

NANO AND ADVANCED MATERIALS INSTITUTE

Executive Summary

1. The National 14th Five-Year Plan indicated clear support for Hong Kong's development into an international innovation and technology (I&T) centre. In the 2022 Policy Address, the Chief Executive of the Hong Kong Special Administrative Region (HKSAR) proposed to dovetail with the National 14th Five-Year Plan and develop Hong Kong into an international I&T centre. In June 2005, the Finance Committee (FC) of the Legislative Council (LegCo) approved the establishment of five Research and Development (R&D) Centres to drive and coordinate applied R&D in selected focus areas and to promote commercialisation of R&D results and technology transfer. In April 2006, Nano and Advanced Materials Institute (NAMI) was established as an R&D Centre for nanotechnology and advanced materials. The operating cost of NAMI is supported by funding from the Innovation and Technology Fund (ITF). As at 31 July 2024, the total funding commitment for NAMI approved by FC was \$1,515.3 million. The funding commitment from ITF would support the operation of NAMI for 22 years from 1 April 2006 to 31 March 2028. In the period from 2019-20 to 2023-24, the income and expenditure of NAMI ranged from \$226.8 million to \$290.2 million each year. The Innovation and Technology Commission (ITC) monitors the operation and performance of NAMI and submits NAMI's progress reports to LegCo on a regular basis. The Audit Commission (Audit) has recently conducted a review of NAMI.

Project management

2. *Performance targets on number of projects commenced not met.* Audit analysed the number of ITF-funded projects commenced in the period from 2019-20 to 2023-24. Audit found that performance targets on the number of ITF-funded projects commenced were not met in 4 (80%) of the 5 years. The average shortfall for the 4 years was 8 projects each year, ranging from 4 to 11 projects (para. 2.3).

Executive Summary

3. ***Performance targets on number of projects completed not met.*** Audit analysed the number of ITF-funded projects completed in the period from 2019-20 to 2023-24. Audit found that performance targets on the number of ITF-funded projects completed were not met in each of the 5 years. The average shortfall was 17 projects each year, ranging from 6 to 32 projects (para. 2.5).

4. ***Need to ensure that projects commence and are completed in a timely manner.*** Audit examined the 46 ITF-funded projects completed in 2023-24 with project costs totalling \$183.6 million and found that: (a) 1 (2%) project commenced 6 months later than the target date of commencement stipulated in the project agreement; and (b) 34 (74%) projects were completed after the target dates of completion stipulated in the project agreements. The average delay was 7.7 months, ranging from 3 to 18 months (para. 2.7).

5. ***Room for improvement in conducting post-project evaluation.*** Audit examined the 47 ITF-funded projects with post-project evaluation reports due for submission in 2023-24. Audit found that: (a) for 24 (51%) projects, post-project evaluation reports had been submitted to ITC. For 2 (8%) of the 24 projects, the reports were submitted with delays of 4 and 47 days respectively. For the remaining 23 (49%) projects, post-project evaluation reports had not been submitted to ITC. Up to 30 June 2024, the reports were overdue for 91 to 366 days (averaging 226 days); and (b) for a project, while the respondent indicated in the report that the project results would not bring benefits to its operation, there was no documentary evidence showing that NAMI had taken follow-up actions on the results of the report (para. 2.12).

6. ***Performance targets on number of contract research projects commenced not met.*** Audit analysed the number of contract research projects commenced in the period from 2019-20 to 2023-24. Audit found that: (a) performance targets on the number of contract research projects commenced were not met in 3 (60%) of the 5 years. The average shortfall for the 3 years was 2.3 projects each year, ranging from 1 to 4 projects; and (b) the target number of contract research projects commenced decreased by 50% from 10 in 2022-23 to 5 in 2023-24. There was no documentary evidence showing the rationale for adjusting the performance target significantly (para. 2.17).

Executive Summary

7. *Need to consider setting more challenging targets on income from contract research projects.* Audit analysed NAMI's achievement of the performance targets on the income from contract research projects in the period from 2019-20 to 2023-24. Audit found that: (a) the target income had been lowered by 32% from \$8.2 million in 2019-20 to \$5.6 million in 2023-24; and (b) as a result, the actual income outperformed the target income in 4 (80%) of the 5 years, with the over-achievements ranging from 4% to 88% (para. 2.19).

