香港特別行政區政府

創新及科技局

香港添馬添美道二號 政府總部西翼二十樓



INNOVATION AND TECHNOLOGY BUREAU

THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

20/F, West Wing, Central Government Offices, 2 Tim Mei Avenue, Tamar, Hong Kong

雷郵

香港中區立法會道1號 立法會綜合大樓 財務委員會秘書 薛鳳鳴女士

薛女士:

財務委員會 2020年5月15日會議的跟進事項

在 2020 年 5 月 15 日的會議上,議員就 FCR(2019-20)40 有 關政府設立「再工業化資助計劃」和注資香港科技園公司以發展微電 子中心的建議,要求政府當局提供補充資料。現附上有關的補充資料 以供參考。

創新及科技局局長

(張佩珊

2020年7月20日

副本送: 創新科技署署長 財經事務及庫務局局長 (經辦人:聶繼恩女士)

(經辦人:陳燕婷女士)

代行)

財務委員會 2020年5月15日會議的跟進事項

FCR(2019-20)40 號文件 補充資料

微電子中心的分項成本及經濟效益研究

香港科技園公司(「科技園公司」)將會把一座位於元朗工業 邨的舊廠房改建為微電子中心,改建後的總樓面面積為 36 180 平方 米,將採用具彈性的設計,並會配置潔淨室、危險品儲存倉庫和廢料 處理等一般多層工業大廈未能提供的專項設施。擬建的微電子中心亦 會提供共用輔助設施,例如辦公室、會議室、共用工作空間、共用產 品質量和可靠性測試分析實驗室等。微電子中心的估算造價約為 20 億元。大樓改建工程及相關費用(包括土地勘測、裝修、顧問 費、駐地盤人員費用和應急費用等)約佔估算造價的 65%,約為每 平方米 35,000 元,當中已考慮了現有建築物的結構及設施狀況、大 樓改建工程的範圍和複雜性等。其餘約 35%的估算造價會用作裝設 潔淨室、危險品儲存倉庫和廢料處理設施等專項設施、購置及安裝微 電子行業所需的專項設備(例如共用產品質量和可靠性測試分析設備 等)。

科技園公司在 2019 年 3 月委聘顧問就擬發展的微電子中心的經濟影響及可持續性發展進行評估。根據顧問的推算,微電子中心項目會創造約 420 個直接就業機會,每年能產生逾 6 億元的增加值。報告的摘要¹載於**附件**以供參考。

「再工業化資助計劃」的現金流量及其估算基礎

載列於 FCR(2019-20)40 號文件中有關「再工業化資助計 劃」2020-21 年度至 2024-25 年度的估計現金流量及其估算基礎表列 如下:

只有英文版本。

	2020-21	2021-22	2022-23	2023-24	2024-25
批出項目數目(註 1)	15	15	24	24	24
項目資助金額 (註 2) (百萬元)	225	225	360	360	360
估計現金流量 (百萬元)	30	112.5	225	307.5	360

註1: 假設「再工業化資助計劃」於2020年上半年推出。

註 2: 估計約四分之一的項目可於一年内完成,其餘為兩年項目。 每個項目獲批金額為上限 1,500 萬元。資助會於政府接納企 業提交的進度/最終項目報告及經審計帳目後,以發還款項 的方式發放。

設計及生產銅芯抗疫口罩+™項目

2019 冠狀病毒病於今年 1 月底起開始肆虐。創科局自 2 月 至 4 月,一直聯絡可重用口罩的供應商,以便評估採購可重用口罩的 可行性。惟大部分均回覆表示已停產、貨量不足、因出口限制而未能 出口,或未能提供檢測證明等。

創科局審視了研發中心早前研發的可重用口罩,認為其檢測 證明符合相關國際標準。但鑑於原材料應非常不穩定,因此,2月 至4月期間,每次研發中心確認找到原材料並估算其可生產的口罩數 量後,創新科技署才會委託對方統籌生產該等數量的口罩。

過程中,我們有定期在政府內部會議上匯報項目進度,相關 政策局及部門亦有在席。

創新及科技局 創新科技署 2020年7月

Annex

Hong Kong Science and Technology Parks

Corporation - Economic Impact Assessment and Sustainability Assessment for an Industrial Building at Fuk Wang Street in Yuen Long Industrial Estate

Executive Summary

Important Message

Important message to any person not authorized to have access to this report.

