For information
On 10 February 2003

LegCo Panel on Commerce and Industry
Evaluation Framework for the Innovation and Technology Fund

Introduction

This paper informs Members of progress made in the development of a framework to evaluate the performance of completed projects funded by the Innovation and Technology Fund.

Background

2. The Innovation and Technology Fund (ITF) was officially launched on 1 November 1999. The Fund aims to finance projects that contribute to innovation or technology upgrading in industry, as well as those that contribute to the development of industry, to be undertaken by government or non-government entities.

3. There are four programmes under the Fund with different purposes, namely the Innovation and Technology Support Programme (ITSP), University-Industry Collaboration Programme (UICP), General Support Programme (GSP) and Small Entrepreneur Research Assistance Programme (SERAP). An outline of the four programmes is at **Annex A**.

4. The Administration completed a review of the ITF in early 2002 and briefed the Panel the findings and recommendations of the review vide Paper No. CB(1) 1232/01-02(03) at its meeting held on 11 March 2002. One of the recommendations is to develop a structured system to evaluate the success of the ITF projects and programmes. We undertook to report to the Panel on the details.

Project Evaluation Framework

5. In developing the project evaluation framework for the ITF, we have sought advice from external experts regarding the practice in overseas funding agencies in evaluating the performance of completed projects. The advice is that in countries, notably the United States, which

operated similar funding schemes, systematic evaluation of the performance of completed projects has not taken place. Usually, they use qualitative/anecdotal case examples to publicise the achievements of the funding schemes.

6. In the United States, they do not have any established post-project evaluation mechanism because -

(a) their emphasis is on project vetting and monitoring since all funded projects have gone through a vigorous vetting and monitoring process;

(b) a large segment of their research belongs to corporate research (corporate contribution in R&D accounts for 70 - 75% of the total R&D spending in the United States). The private sector would have to evaluate the success of individual projects in the commercial sense and the need for the Government to conduct post-project evaluation is not prominent;

(c) it is difficult to compare the performance of different projects as they cover a wide range of technology areas and have a great diversity of deliverables; and

(d) for researches into new technology area, it is understandable that not all approved projects will lead to fruitful results.

7. In the case of ITF, given the size of the fund and the need for public accountability, we are of the view that we should develop an evaluation system for the ITF as a useful tool to assess the performance and outcome of projects funded by the ITF. In this regard, we have developed a three-tier system in evaluating the performance of completed ITF projects. The first tier targets at individual ITF projects, the second tier targets at each of the four specific ITF programmes, and the third tier involves studies on the impact of the funded projects, particularly clusters of projects in the same technology area.

A. Project-level Evaluation

8. At individual project level, we adopt a two-stage assessment. At the first stage, we assess whether a project is satisfactorily completed in accordance with the milestones and deliverables stipulated in the approved project proposal. At the second stage, we rate the project on the basis of the practical usefulness and benefits of the project deliverables to the relevant industry.

Innovation and Technology Support Programme (ITSP)

9. Among the four programmes, most applications were made under the ITSP and about 64% of the funds committed are used to support projects approved under this programme. Together with those projects approved under the previous Industrial Support Fund, continued to be funded under the ITSP after the launch of the ITF in November 1999, a total of 118 ITSP projects have been completed up to the end of 2002.

10. In assessing the impact or practical usefulness of individual ITSP projects, we have made reference to the following factors -