8. *Need to improve laboratory safety inspections.* NAMI conducts laboratory safety inspections on the laboratories on a bi-monthly basis. After the safety inspections, the Laboratory Safety Team prepares laboratory safety inspection reports to document the findings. In May 2024, Audit accompanied the Laboratory Safety Team in the conduct of the laboratory safety inspections on 2 laboratories and observed inadequacies: (a) for the inspection conducted on 1 of the 2 laboratories, the Laboratory Safety Team had an inspection report pre-filled with results of the checking procedures, even before commencing the inspection; and (b) some checking procedures listed on the inspection reports were not covered during the inspections (paras. 2.23 and 2.24).

9. *Need to ensure clarity in reporting performance indicators.* Audit examined the calculation records of the performance indicators on the number of companies participating in on-going projects and the number of organisations benefitting from the Public Sector Trial Scheme (PSTS) for the period from 2019-20 to 2023-24. Audit found that: (a) the differences between the number of companies participating in on-going projects (as at 31 March each year) reported in the papers submitted to LegCo and that based on NAMI's supporting records ranged from 5 to 19 each year; and (b) the differences between the number of organisations benefitting from PSTS reported in the papers submitted to LegCo and that based on NAMI's supporting records ranged from 3 to 20 each year. In Audit's view, in the absence of an explanatory note on the calculation basis of the performance indicators in the papers submitted to LegCo, the public and Members of LegCo might not be aware of the fact that a company/an organisation could be counted as more than one company/organisation in the reported results of the 2 performance indicators (paras. 2.30 and 2.32).

Industry income and commercialisation

10. ***Performance targets on industry contribution not met.*** Audit analysed NAMI's achievement of the performance targets on industry contribution in the period from 2019-20 to 2023-24. Audit found that: (a) the industry contribution decreased from 30.8% in 2019-20 to 22.5% in 2023-24; and (b) the performance targets on industry contribution were not met in 4 (80%) of the 5 years. The average shortfall for the 4 years was 3.1 percentage points, ranging from 1.1 to 5.6 percentage points (para. 3.2).

11. ***Performance targets on level of industry and other income not met.*** Audit analysed the level of industry and other income of NAMI for the period from 2019-20 to 2023-24. Audit found that: (a) the level of industry and other income had been on a decreasing trend from 2019-20 to 2022-23, which decreased from 47% in 2019-20 to 35% in 2022-23. The level of industry and other income increased to 46% in 2023-24; (b) while noting that the level of industry and other income met ITC's targets for all of the 5 years, it fell short of NAMI's targets in 2 (40%) years, with shortfalls of 4.3 percentage points and 5.8 percentage points; and (c) in the recent two years (i.e. 2022-23 and 2023-24), NAMI's actual level of industry and other income was the lowest among the five R&D Centres (para. 3.5).

12. ***Differences in reported level of industry and other income.*** Audit found differences in the levels of industry and other income as reported in the papers submitted to LegCo and those reported in NAMI's Annual Reports. For 2019-20 and 2023-24, the level of industry and other income reported in NAMI's Annual Report was 4.5 percentage points and 7.8 percentage points less than those reported in the papers submitted to LegCo respectively (para. 3.7).

13. ***Need to reduce discontinued patent applications.*** Audit examined the 294 patent applications filed by NAMI for 89 projects completed in the period from 2019-20 to 2023-24. As at 31 March 2024, the results for 87 (30%) patent applications were concluded. Audit found that, of the 87 patent applications, 33 (38%) were discontinued (comprising 21 discontinued standard patent applications and 12 expired provisional patent applications without filing standard patent applications), involving 25 projects (para. 3.18).

Executive Summary

14. *Need to closely monitor the large number of pending patents.* Audit analysed the number of pending patents (i.e. patents where standard patent applications had been filed with the patent offices but yet to be granted) for the period from 2019-20 to 2023-24. Audit found that the number of pending patents was on an increasing trend, with a significant increase of 108% from 77 as at 31 March 2020 to 160 as at 31 March 2024. For the elapsed time since filing of patent applications for the 160 pending patents as at 31 March 2024: (a) on average, the pending patents had been filed for 1.4 years, ranging from 5 days to 5.3 years; and (b) 14 (9%) pending patents had been filed for more than 3 years (paras. 3.22 and 3.23).