Any person who is not an addressee of this report is not authorized to have access to this report.

Our work was performed in accordance with the engagement letter dated 18 February 2019 with Hong Kong Science and Technology Parks Corporation (HKSTPC) and is subject to the terms included therein. This Executive Summary summarises the findings in relation to Economic Impact Assessment for the MEC dated 29 November 2020. This Executive Summary is intended solely for the members of the Hong Kong Legislative Council. PwC accepts no liability to any third parties.

Introduction

PricewaterhouseCoopers Limited ("PwC", "We" or "The Consultants") were commissioned by the Hong Kong Science and Technology Parks Corporation (HKSTPC, the Client), to undertake an Economic Impact Assessment (EIA) for a Microelectronics Centre ("MEC") at Fuk Wang Street in Yuen Long Industrial Estate (YLIE) ("The Study"). The Study commenced in March 2019. This paper provides an Executive Summary of such Economic Impact Assessment. For more detailed information, please refer to the full report for the "Economic Impact Assessment and Sustainability Assessment for an Industrial Building at Fuk Wang Street in Yuen Long Industrial Estate".

The Policy Context

<u>Re-Industrialisation</u>

Manufacturing is currently playing a relatively small role in the Hong Kong economy, accounting for 1.7% of its total GDP in 2017. In the past 30 years, Hong Kong has undergone a significant shift in its economic structure, resulting in the majority of the manufacturing activities migrating to the Pearl River Delta (PRD). Currently, Hong Kong mainly plays a role in the management, sale promotion and administration of the manufacturing facilities located in the Greater Bay Area (GBA).

Hong Kong's strategic location, highly reputable universities, supportive Government policies and ease of trade allows it to serve as an innovation hub for the Greater Bay Area and Mainland China more generally. Its market-focused economy and stringent intellectual property protection laws attract businesses from around the World, ranging from international market leading firms to startups.

Industry 4.0 promotes the concept of "smart factories", with the objective of promoting labour productivity; enabling countries with relatively high costs to be competitive in the Global market, especially **to produce high-value goods at low volumes**. This could be suitable for Hong Kong as it provides an opportunity to engage in the re-industrialisation process to support the diversification of the Hong Kong economy.

HKSTPC has a role in facilitating re-Industrialisation in support to the Re-Industrialisation policy of HKSARG by creating a supportive environment; providing modern manufacturing premises with support services and effectively promoting the buildup of a new and competitive manufacturing sector, based on the application of Industry 4.0 objectives.

HKSTPC plans to construct and manage specialised industrial buildings to support science, innovation, and technology industries that could bring wider benefits to Hong Kong. Following the implementation of IE 2.0 Pilot Projects (i.e. Advanced Manufacturing Centre (AMC) & Precision Manufacturing Centre (PMC)), demand in Hong Kong has been catalised, requiring more infrastructure and facilities to accommodate new manufacturing operations and upgrading existing undertakings.

Why "semiconductor"?

Based on the market review and consultations conducted by HKSTPC and PwC, it is noted that "Semiconductors" (or so called "microchips") are considered to be one of the high-potential high-tech manufacturing industries to be accommodated in Hong Kong.

Microchips are utilized by and incorporated into most technology products, from powering AI technology to running the motherboard of a laptop.

In 2018, the **global semiconductor market reached over US\$ 470 billion**, **representing a ~16% growth from the previous year**, and is expected to continue to grow. East Asia including Japan, Mainland China, South-Korea, Singapore, and Taiwan dominate in terms of production and the export of microelectronic devices and components.



Figure 1: Semiconductor sales revenue Worldwide from 1987 to 2019 (USD, bn)

Source: Statista (2019)

Within consumers of semiconductors worldwide, **China composes over half of the Global demand**. However, domestic producers only meet ~30% of the country's demand. The Chinese Government's initiative aims to stimulate production activity and help domestic producers meet ~40% demand by 2020 and ~80% demand by 2030. This will create further demand for microchips and other microelectronics to be incorporated into Chinese made semiconductors, and Hong Kong is well placed to capture this growth and benefit.

