of the rising Mediterranean countries with immense natural beauty, unbeatable history and amazing people. As a delegation from Hong Kong, we are pleased to have warm welcome from the professionals and the locals in Israel.

Israel, being an innovation hub, has encouraged lots of flow of creativity and imaginations. Visiting Israeli companies enables me to be closely in touch with this energetic country with tons of thought -provoking ideas and understand how start-ups can stand out from the crowds and make themselves shinning on the stage. To nurture of the innovation hub is not purely the effort by the founders but also the innovation eco-system including the government and community.

*Sally KONG*

The most impressive part of the delegation is the people we met in Israel. Israelis are passionate and they never feel sorry to fail. Nearly all the CEOs receiving our delegation mentioned that they tasted and valued failures in their start-ups journey and those experiences shaped who they are. They reminded me of a famous quote that is "failure is the mother of success". It is not difficult for us to learn the literal meaning of the quote, but we usually underestimated the power when we affirm our attitude.

Travel gives us a new perspective and diminishes the distance of the world where people can meet each other and get inspirations. Thank you, our great team, for creating a tremendous delegation experience.

"A country surrounded by enemies but home to some most high-tech starts ups?" It jumps out of my mind at first. I then wondered how this country can be named as a 'start-up nation', a young, with only around 8 million people nation, religious, in a state of war, no natural resource, become the birthplace of USB storage drive, instant messaging, navigation system, etc? Amid the development of Industry 4.0, it is really a once-in-a-lifetime experience to join this delegation trip to visit this historical land and meet some extraordinary Israeli people across different area in Innovation, Infrastructure and Investment.

In this delegation, we got some chance to visit different start-up companies, authorities and met some founders and officials. Most of them are really amazing and they have inspired us extensively. Israel is built from nothing in a land full of desserts. With their adaptability and never give up spirit, Israel has now become a flourishing, high tech society which contributes in different aspect of modern human life. They even now export technologies which are beneficial to all people around the world. Israeli people are very friendly and they always help each other. They think positively and their vibes are full of happiness. Children have leading education and government funds a lot in helping start-ups and invest a lot in technological fields. IDF military service allows teenagers to equip with necessity before they work and build a strong connection network in the whole country.

*Kasey CHIU*

To me, this delegation visit to Israel broadens my horizons and change the way I think. Every idea counts and together they make great impacts to society. Idea should not be hindered by what are lack of or how complicated it is. People should accept failures during the process as it is a path of learning. All in all, we have so much to learn from the Israeli people who use innovation to shape a better world. Thank you YMC and all members in the delegation to make it happen for all of us.

The YMC Overseas Delegation 2019 to Israel was meaningful and memorable. In this trip, I have met people of different backgrounds who were experienced in engineering as well as starting and organizing a start-up company. Unlike other Middle East countries, Israel lacks natural resources. However, due to its advanced high-tech innovation sector and comprehensive start-up ecosystem, Israel not only gains positive growth rate in economy, but also achieves a reputation of "Start-Up Nation". The thing that impressed me most is the mindset of those entrepreneurs. They are never afraid of failure, instead they see it as a lesson which allows them to identify the factors that cause the failures, and well prepare for future. One CEO said that he never hires a person without any experience in failure. From this case, there is no doubt to say that under this "common mindset", Israelis are encouraged to take risks, to try things that are outside their comfort zone, to push their limit, and finally a successful and sustainable start-up ecosystem is created. Besides that, it has been my pleasure to be one of the team members of this delegation, not only have I met new friends, but I have also gained some knowledge about the working environment in Hong Kong which is helpful for future job hunting.

*Thomas LUK*

# Acknowledgement

# Acronyms

| | |
|---|---|
| 10D | Ten dimensions |
| 3D | Three dimensions |
| 4IR | Fourth Industrial Revolution |
| 5G | The Fifth Generation |
| AEAI | The Association of Engineers, Architects and Graduates in Technological Sciences in Israel |
| AI | Artificial Intelligence |
| AI1 | All-in-one |
| BEA | The Bank of East Asia Limited |
| BIM | Building Information Modelling |
| BOT | Build, Operate, Transfer |
| CEO | Chief Executive Officer |
| CNC | Computer Numerical Control |
| Contopia | Container Utopia |
| DfMA | Design for Manufacture and Assembly |
| e4.0 | Enterprise 4.0 |
| EDGES | Enterprise Directed Research |
| ERS | Energy Recovery System |
| FDM | Fused Deposition Modelling |
| FinTech | Financial Technology |
| GDP | Gross Domestic Product |
| GPS | Global Positioning System |
| HKPC | The Hong Kong Productivity Council |
| HKU | The University of Hong Kong |
| HKUST | The Hong Kong University of Science and Technology |
| HUJI | The Hebrew University of Jerusalem |
| i4.0 | Industry 4.0 |
| IDF | Israel Defense Forces |
| IDPD | Integrated Digital Project Delivery |
| ILS | Israeli New Shekel |
| IoT | Internet of Things |
| IP | Intellectual Property |
| IPO | Initial Public Offerings |
| ITB | Innovation and Technology Bureau |
| MRI | Magnetic Resonance imaging |
| NFC | Near Field Communication |
| ORRC | Occasion Renewable Resources Company Limited |
| P2P | Person-to-person |
| PolyU | The Hong Kong Polytechnic University |
| Q&A | Questions and Answers |
| R&D | Research and Development |
| RO | Reverse Osmosis |
| SCS | Schaefer Carousel System |
| SLA | Stereolithography |
| SW | seawater |
| TASE | Tel Aviv Stock Exchange |
| TKO | Tseung Kwan O |
| TWM | Total Water Management |
| UN | United Nations |
| VC | Venture capital |
| WSD | Water Supplies Department |

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