15. *A large proportion of platform projects and seed projects did not generate licensing fee income.* For the 73 platform projects and seed projects completed in the period from 2019-20 to 2023-24, up to 31 March 2024: (a) 50 (68%) projects had not generated any licensing fee income since their completion; and (b) the remaining 23 (32%) projects generated licensing fee income of \$7.2 million. On average, the licensing fee income as a percentage of the project costs was 7.4%. The percentages ranged from 0.8% to 28.6%. For 9 (39%) of the 23 projects, the licensing fee income only represented 5% or less of the project costs. Audit noted that there were no guidelines setting out the rationale for determining the licensing fees (paras. 3.27 and 3.28).

Administrative expenditure and corporate governance

16. *Need to enhance guidelines on modification of business travel arrangements.* According to NAMI's guidelines, NAMI shall settle all "business related" travelling costs (i.e. the airfares for itinerary solely for business related destinations and periods and in the flight class that the staff is entitled) directly with the appointed travel agents. Other "non-business related" travelling costs (i.e. excess of the actual costs over the "business related" costs) shall be borne and settled by staff. Audit examined 20 business travels outside Hong Kong (involving airfares totalling \$2 million) conducted in the period from 2019-20 to 2023-24. For 9 (45%) business travels, there were modifications of travel arrangements. For the 9 business travels, the same staff extended the stay for personal reasons. NAMI found that there were excess travelling costs for 3 (33%) of the 9 business travels, ranging from \$2,300 to \$11,430. For 2 (67%) of the 3 business travels with excess travelling costs, NAMI paid the travelling costs for the whole period and the staff concerned subsequently repaid such excess travelling costs. For the remaining 1 (33%) business travel, the staff concerned settled the excess travelling costs before NAMI paid the travelling costs. However, Audit found that approval had not been sought for the

Executive Summary

modification of business travel arrangements. In this connection, NAMI did not have specific guidelines on modification of business travel arrangements. The need for approval and the approving authorities for modification of business travel arrangements for personal reasons (including business travels involving the Chief Executive Officer) were not specified in NAMI's guidelines (paras. 4.3 and 4.4).

17. ***Room for improvement in claims for subsistence allowance.*** Audit examined the subsistence allowance claims for 30 business travels (involving subsistence allowance claims totalling \$1 million) conducted in the period from 2019-20 to 2023-24. Audit found that: (a) there was scope for improving NAMI's guidelines on subsistence allowance claims involving the Chief Executive Officer. The approving authorities for subsistence allowance claims involving the Chief Executive Officer were not specified in NAMI's guidelines. The subsistence allowance claims involving the Chief Executive Officer were approved by the Chief Technology Officer. Furthermore, for subsistence allowance claims involving the Chief Executive Officer for extra meal costs or accommodation costs in addition to the entitled subsistence allowance, only exceptional approval from the Chief Executive Officer or his designate is required. Exceptional approvals for such claims were given by the Chief Executive Officer himself; and (b) for 10 (33%) business travels (including 7 business travels involving the then Chief Executive Officer) with the hotel accommodation costs exceeding the entitled subsistence allowance, the excess amounts ranged from \$5,292 to \$82,644 and were borne by NAMI. For 4 (13%) business travels (all involving the then Chief Executive Officer) with the meal costs exceeding the entitled subsistence allowance, the excess amounts ranged from \$607 to \$4,700 and were borne by NAMI (para. 4.7).

18. ***Room for improvement in approval of entertainment expenses.*** Audit examined 50 entertainment expense reimbursement claims (involving expenses totalling \$0.2 million) which were approved in the period from 2019-20 to 2023-24 and found that: (a) the approving authorities for entertainment expense reimbursement claims involving the Chief Executive Officer were not specified in NAMI's guidelines. Such reimbursement claims were approved by the Chief Operating Officer or the Chief Technology Officer; (b) 2 (4%) claims involved meal costs exceeding the cost-per-head spending limits by \$39 and \$50 respectively. For the former claim, there was no approval for exceeding the limit. For the latter claim, the justifications for granting approval were not documented; (c) for 8 (16%) claims involving entertainment expenses incurred by staff at the grade below Section Directors, no prior approvals were obtained from Section Directors or above. Covering approvals were obtained 1 to 37 days after the entertainment expenses were incurred (averaging

Executive Summary

18 days); and (d) for 1 (2%) claim, the guests entertained were significantly outnumbered by NAMI staff. There were 8 NAMI staff and 2 guests (i.e. NAMI staff outnumbered the guests entertained by 6). However, no justifications were provided in the claim form to justify that NAMI staff significantly outnumbered the guests entertained in the event (para. 4.12).