The Opportunity for Hong Kong

With a high density of world-class universities, especially with HKUST as one of the leading microelectronics research centres, Hong Kong has a strong supply of talent to develop and deploy in the microelectronics industry. However, many Hong Kong university students move to other economies such as Mainland China and Taiwan after graduation, primarily due to the lack of relevant local work opportunities.

As such, the "Re-industrialization" Policy, initiated and supported by the Government, has successfully attracted some market leading firms to relocate and expand in Hong Kong including IoT, AI, biotech, and robotics. With strong ongoing Government and local support on the R&D and robust Intellectual Property protection, Hong Kong is considered to be well equipped to support microelectronics market.

Supply and Demand for industrial floor area in Hong Kong

Over the past 40 years, Hong Kong has gradually transformed itself from a manufacturing-based economy to a leading financial centre. This economic evolution has been mirrored by new supply in the commercial facilities in urban area, with total office stock increasing by 6.3 times between 1976 to 2016, compared to growth of just 1.8 times industrial space. According to the 2018 Hong Kong Property Review, there was 16.5 million sq.m of industrial floor space at the end of 2017. Most of the flatted factories are old buildings, which were built 20 - 30 years ago, with low ceilings, inadequate lifts and loading areas and are generally not suitable for modern manufacturing.

In addition, the majority of vacant industrial units available are less than 10,000 sq.ft. As such, the proportion of this vacant units, that are appropriate for advanced and micro-electronic manufacturing, is low.

According to the "Consolidated Land Requirements and Supply Analysis" on Hong Kong 2030+, the shortage for industrial buildings will be about 5.0 million sq.m in the long term (up to 2041). As such, the Consultants consider that industrial buildings are unlikely to provide sufficient capacity for microelectronics manufacturing in the future.

Rationale for developing MEC

Following implementation of IE 2.0 Pilot Project AMC, HKSTPC has received positive market response. As such, there is demonstrated demand for the facilities in Hong Kong to accommodate new and advanced manufacturing operation, especially for the microelectronic manufacturing uses. It is, however, noted that AMC cannot serve the purpose of microelectronic manufacturing use due to the need for specialised facilities in the factory. This provides justification for the development of the proposed MEC in Hong Kong. The major special features of microelectronic manufacturing are summarized below :

• <u>Special Gas Storage:</u> "Code of Practice for the Storage and Use of Special Gases in the Micro-electronics Industry" states that internal storage or external storage of the special gas needs to be located on ground floor. The special gases are required to pipe directly from the storage to the machines. The storage should be located next to the factory. Therefore none of the current spaces, including AMC, can provide such direct piping special gas storage on the ground floor.

- <u>Waste Management:</u> Proper waste treatment is required before discharging. The waste treatment plant in microelectronics factory must be specially designed to comply with all the relevant regulations in Hong Kong.
- <u>High Demand of Electricity Power:</u> The demand of electricity power for advanced manufacturing is high. Currently, the electricity in the current supply of industrial space is only able to support office and landlord electrical loading such AC system.
- <u>Structural Consideration:</u> The development of advanced manufacturing requires additional underground works and includes the fitting of new fireman's lift, additional manholes, underground tank if necessary and strengthening of existing footing for additional loading capacity. Additional structure works may be needed to enhance the anti-vibration capability of the building in order to host high-precision equipment."

HKSTPC is considering to convert the industrial building at Fuk Wang Street for MEC to foster advanced manufacturing production in Hong Kong with a total construction cost of about HK\$ 2.0 billion. The details of the project are summarized below:

- Converting a two-story industrial building at Fuk Wang Street in Yuen Long Industrial Building offering a total Gross Floor Area (GFA) of 36,180 sq.m. The target is to complete construction works by 2021.
- 3 distinct areas are included in the MEC: 1) Office (covering Process Development), 2) Manufacturing, 3) Communal Supporting Facilities; and
- Quality control and reliability lab facility will be provided by HKSTPC to support the operation of tenants.

Based on the current and future shortage of industrial buildings and the uniqueness of facilities contained in MEC, and relatively modern capacity of the project, a 95% occupancy rate¹ is assumed when the project is fully occupied.

