

香港特別行政區政府

創新及科技局

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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

By Email

21 September 2020

Ms Anita SIT
Clerk to Finance Committee
Legislative Council Complex
1 Legislative Council Road
Central, Hong Kong

Dear Ms SIT,

**Finance Committee
Follow-up Action to the Meeting on 19 June 2020**

At the Finance Committee meeting on 19 June 2020, Members requested the Administration to provide supplementary information for the item to increase the commitment of the four Research and Development Centres (R&D Centres) funded by the Innovation and Technology Fund (ITF), i.e. the Nano and Advanced Materials Institute (NAMI), the Hong Kong Research Institute of Textiles and Apparel (HKRITA), the Automotive Platforms and Application Systems R&D Centre (APAS) and the Logistics and Supply Chain MultiTech Research and Development Centre (LSCM) (FCR(2020-21)1). The relevant supplementary information is enclosed for reference.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Sandy CHEUNG', written over a horizontal line.

(Sandy CHEUNG)

for Secretary for Innovation and Technology

c.c. Commissioner for Innovation and Technology (Attn.: Ms Kathy CHAN)
Secretary for Financial Services and the Treasury Bureau (Attn.: Ms Jessica LEE)

Finance Committee
Follow-up issues for the meeting on 19 June 2020

Paper FCR(2020-21)1
Supplementary Information

The four R&D Centres' R&D expenditures involving tax deductions claims in the 2018-19 year of assessment

In the 2018-19 year of assessment, the total R&D expenditures of the four R&D centres amounted to \$336.6 million. The amount of R&D expenditures claimed for tax deductions by enterprises in relation to their commissioning of the Nano and Advanced Materials Institute (NAMI), the Hong Kong Research Institute of Textiles and Apparel (HKRITA), the Logistics and Supply Chain MultiTech Research and Development Centre (LSCM) and the Hong Kong Productivity Council (HKPC) (including the Automotive Platforms and Application Systems R&D Centre (APAS))¹ to carry out R&D projects is about \$8 million.

Operating expenditures of the four R&D Centres in 2021-22 to 2024-25 and reasons for the increase in funding amounts requested

2. The R&D Centres have formulated their future R&D focuses and have been conducting basic research to build up their technological capabilities; identifying potential industry clients and research partners for R&D collaboration; and carrying out commercialisation and marketing activities, which include building network with the relevant stakeholders and disseminating their R&D outcomes.

3. The operating expenditures of the four R&D Centres would increase gradually in the coming few years to commensurate with the increasing number of R&D projects and commercialisation efforts. The Innovation and Technology Commission (ITC) has critically reviewed those operating expenditures (covering accommodation costs, salaries and related costs of personnel, equipment costs, costs of electricity and other utilities, etc.) and consider them generally reasonable. We expect that the effectiveness of the R&D Centres should improve, particularly when the completed R&D projects could bring about more commercialisation income.

¹ The APAS is one of the departments under the HKPC. We do not have the breakdown figure related to its tax deduction applications.

4. The total operating expenditure of the four R&D Centres is estimated to increase from about \$565.7 million in 2015-16 to 2018-19 to about \$1,078.7 million in 2021-22 to 2024-25. The detailed breakdowns and explanatory notes of the operating expenditures of the four R&D Centres have already been set out in Enclosures 2 to 5 of FCR(2020-21)1. The major reasons for the increase in the operating expenditures of the R&D Centres as compared to 2015-16 to 2018-19 are outlined below -