19. ***Room for improvement in declarations of interest.*** NAMI adopts a two-tier reporting system for Board of Directors (i.e. the Board)/functional committees (i.e. the Committees) members to declare matters which may give rise to a conflict of interest. Audit noted the following room for improvement: (a) Audit examined the first-tier declarations made in the period from 2019 to 2023 and found that, of the 15 declarations of interest on first appointment, 2 (13%) were made 1 and 15 days respectively after the dates of first appointment of the members concerned; and (b) Audit examined the minutes of the Board meetings held in the period from 2019 to 2023 and found that some Board members had not made second-tier declarations of interest (paras. 4.24, 4.25 and 4.27).

Other issues

20. ***Need to strengthen guidance and regulation over matters concerning the safeguarding of national security.*** The Law of the People's Republic of China on Safeguarding National Security in the HKSAR was implemented on 30 June 2020. The Law stipulates that it is the constitutional duty of the HKSAR to safeguard national security. Besides, the Safeguarding National Security Ordinance took effect on 23 March 2024. It is stated in the Preamble of the Ordinance that any institution, organization and individual in the HKSAR must abide by the law of the HKSAR applicable for safeguarding national security. However, Audit noted that there were no specific clauses concerning safeguarding national security in the tripartite Funding Agreement between the Government, the host institution and NAMI (para. 5.2).

21. ***Need to take measures to reduce staff turnover.*** Audit analysed the staff turnover of NAMI for the period from 2019-20 to 2023-24 and found that: (a) on average, 57 staff left NAMI each year, ranging from 47 to 70 staff; and (b) the average staff turnover rate was 22.8%. The staff turnover rates ranged from 18.4% to 27.0% (para. 5.9).

Executive Summary

22. ***Need to step up efforts in achieving the performance targets relating to publicity.*** Audit examined the achievements of the 4 performance targets relating to publicity in the period from 2019-20 to 2023-24 and found that there were shortfalls in the achievement of 3 (75%) performance targets: (a) the performance targets on number of visitors to corporate website were not achieved in 2 (40%) of the 5 years, with shortfalls of 11% and 21%; (b) the performance target on number of exhibitions/roadshows organised/participated was not achieved in 1 (20%) of the 5 years, with shortfall of 45%; and (c) the performance targets on number of conferences/seminars/workshops organised/participated were not achieved in 4 (80%) of the 5 years, with shortfalls ranging from 9% to 49% (paras. 5.25 and 5.26).

23. ***Need to improve cost-effectiveness of NAMI's operation.*** Audit analysed the operating expenditure and R&D project costs of NAMI in the period from 2019-20 to 2023-24 and found that: (a) the operating expenditure increased by 47% from \$78.7 million in 2019-20 to \$115.9 million in 2023-24; and (b) the ratio of operating expenditure to R&D project costs increased from 66% in 2019-20 to 74% in 2023-24 (para. 5.32).

24. ***Decreasing gross domestic product contributions from NAMI.*** ITC commissioned an independent consultant to carry out a study to analyse the gross domestic product (GDP) contributions towards Hong Kong as generated by the five R&D Centres' operation. Audit analysed the GDP contributions generated by the R&D Centres in the period from 2020-21 to 2022-23 and found that: (a) NAMI's GDP contributions decreased by 29% from \$1,531 million in 2020-21 to \$1,092 million in 2022-23; and (b) among the five R&D Centres, NAMI's GDP contributions decreased by the largest margin in the period (para. 5.34).

25. ***Need to step up efforts on deepening co-operation with the Mainland.*** The guiding principles of NAMI include commercialising R&D outcomes by collaborating with industries in Hong Kong and the Mainland, and deepening research co-operation with the Mainland to align with the National Five-Year Plan for integration into the overall national development. According to NAMI, it had stepped up its promotional effort and organised/participated in a number of business activities in the Mainland, especially in the Guangdong-Hong Kong-Macao Greater Bay Area. While noting NAMI's recent work in the Mainland, at present, there are no performance targets or indicators in NAMI's Annual Plans relating to NAMI's efforts on deepening co-operation with the Mainland (paras. 5.38 to 5.40).