Economic Impact Assessment

Assessment Methodology

Theoretically, economic impacts in an EIA study will be assessed at three levels -1) the direct, 2) indirect and 3) induced impacts.

• **Direct impacts** arise through i) **the operation of tenants at the proposed building** (i.e. economic activities of the tenants at the proposed building) and ii) **operation of the proposed building per se (i.e. the management and operation of MEC by HKSTPC)**;

¹ A 5% natural vacancy rate is assumed to reflect the proposed project turnover with tenants for moving in and out.

- **Indirect impacts** arise from the expenditure of the operation of such tenants / HKSTPC on goods and services throughout the supply chain in the Hong Kong economy. Apart from wages paid to the employees of tenants / HKSTPC, there are also non-wage expenditures which are for utilities, professional services, etc. This non-wage expenditure supports the revenue of other companies in Hong Kong, supporting further value added and employment in other businesses; and
- **Induced impacts** arising from the spending of employees and beneficiaries (throughout the supply chain) on other goods and services in Hong Kong. For instance, the tenants / HKSTPC pay salaries to their employees and then these employees spend their income on goods and services, further promoting spending and job creation.

Practically, the indirect and induced impacts can be estimated via indirect and induced multipliers.

Impacts are quantified using TWO conventions:

- Value-added impacts (or "GDP"): These being the monetary economic contribution that the development will deliver to Hong Kong through **profits and salaries** being supported that would otherwise not have existed. All value added figures are presented in 2018 prices; and
- Full Time Equivalent (FTE) jobs.

Figure 2: Relationship between direct, indirect and induced value-added



Source: PwC analysis

<u> Major assumptions</u>

Employment

Direct employment refers to the number of jobs created directly by 1) the companies who are located at the proposed MEC and 2) the HKSTPC's operation of MEC per se.

Item 1 - Companies who are located at the proposed MEC

According to the consultation with the potential tenants, it is estimated that, based on the current floor area with the **occupancy rate of 95%**, **some 413 jobs will be generated** at MEC for some 20 hours per day (2.5 to 3 shifts per day).

Since the manufacturing activities at MEC should relate to larger factories with fully automated manufacturing using robotics, the overall worker density of MEC (i.e. some 150 sq.m./worker²) should be lower than that for Industrial Estates in Hong Kong (i.e. around 75 sq.m./worker³). As such, the Consultants consider that the current assumption (i.e. 413 jobs to be created) is conservative⁴ and within a reasonable range.

Item 2 – HKSTPC's operation of MEC

As discussed with HKSTPC, **3 FTE employment positions** will be hired directly by the Corporation to operate, manage and promote the proposed MEC, regardless of the occupancy rates.

Direct Value added per person

Value added is an important measure of economic impact, showing the value added generated by employment (i.e. profit and salary).

Item 1 – companies who are located at the proposed MEC

The market survey conducted in this EIA Study shows the direct value added per person for the manufacturing activities at the proposed MEC is around HK\$840,000 at 2018 prices. As compared to the annual value added per person for the Manufacturing sector of about HK\$ 400,000, the assumed direct value added per person for MEC is higher, mainly attributable to a higher automation production process adopted by the potential tenants at the proposed MEC as compared with the current manufacturing industries.

Given that the C&SD's manufacturing statistics may not reflect the type of economic activity to be undertaken at the MEC, a number of overseas science parks / industrial estates were also reviewed in order to assess the reasonableness of current value-added assumption.

We have also benchmarked the figure on value-added per person with a number of overseas science parks / Industrial estates studies. The figures of value-added per person vary greatly among different advanced countries, with the highest figure in Singapore (overall HK\$ 1 million per person), and the lowest in France (lower bound estimate of HK\$ 600,000 per person). As such, we consider that the value-added per person figure of HK\$ 840,000 in this Study falls into the range of the figures found in the international studies.