- NAMI – the operating expenditure of the NAMI is estimated to increase from \$246.2 million in 2015-16 to 2018-19 to \$451.4 million in 2021-22 to 2024-25, as the NAMI needs to continue to expand its operation to meet the increasing demand from the local industry for materials R&D work to be conducted by the NAMI. Such expansion includes increasing its staff establishment and setting up additional office and laboratory. In addition, as the number of R&D projects grows, the NAMI will also devote more resources to promote the commercialisation of its R&D results.
- HKRITA – the operating expenditure of the HKRITA is estimated to increase from \$132.4 million in 2015-16 to 2018-19 to \$214.3 million in 2021-22 to 2024-25. With the development of the local textile and apparel industry, the HKRITA has begun to strengthen its internal R&D capabilities in recent years, focusing on R&D work in environmental protection and high-performance textile products; and actively implemented a number of cross-disciplinary and industry-led R&D projects conducted by the HKRITA itself. As a result, the HKRITA's scale and staff establishment have expanded accordingly. In addition, the HKRITA has set up additional laboratories in the Hong Kong Science Park and the HKPC. Following the expansion of its scale in recent years, the HKRITA's operating expenditure including staff, rental and equipment expenses, etc., have also increased accordingly.
- APAS - the operating expenditure of the APAS is estimated to increase from \$68.2 million in 2015-16 to 2018-19 to \$136.2 million in 2021-22 to 2024-25. In the past, the APAS encountered many difficulties in recruiting suitable R&D talents. This has limited its development and its operating expenditure was lower than budgeted. The APAS expects more talents to join in the coming few years and more R&D projects be conducted from 2021-22. Therefore, more

working space is needed to accommodate the new staff and the rental expenses will also increase accordingly. In addition, as more and more R&D projects would be completed, the APAS will devote more resources to promote its R&D outcomes so as to foster their commercialisation.

- LSCM - the operating expenditure of the LSCM is estimated to increase from \$118.9 million in 2015-16 to 2018-19 to \$276.8 million in 2021-22 to 2024-25 due to the recruitment of more staff for better management of projects. The LSCM also needs to continue to improve and upgrade its existing systems, software, information technology equipment and office data management system to meet operational needs. In addition, the LSCM will consolidate its premises in phases, which would entail one-off non-recurrent expenditures including renovation works as well as setting up of an enhanced laboratory for R&D work and a technology showcase area.

5. The relevant tax deduction legislation was enacted in October 2018 to provide enhanced tax deductions for expenditures incurred by enterprises on 1 April 2018 and thereafter for conducting qualifying R&D activities. As the legislation has only been in force for a rather short time, coupled with the worsening of the economic environment, we expect that the effect of the measure of enhanced tax deduction for R&D expenditure in bringing additional commercialisation income to the R&D Centres would be limited. As a result, the operating expenditures of the four R&D Centres from 2021- 22 to 2024-25 still have to be supported by the ITF.

Key performance indicators of the four R&D Centres

6. The ITC has set various performance indicators for the R&D Centres to measure their work progress and performance in various aspects. The existing key performance indicators include the number of new projects commenced and the relevant project costs, the level of industry contribution, the number of on-going projects, R&D expenditure, the number of licensing agreements signed, the number of contract research/consultancy projects, and the number of researchers participating in ITF-funded R&D projects, etc. From 2017-18 onwards, we have introduced six new indicators, namely the level of industry income, the number of on-going projects involving industry participation, the number of companies participating in on-going projects, the number of organisations benefitting from the Public Sector Trial Scheme (PSTS), the

number of researcher interns engaged, and the numbers of patents filed and granted. The ITC has been closely monitoring the operation and performance of the R&D Centres. Each of the R&D Centres is required to prepare annual plans as well as quarterly and annual reports on its operation, and submit them to its board (or Business Development Committee) and the ITC for approval. We also report to the Panel on Commerce and Industry of the Legislative Council every year on the performance of the R&D Centres in the previous financial year.

7. The existing key performance indicators are comprehensive and can effectively reflect the performance of the R&D Centres in various aspects. That said, we will review at an appropriate time and consider whether we need to add new indicators or higher target levels for individual indicators are needed in the future.

HKRITA's staff expenditure

8. The number of staff of each R&D Centre comprises centre staff and project staff who conduct R&D projects. The number of centre staff of the HKRITA will increase from between 32 and 38 (actual numbers) in 2015-16 to 2018-19 to 43 (estimated number) in 2020-21, and is expected to further increase to between 45 and 50 (estimated numbers) in 2021-22 to 2024-25. From 2021-22 to 2024-25, the average annual growth rate of the HKRITA's staff expenditure is about 8.2% due to the increase in the staff establishment to support the HKRITA's continued development of its internal R&D capabilities and salary adjustments, etc.