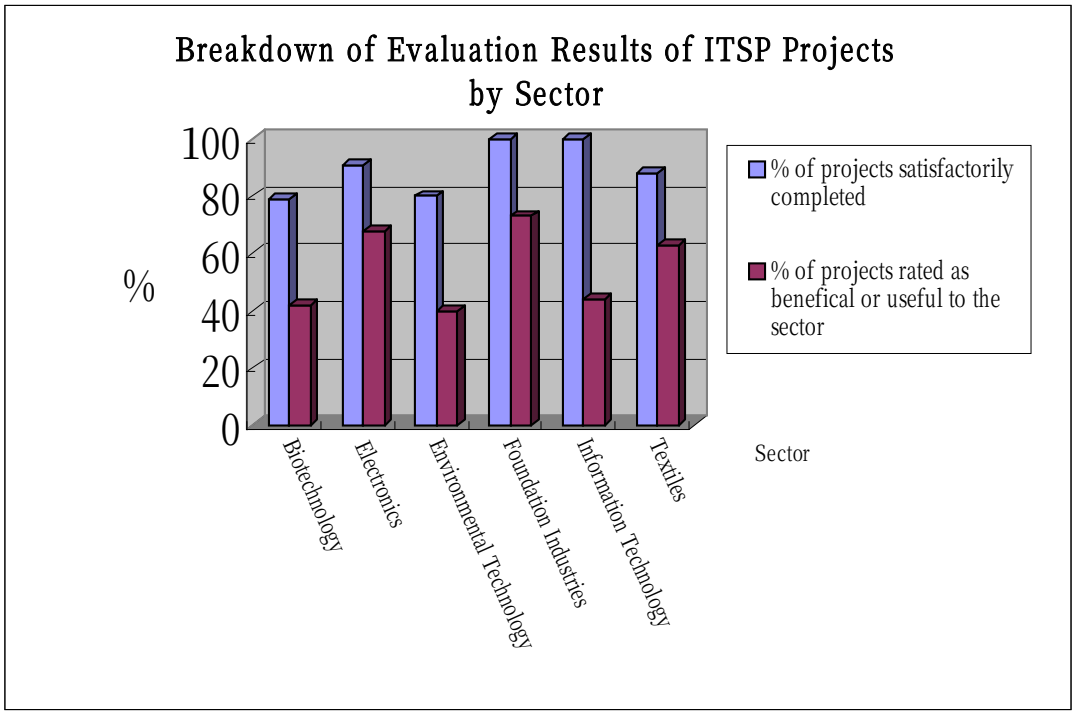
(a) whether the new technology developed is recognized as a major breakthrough by the authority in the subject field;

(b) whether the new technology or product has been successfully commercialized; and

(c) whether the new technology/infrastructure supports industrial development or the extent to which it is adopted by the relevant industry in their business processes.

11. Among these 118 completed ITSP projects, 106 or 90% have been satisfactorily completed, and 66 or 53% have been rated as practically useful or having benefits to the relevant industry.

12. Details of the evaluation results of the completed ITSP projects, broken down by industry sector, are shown in the following chart.



13. Among the 66 projects rated as beneficial or practically useful to the relevant industry, some of them involve the development of new technology which is recognized as a breakthrough in the relevant field, e.g. -

- in the area of biotechnology, a new platform technology has been developed from an ITF project which allows a cost-effective, free of animal contaminant and ready-for-scale-up production of high value pharmaceutical proteins in plant seeds; and

- in the electronics area, new LCD technologies have been developed from an ITF project which enable inventions for micro-display and shadowless reflective display.

14. Some of the deliverables developed from ITF projects have been successfully commercialized and licensed to local companies, e.g. -

- an on-line monitoring system for metal stamping operations; and

- authentication technologies for secure smart card applications.

15. In addition, some projects have provided the necessary infrastructural support and services to the relevant industries so that they

could upgrade their technology level, e.g. -

- the Textiles Manufacturing Technology Centre funded by the ITF has transferred the quality evaluation technologies to the local textiles and clothing industry and helped the industry to upgrade to high quality manufacturing; and

- the establishment of the Electronic Packaging and Assemblies Centre has provided cost-effective analytical and testing services to the local manufacturers, thereby reducing the cost and lead-time in their analytical work, and raising the reliability and technology levels of their products.

University Industry Collaboration Programme (UICP)

16. There are three schemes under this programme. They are -

(a) The **Teaching Company Scheme** which aims to foster university-industry partnership by supporting local companies to take on graduate students from local universities to assist in proprietary R&D work. The ITF contributes about half of the monthly studentship for each graduate student.

(b) The **Matching Grant for Joint Research** which aims to foster private companies to collaborate with universities in proprietary R&D projects. The participating company has to bear no less than 50% of the project cost in cash.

(c) The **Industrial Research Chair Scheme** which aims to assist universities and industry to develop research efforts in the natural science or engineering fields that respond to industrial needs and not yet developed in Hong Kong but for which there is good development potential in the longer term. The participating company has to bear no less than 50% of the project cost in cash.