² Weighted average of the worker density for MEC is estimated at 150 sq.m. per worker based on distribution of staffs working at MEC by 1) office admin, and sale and process development (40 sq.m. per worker) and 2) manufacturing (290 sq.m. per worker)

³ Based on Hong Kong Planning Standards and Guidelines (HKPSG)

⁴ Theoretically, a higher number of worker density will generate less number of jobs



Figure 3: Overseas manufacturing VA per person (at 2018 prices)

Source: PwC based on the VA figures from C&SD and the statistic departments of advanced economies as shown above

Item 2 – HKSTPC's operation of MEC

HKSTPC expects that the direct value added per person of its staff is around HK\$ 800,000 (at 2018 prices)⁵.

Indirect and induced multiplier

Item 1 – companies which will be located at the proposed MEC

Since the proposed MEC is unique in Hong Kong, the generic Hong Kong manufacturing indirect multipliers should not be applicable to the proposed MEC project.

In light of the above, the Consultants make reference to the relevant indirect value added multipliers of the advanced economies. An indirect value-added multiplier of some 0.2 is assumed by taking the average of THREE advanced economies' multipliers as mentioned below⁶.

Table 1: The overseas relevant value added indirect multipliers (as compared to per revenue generated)

	Indirect VA
Singapore Electrical Manufacturing	0.17
UK Electrical Manufacturing	0.25
US Electrical Manufacturing	0.25
Average	0.20

Source: OECD input output table 2015

The number of indirect employments is calculated by dividing indirect value added generated by the Hong Kong average value-added per person of HK\$ 730,000.

⁵ Assuming zero profit generated by MEC to HKSTPC

⁶ Based on the consultation, the potential tenants expect that the manufacturing activities at MEC would generate a total revenue of some HK\$ 750 to 800 million (at 2018 prices) per annum to the operators once the project is fully occupied (at 95%). The indirect VA is estimated by multiplying 0.20 by HK\$ 775 million.

Item 2 – HKSTPC's operation of MEC

Apart from the three staff directly hired by the Corporation, most of the management and operation roles of the MEC will be outsourced, including property management, quality control and reliability lab, and provision of DG gas – which accounts for about 40% of total operational revenues generated by MEC to HKSTPC (or some HK\$ 45 million per annum at 2018 prices). The indirect value-added and Employment multiplier coefficients for such outsourcing business are assumed to be 0.8 (as compared to total revenue) and 1.7 (jobs per HK\$ million revenue) respectively based on the relevant sectors in Hong Kong and overseas⁷.

By making reference to the induced multipliers adopted in the relevant HKSTP economic impact assessments, induced impact is approximately equal to 12% of direct and indirect impact. The number of induced employments is calculated by dividing induced value added generated by the Hong Kong average VA per person of HK\$ 730,000.

Assessment of the economic impacts of MEC

Tables below shows the potential economic impacts arising from MEC:

- The total annual economic contribution of MEC to the Hong Kong economy (including direct, indirect and induced) is expected to be some HK\$606 million once the project is fully occupied⁸
- Total employment at the project (including direct, indirect and induced) is expected to be 795 jobs once the MEC is fully occupied
- Over 90% of total value-added would be generated by the tenants operating at MEC, while the operation of MEC per se only account for less than 10%.

Table 2: Projected value added of the MEC as a whole once the project is fully occupied at95% (\$ million, at 2018 prices)

	Value-added ("GDP")
Direct	348
Indirect	193
Induced	65
<u>Total</u>	<u>606</u>

Source: PwC Analysis

⁷ The non-wage expenditure supports the revenue of other companies in Hong Kong. So the indirect VA and employment impact for Item 2 are estimated by multiplying HK\$ 45 million by 0.8 and 1.7 respectively.

⁸ Assuming the occupancy rate of 95%

	Employment (FTE)
Direct	416
Indirect	291
Induced	88
Total	795

Table 3: Projected employment (FTE) of the MEC a whole once the project is fully occupied at 95%

Source: PwC Analysis

Apart from the above, advanced manufacturing, high-tech, research and development (R&D) can also generate external benefits to the wider economy. The high-tech and R&D Initiatives can strengthen the I&T ecosystem and research capability, build up linkages between technology companies and researchers, attract more foreign investment and talents, nurture I&T talents and start-ups, create more high value-added jobs for new entrants to the labour force, foster the development of Hong Kong as a knowledge-based economy and build a vibrant venture capital investment market.

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