9. The staff expenditure of the HKRITA in 2018-19 was about \$23.9 million, which was the total remuneration of 38 centre staff (excluding the remuneration of 37 project staff). The average annual salary per person was about \$620,000, including wages, employer's contribution to the Mandatory Provident Fund, staff contract gratuities, and medical insurance premiums. In the same year, the number of staff of the LSCM was 124, including 24 centre staff and 100 project staff. The staff expenditure of the LSCM in that financial year was about \$23.9 million, which was the total remuneration of 24 centre staff (excluding the remuneration of 100 project staff). The average annual salary per person was about \$990,000. Since the organisation and management structure as well as the scale and number of projects conducted varied amongst the R&D Centres, we consider that it is not suitable to directly compare their respective staff expenditures.

Usage of geron-technology products developed by HKRITA

10. Through the PSTS, the Tung Wah Group of Hospitals (TWGHs) agreed to try out the smart anti-wandering vest system jointly developed by the HKRITA, the LSCM and the Hong Kong Applied Science and Technology Research Institute. The relevant project was carried out in two phases. In the first phase, radio frequency identification (RFID) tag technology was used to produce 300 vests for trial use by the elderly in the care homes under the TWGHs, while RFID tags, 130 vests incorporating global positioning system (GPS) trackers and short-distance detection devices equipped with low energy bluetooth communication function were produced for trial use in the second phase. After completion of the PSTS project, the TWGHs was satisfied with the trial results and ordered about 600 anti-wandering vests to facilitate the taking care of the elderly in need by staff in 11 care homes.

11. In addition to the above smart anti-wandering vest system, the HKRITA has also developed the following geron-technology products which bring benefits to the elderly and their caretakers -

- Anti-strip jumpsuits – through the PSTS, the HKRITA produced 200 pieces of anti-strip jumpsuits for trial use by the TWGHs. After completion of the PSTS project, the TWGHs considered the jumpsuit effective in assisting the staff of care homes to take care of the elderly in need. Therefore, the TWGHs placed an order of 615 pieces of anti-strip jumpsuits for use at its 26 care homes.
- Novel thermal conductive textiles – a local manufacturer has already obtained the licence of the technology from the HKRITA and produced thermal insulation products which are particularly suitable for use by the elderly. 80% of the users are elderly people, and about 1 240 pieces of products are involved.
- Chitosan aprons, bedding products and handkerchiefs made by the innovative spinning system for chitosan yarn – through the PSTS, the HKRITA produced 100 sets of pillowcases, bed sheets, quilt covers and waterproof pads, 200 aprons and 200 handkerchiefs for trial use by three care homes.

Effectiveness of the research outcomes of the NAMI in eliminating/blocking the Coronavirus Disease 2019 (COVID-19)

12. The research outcomes developed by the NAMI which reach the nano-specification, their effectiveness in eliminating/blocking the COVID-19 and the relevant certifications are as follows-

- NASK nanofiber facemask – The NAMI developed the NASK as the world’s first nanofiber mask with its patented nanofiber technology. NASK has been certified to meet different international standards for achieving effective filtration against bacteria and viruses, including the N95 standard of the United States National Institute of Occupational Safety and the EN 149 FFP2 standard of the European Union (EU).

Viruses are in general smaller than bacteria. Taking the COVID-19 virus as an example, its diameter is about 120 nanometers (nm). Unlike bacteria, viruses cannot survive on their own without a host. NASK is capable of filtering 99% of sodium chloride particulate aerosol with diameter of 75 nm. The effectiveness of NASK in filtering viruses and bacteria has also passed the relevant testing (the Viral Filtration Efficiency (VFE) and Bacterial Filtration Efficiency (BFE) of NASK are both above 99.9%). Moreover, NASK has sterilisation function which can kill more than 99% of bacteria instantly. From R&D innovation, nanofiber production, facemask assembly to final product packaging, NASK is a true “made in Hong Kong” product.