17. Among the 15 projects completed up to the end of 2002, seven of them have been satisfactorily completed. Out of these seven projects, six have been rated as practically useful and having benefits to the participating companies.

General Support Programme (GSP)

18. The GSP aims to support projects that contribute to fostering an innovation and technology culture. Together with those projects of this nature approved under the previous Industrial Support Fund and the Services Support Fund which continued to be funded under the GSP after the launch of the ITF in November 1999, a total of 60 GSP projects have been completed up to the end of 2002. We have made reference to the following factors in conducting the assessment -

(a) whether the events/activities organized under the projects are well attended or the products developed are adopted by the relevant industry; and

(b) whether the events/activities can generate the interest in developing an innovation and technology culture in the relevant industry.

19. Among the 60 completed GSP projects, 58 or 97% have been satisfactorily completed, and 39 or 65% have been rated as well attended and can generate interest in developing an innovation and technology culture in the relevant industry.

Small Entrepreneur Research Assistance Programme (SERAP)

20. The SERAP aims to help small, technology based and entrepreneur driven companies carry out business-oriented researches at the pre-venture capital stage. SERAP funding may be provided in two phases. Phase I is a trial period of no longer than six months. Subject to satisfactory progress being demonstrated during the course of Phase I, Phase II, which should not last for longer than 18 months, may be funded to take the project up to the pre-market launch stage.

21. In order to ensure the quality of the funded projects, we will critically assess all funded projects after their initial six months or so, before they proceed to Phase II. We will terminate a project if proves to be unsuccessful technologically or commercially.

22. Up to the end of 2002, 34 SERAP projects have been completed. All these 34 projects had completed both Phase I and II and were rated as satisfactorily completed. Another 19 projects were not satisfactorily completed in various ways. Among them, two managed to achieve most, but not all, pre-set milestones as originally planned. 15 had

only completed Phase I and did not proceed to Phase II, either on the initiatives of the fund recipients concerned or because their application for Phase II funding was rejected. The remaining two were withdrawn during Phase II.

23. We have made reference to the following parameters in assessing the benefits or practical usefulness of individual SERAP projects -

(a) the amount of revenue generated;

(b) the size of follow-on investment attracted; or

(c) the number of patents filed or registered.

24. Out of the 34 satisfactorily completed projects, 8 (or 24%) projects met the above criteria. Out of these 8 projects, we note that -

(a) three projects generated revenue;

(b) two companies attracted follow-on investments, approximating to $25 million; and

(c) five projects successfully obtained patents.

25. The other 26 satisfactorily completed projects, though not yet achieving the criteria mentioned in paragraph 23 above as at the end of December 2002, they have contributed in other ways. In many of the cases, either a product prototype or a new technology or product has been successfully developed in accordance with the approved project plan, but it was unable to be successfully launched into the market due to insufficient market demand or the market was not ready to take up the technology.

B. Evaluation at Programme Level

ITSP and UICP

26. In evaluating the effectiveness of the ITF at programme level, we have identified the following parameters in assessing the performance of ITSP and UICP -

(a) private sector contribution in R&D;

(b) human capital deployment, such as number of researchers involved, number of researchers trained and employed, etc.;

(c) number of patents/copyrights filed or registered or the amount of royalties generated;

(d) technologies, products and services in applicable or commercializable form;

(e) technology transfer activities, including industrial consultancy; and

(f) new ventures, new business model, follow-on development or investment.

27. Since most of these parameters relate to commercialization and development activities after completion of the project, we are collecting data in the first half of 2003 for the projects completed in 2002, and the evaluation work is expected to be completed by the end of 2003.

28. While the quantitative results relating to paragraph 26 are not available for the time being, we have already seen some initial success of the ITSP projects and their contribution to the upgrading of innovation and technology of the industries in Hong Kong.