Executive Summary

Audit recommendations

26. Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

Project management

- (a) take measures to ensure that the target numbers of ITF-funded projects commenced/completed are met (para. 2.14(a));
- (b) take measures to ensure that ITF-funded projects commence and are completed in a timely manner (para. 2.14(c));
- (c) take measures to ensure that post-project evaluation reports are submitted to ITC in a timely manner and appropriate follow-up actions are taken on the results of the reports (para. 2.14(e));
- (d) take measures to ensure that the target numbers of contract research projects commenced are met (para. 2.21(a));
- (e) document the rationale for making significant adjustments to the performance targets on the number of contract research projects commenced (para. 2.21(c));
- (f) consider setting more challenging targets on the income from contract research projects (para. 2.21(d));
- (g) take measures to improve the laboratory safety inspections (para. 2.36(a));

Industry income and commercialisation

- (h) take measures to encourage the industry partners to increase their contribution in projects (para. 3.10(a));

Executive Summary

- (i) **step up efforts in achieving the performance target on level of industry and other income (para. 3.10(b));**
- (j) **take measures to reduce discontinued patent applications (para. 3.31(a));**
- (k) **closely monitor the number of pending patents and take measures to increase the number of patents granted (para. 3.31(b));**
- (l) **for pending patents filed for a long period of time, ascertain the reasons for the long time taken and take necessary follow-up actions (para. 3.31(c));**
- (m) **explore measures to increase the licensing fee income generated from platform projects and seed projects (para. 3.31(e));**
- (n) **formulate guidelines on the rationale for determining the licensing fee (para. 3.31(f));**

Administrative expenditure and corporate governance

- (o) **enhance guidelines on modification of business travel arrangements for personal reasons and take measures to ensure that approval is obtained from appropriate approving authorities (para. 4.14(a));**
- (p) **enhance guidelines on subsistence allowance claims involving the Chief Executive Officer and take measures to ensure that approval is obtained from appropriate approving authorities (para. 4.14(b));**
- (q) **take measures to contain the actual expenditures for business travels outside Hong Kong to a level within the entitled subsistence allowance as far as practicable (para. 4.14(c));**
- (r) **enhance guidelines on approval of entertainment expense claims involving the Chief Executive Officer and take measures to ensure that approval is obtained from appropriate approving authorities (para. 4.14(d));**

Executive Summary

- (s) remind NAMI staff to observe the spending limits of entertainment expenses and take measures to ensure that approvals for entertainment expense claims exceeding the spending limits are only given with sufficient justifications (para. 4.14(e) and (f));
- (t) for entertainment expenses incurred by staff at the grade below Section Directors, take measures to ensure that prior approvals are obtained and for exceptional cases with only verbal approvals, covering approvals are obtained as soon as possible (para. 4.14(g));
- (u) specify the reasonable ratio of NAMI staff to guests entertained in NAMI's guidelines and take measures to ensure that there is a reasonable ratio on all occasions of entertaining external guests and document the justifications for exceptional cases (para. 4.14(h));
- (v) take measures to ensure that first-tier declarations of interest are made by Board/Committee members in a timely manner (para. 4.31(b));
- (w) take measures to ensure that the requirements on second-tier declarations of interest are complied with by Board/Committee members (para. 4.31(c));

Other issues

- (x) take measures to reduce the staff turnover (para. 5.20(c));
- (y) ascertain the reasons for not meeting the performance targets relating to publicity and step up efforts to achieve the performance targets (para. 5.30(b) and (c));
- (z) ascertain the reasons for the increase in operating expenditure and take effective measures to contain operating expenditure to a lower level (para. 5.41(a)); and
- (aa) step up efforts on deepening co-operation with the Mainland and consider setting performance targets or indicators relating to NAMI's work in the Mainland (para. 5.41(b) and (c)).

Executive Summary

27. **Audit has also *recommended* that the Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute should:**

Project management

- (a) **take measures to ensure clarity in reporting performance indicators and clearly define the performance indicators in the papers submitted to LegCo (para. 2.37);**

Industry income and commercialisation

- (b) **take measures to ensure that a consistent basis is adopted in calculating and reporting the level of industry and other income (para. 3.11); and**

Other issues

- (c) **keep under review the GDP contributions from NAMI and formulate effective strategies to increase the GDP contributions (para. 5.42).**

28. **Audit has also *recommended* that the Commissioner for Innovation and Technology, in collaboration with the Chief Executive Officer, Nano and Advanced Materials Institute, should take measures to strengthen guidance and regulation over matters concerning the safeguarding of national security (para. 5.4).**

Response from the Government and Nano and Advanced Materials Institute

29. **The Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute agree with the audit recommendations.**