- A multifunctional High-Efficiency Particulate Air (HEPA) filter (MultiHEPA) – The MultiHEPA was developed by the NAMI with its nanofiber technology, which could replace conventional HEPA-grade filter (which has to work in conjunction with multiple layers of filters for comprehensive particulate filtration, bacteria killing and volatile organic compounds removal). The MultiHEPA has already been commercialised successfully. It was awarded a Gold Medal and the King Abdulaziz University Distinguished Innovation Award at the 2018 International Exhibition of Inventions Geneva. It is also the Finalists of the 2018 R&D 100 Awards.

Meeting the EN 1822 H13 class standard of the EU, the MultiHEPA is capable of removing more than 99.97% of Di-Ethyl-Hexyl-Sebacat (DEHS) particulate aerosol which is

of the most penetrating particle size. The MultiHEPA has also passed tests adapted from the ASTM F2101 standard which were carried out by third party certification organisations, and has been proven effective in filtering viruses and bacteria (with both VFE and BFE reaching above 99.99%). Moreover, the MultiHEPA has sterilisation function which can kill more than 99.99% of bacteria. The MultiHEPA, produced in Hong Kong, can also reduce energy consumption and is a successful example of re-industrialisation in Hong Kong.

Indirect economic benefits brought about by the APAS' R&D Outcomes to Hong Kong

13. The APAS aims to assist the Hong Kong industry in entering the automotive market and expanding their businesses. The R&D outcomes of its various projects have brought about fairly considerable indirect economic benefits to Hong Kong with examples as follows -

- Bus infotainment system – the relevant Hong Kong enterprise has successfully promoted the bus infotainment system in the Mainland. The first generation of the system has already been installed in 150 cross-border buses in Hong Kong and Guangdong, with a total value of \$12 million. The enterprise is planning to install the second generation of the system in 400 Greater Bay Area cross-border buses and 100 coaches in the Sichuan Province. In view of its business development, the enterprise has already set up a media company in Hong Kong for design and market promotion, which has increased local employment opportunities.
- Advanced motorcycle electronic fuel injection system – the relevant Hong Kong enterprise has successfully sold over 30 000 units of the system in the Mainland, with total sales amounting to RMB 9 million. The enterprise plans to carry out the manufacturing, repairing, promotion and marketing operations in Hong Kong to enhance product quality, thereby creating local employment opportunities and promoting local re-industrialisation.
- Autonomous electric tractor – the APAS assisted the Airport Authority Hong Kong to test the autonomous electric tractor to increase the efficiency of the baggage and cargo conveyance service, thereby realising the Smart Airport

Blueprint. The autonomous electric tractor will mainly be used in the operation of the third runway to enhance the operational efficiency of the Hong Kong International Airport, which will bring about considerable indirect economic benefits.

- Electric car with super capacitor energy storage system – the relevant Hong Kong enterprise has acquired the super capacitor energy storage technology through the relevant R&D project by the APAS, which has facilitated its technological upgrading and enhancement of the quality of its products. As a result, the enterprise has developed as one of the world's top five super capacitor module suppliers, raising Hong Kong's leading position in the relevant technological areas and industry.
- Electric vehicle (EV) fast charging station - through the relevant R&D project by the APAS, the relevant Hong Kong enterprise has successfully cooperated with an overseas EV charging station enterprise to build a charging station equipped with a smart payment system in Hong Kong, and brought about revenue of about \$1 million. The project has fostered cooperation opportunities between Hong Kong and overseas in the area of EV technologies.
- Dual-channel fast charging system for EVs – the dual-channel fast charging station for EVs developed by the APAS has already been installed for trial use at the Hong Kong International Airport, the Water Supplies Department and the Hong Kong Housing Society so as to encourage the adoption of EVs and help build Hong Kong into a smart city.

Innovation and Technology Bureau
Innovation and Technology Commission
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