29. For the foundation industries, the technologies developed from a number of ITSP projects have helped the industries to migrate from producing lower end products to higher end products and hence increasing their competitiveness, e.g. -

- the single point diamond turning, aspheric lens design and manufacturing technologies developed from ITSP projects improved local photographic and optical products manufacturers' design flexibility, and reduced their production costs and reduced their reliance on the supply of critical components from overseas, which are also their major competitors; and

- the free form machining technology developed from ITSP projects helped local manufacturers to migrate from the development of traditional optical products to high-end products. With the improvement in technical capability, local companies can diversify their operation, including the

development of high-end precision optics components for the photonic industry; and

- for the plastics machinery industry, the results of a number of projects have helped the plastics machinery industry in meeting the stringent European safety regulations so that their products could satisfy the required EC Directives and obtain the CE marks. This greatly facilitates the trading of their products among the EC member states. According to the industry, the exports of locally made CE approved machines to EC countries had been increased by 50% and exports of locally made CE approved machines to non-EC countries had been increased by 20%.

30. For the information technology sector, the local industry has also benefited from the results of some of the ITSP projects, e.g. -

- in promoting e-commerce in Hong Kong, the results of an ITSP project have offered a technology solution in conducting electronic transactions on the Internet. This technology is a building block of the public key infrastructure (PKI) which is an indispensable element in ensuring the quality and legality of electronic transactions; and

- another example is the development of a web-based news publication technology in the news media industry. A number of ITSP projects were on this technology area and the results have kicked start a new industry for the provision of electronic news archiving and newspaper cutting services. One of the new companies has now been providing such services to companies in the Mainland and Taiwan.

31. For the electronics industry -

- a number of ITSP projects have developed technologies related to electronics packaging processes which are essential to product miniaturization and performance improvement and enable local manufacturers to produce Printed Circuit Boards of very high component densities; and

- some ITSP projects have helped the local manufacturers in developing innovative products by introducing latest technologies in areas such as Internet and mobile

communications, digital audio and video, CMOS image sensing, high efficiency switching power supplies, ultrasonic transducers, etc. All will upgrade the capabilities of local manufacturers in product design and development, which are the prerequisite for transforming the electronics industry from OEM to the higher-profit ODM mode of operation.

GSP

32. For GSP, the parameters adopted for evaluating its effectiveness relate to the following -

(a) the number of projects broken down by nature (e.g. seminars, conferences, surveys);

(b) the profile of the applicants; and

(c) the number of direct beneficiaries.

33. Though a comprehensive review at programme level has not been completed, we have seen some positive feedback to some of the GSP projects. For instance -

- the Innovation Expo of 2001 have attracted the active participation of more than 330 exhibitors and research institutes to showcase their technologies and technological products, and have been well attended by some 250,000 visitors, many of them are secondary school and university students who are the potential stalwart supporters and practitioners in technology development and advancement; and

- an increasing number of local traders and retailers have been aware of the importance of, and hence have adopted electronic product ID, in the form of bar-codes and the associated unique numbers, for trading through a project funded under this programme.

34. In addition, we operate a Patent Applications Grant (PAG) as a sub-programme under the GSP. The PAG aims to help first-time patent seekers to capitalize their intellectual work through patent registration as well as to promote the importance of protection of intellectual property rights.

35. Since the establishment of the PAG in 1998, more than 800 applications have been received and a total of 294 applications have been approved. Among these approved cases, 143 applicants have already successfully obtained 250 patents for their inventions while others are still in the process of applying or waiting for the grant of patents from Patent Offices from the relevant countries or territories. Furthermore, 101 inventions have subsequently been commercialized into products or technology for adoption by the market. Successful examples include rubber soil, Q9 Chinese input, a scaffolding technology, and non-circular CD.

SERAP

36. For SERAP, we have seen a number of funded projects flourishing in different areas covering information technology and communications, software and electronics exhibiting commercial prospects. For instance -

- a company has successfully developed server-side software for real-time language translation. The translation is between traditional Chinese and simplified Chinese or between Chinese and other Asian languages such as the Japanese or Korean languages;

- another one has developed optical character recognition technology for successful identification of license plate numbers and also characters (such as in the Chinese, Korean languages, etc.) under high-speed environment; and

- an integrated-circuit design house has successfully developed a system-on-chip solution for a major remote control manufacturer. Another company has developed a pioneering dimmable fluorescent desk lamp with its own developed patented technology.

37. All the above technologies, services or products are now available in the market.

38. From an overall perspective, SERAP is part and parcel of the holistic public policy programmes to support technological

entrepreneurship.[1] The prevalence of technological entrepreneurship is understood as manifestation of the innovation capacities of a knowledge-based economy. Various studies have pointed out the importance of innovation as the driver of economic growth in a globalised economy.

