

Annex

**Supplementary Note on  
Research and Development Expenditure (R&D) and  
Cost Effectiveness of R&D Activities of  
Hong Kong and Other Major Economies**

**Purpose**

This paper provides supplementary information comparing the research and development expenditure (R&D) and the cost effectiveness of R&D activities of Hong Kong and other major economies.

**Background**

2. The Administration briefed the Panel on the operation of the Innovation and Technology Fund (ITF) on 13 April 2004. Members noted the performance of the ITF and asked the Administration to provide supplementary information on the research and development (R&D) expenditure of other major economies, in particular the United States, in order to compare the cost effectiveness of Hong Kong's R&D activities.

**R&D Expenditure**

3. Since different economies have different funding arrangements for supporting R&D activities, it is difficult, if not impossible, to compare directly the number of projects funded by the ITF and the amount spent with schemes operated by other major economies.

4. As reported by the Census and Statistics Department, Hong Kong spent a total of about US\$0.96 billion on R&D in 2002. For the same period, the US spent a total of more than US\$290 billion on R&D. Separately, the Institute for Management Development has published a World Competitiveness Yearbook 2003 which compared expenditure on R&D of different economies. In this regard, Hong Kong was ranked 17 in terms of total expenditure on R&D as compared with other economies of similar size. (Finland was ranked 7, Israel was ranked 11 and Singapore was ranked 14.)

## **Cost Effectiveness of R&D Activities**

5. We have sought advice from external experts regarding the practice in overseas funding agencies in evaluating the performance of completed projects and the cost effectiveness of their funding schemes. The advice is that in countries, notably the United States, which operated similar funding schemes, systematic evaluation of the performance of completed projects and the cost effectiveness of their schemes has not taken place. 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) 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
- (c) for researches into new technology areas, it is understandable that not all approved projects will lead to fruitful results.

6. Basic research and applied research activities are inter-related and it is very difficult, if not impossible, to single out and assess the cost effectiveness or performance of a particular segment of R&D activities. Despite the aforementioned constraints, the Administration has obtained some indicators on research output, such as high-tech exports and patents granted by US Patent & Trademark Office (USPTO), for comparing the cost effectiveness of R&D activities in Hong Kong and some other economies.

7. The following table gives the amount of high-tech exports of Hong Kong and other major economies. To compare the cost effectiveness of R&D activities, we divide the amount of high-tech exports by gross expenditure on R&D<sup>1</sup>. This ratio (output/input of R&D activities) may be perceived as one of the indicators of the cost effectiveness of R&D activities.

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<sup>1</sup> The latest figures available for comparison purpose are the 2001 figures. Source data of high-tech exports of other economies are from the IMD World Competitiveness Yearbook, Institute for Management Development.

	High-tech Exports (US\$ million)	Ratio of R&D Output and Input
Hong Kong	3,716	4.13
United States	178,906	0.63
Singapore	62,572	34.8
Taiwan	N.A.	N.A.
Korea	40,427	3.23
Japan	99,389	0.74
Finland	9,254	2.26

8. The following table compares the number of patents granted by USPTO per 1,000 R&D personnel. The figures may serve as another indicator of the performance of R&D activities.

	Patents granted by USPTO per 1,000 R&D personnel
Hong Kong	55.1
United States	N.A.
Singapore	11.4
Taiwan	53.3
Korea	26.8
Japan	38.5
Finland	12.9

9. It is noted from the above tables that Hong Kong's ratio of output and input of R&D activities and number of US patents granted per 1,000 R&D personnel is among the highest as compared with the United States, Taiwan, Korea, Japan and Finland.