39. In this respect, SERAP provides a sustainable and concrete platform to better enable starting up of technology businesses; better provide necessary sources of funding for entrepreneurs most of whom have few assets or track record to acquire conventional debt financing, thus reducing barriers for technology businesses to flourish and providing a spawning ground for technopreneurs. While it is difficult to quantify to what extent SERAP has been successful in springing up technopreneurship, we consider the programme as a major policy tool encouraging innovation and fostering dynamic high-tech clusters of industries to springboard the next stage of economic growth.

C. Impact Studies

40. We plan to conduct studies to assess the impact of ITF funded projects on specific technology areas, or sectors of industry. As a start, we consider that it is more appropriate to start with the cluster of projects in the solicitation theme issued under the ITF, or the cluster of projects which aims to develop technologies for a specific industrial sector.

41. The impacts of ITF projects on specific sector could be both tangible and intangible, direct and indirect. Tangible and direct benefits may include the employment opportunities created, the number of new products developed and their export or sales volume, etc. Intangible and indirect benefits may include, the improvement of a particular industry's competitiveness, the building of the technological capability of Hong Kong

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[1] Other public policy programmes supporting the development of technological entrepreneurship include the incubation programme offered by the Hong Kong Science and Technology Parks Corporation, with Government support. The incubation programme offers not only fully-serviced accommodation at an affordable level but also value-adding services in order to help these companies in their operation and growth. Such value-adding services included management training courses, customised marketing services, business matching, professional services such as legal and financial services, as well as identification of follow-on investors.

Another relevant public policy programme is the HK$750 million Applied Research Fund (ARF). The ARF is a venture capital fund set up by the Government in March 1993 to provide funding support to technology ventures and research and development projects that have commercial potential. When technology start-up companies have survived their critical stages of development in the first two to three years, they would need further funding, usually from venture capital, to proceed to the next stage of growth and business development. The ARF helps such companies with commercial potential.

industry, and its recognition as such, the increase in corporate expenditure in R&D activities etc. Since most of the projects approved under the solicitation theme scheme are expected to be completed towards the end of 2003, we are starting to develop an appropriate methodology for the impact studies, with a view to carrying out the actual study after the projects are complete.

Conclusion

42. R&D is a long term investment. Immediate benefits may not be easily observed shortly after the completion of a project, and it may take some time for the market to develop or mature before the new technology or product developed from the ITF projects would be taken up by industry. We are beginning to see the initial results and fruits of the completed ITF projects.

43. Post-project evaluation of ITF projects is an on-going process and the Administration will continue to conduct assessment at different levels in order to ensure that public money is well spent.

Advice sought

44. Members are invited to note the progress made in the development of a framework to evaluate the performance of completed projects funded by the ITF.

Commerce, Industry and Technology Bureau
January 2003

Annex A

Outline of the Four Programmes under the Innovation and Technology Fund (ITF)

Innovation and Technology Support Programme

This programme supports midstream/downstream research and development projects undertaken by universities, industry support organizations, professional bodies and trade associations. Applications are normally invited twice a year, and the ITF provides funding support up to 90% of the approved total project costs while the remaining comes from the industry in the form of sponsorship.

University-Industry Collaboration Programme

This programme supports commercial research and development projects undertaken by private companies in collaboration with local universities. Funding is provided on a matching basis, with the private company bearing at least half of the project cost. Applications are considered at any time of the year.

General Support Programme

This programme supports projects that contribute to fostering an innovation and technology culture, such as conferences, exhibitions, seminars and so on. As with the ITSP, applications are normally invited twice a year and the ITF provides funding support up to 90% of the approved total project costs while the remaining comes from the industry in the form of sponsorship.

Small Entrepreneur Research Assistance Programme

This programme provides financing for pre-venture capital stage of technology entrepreneurs for starting up, carrying out research and development, and conducting market validation. A grant of up to $2 million will be provided by ITF on a dollar-for-dollar matching basis. The grant will only be recouped if the project is able to attract follow-on investment or generate revenue. Applications are considered at any time of the year.