

# **CHAPTER 1**

**Innovation, Technology and Industry Bureau  
Innovation and Technology Commission  
Nano and Advanced Materials Institute**

**Nano and Advanced Materials Institute**

**Audit Commission  
Hong Kong  
28 October 2024**

*This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.*

Report No. 83 of the Director of Audit contains 8 Chapters which are available on our website (<https://www.aud.gov.hk>).



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# NANO AND ADVANCED MATERIALS INSTITUTE

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# 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).

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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).



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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).

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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

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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

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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).

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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).

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### 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));

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- (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));**



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- (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)).

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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.

## PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

### *Background*

1.2 In March 2021, the National 14th Five-Year Plan was promulgated. The National 14th Five-Year Plan indicated clear support for Hong Kong's development into an international innovation and technology (I&T) centre, better integration into the overall development of the Country as well as deepening of the co-operation between the Mainland and Hong Kong in I&T, and for the first time included the Shenzhen-Hong Kong Loop as a major platform of co-operation in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA). 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. The Hong Kong Research and Development (R&D) Centre Programme is the core initiative driven by the Innovation and Technology Commission (ITC) with the aim to harness Hong Kong's advantages in applied research, intellectual property protection, business-friendly environment and proximity to the manufacturing based in the Pearl River Delta region, to thrive as a regional technology service hub.

1.3 ***R&D Centres.*** In June 2005, the Finance Committee (FC) of the Legislative Council (LegCo) approved the establishment of five R&D Centres, namely the Automotive Platforms and Application Systems R&D Centre (APAS), the Hong Kong Applied Science and Technology Research Institute (ASTRI – Note 1), the Hong Kong Research Institute of Textiles and Apparel (HKRITA), the Logistics and Supply Chain MultiTech R&D Centre (LSCM), and the Nano and Advanced Materials Institute (NAMI) to undertake R&D projects in five technology focus areas. In April 2006, the five R&D Centres were set up to drive and coordinate applied R&D in selected focus areas and to promote commercialisation of R&D results and technology transfer. NAMI was established as an R&D Centre for nanotechnology and advanced materials.

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**Note 1:** *ASTRI was established in 2000 and designated as the R&D Centre for Information and Communications Technologies in 2006.*

## Introduction

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### *Nano and Advanced Materials Institute*

1.4 In April 2006, NAMI was established as a company limited by guarantee, wholly owned by its host institution, i.e. the Hong Kong University of Science and Technology. The headquarters and laboratories of NAMI are located at the Hong Kong Science Park. The mission of NAMI is to:

- (a) conduct market-driven, demand-led R&D in nanotechnology and advanced materials for enabling technology upgrading of the industries in Hong Kong and the Mainland;
- (b) acquire and advance core competencies in nanotechnology and advanced materials for innovative and breakthrough technologies; and
- (c) nurture and develop world-class research talents in nanotechnology and advanced materials.

1.5 The guiding principles of NAMI are to:

- (a) cultivate technology research talents to create innovative materials;
- (b) commercialise R&D outcomes by collaborating with industries in Hong Kong and the Mainland;
- (c) contribute to Hong Kong's I&T competitiveness and applications to promote smart living and sustainability; and
- (d) deepen research co-operation with the Mainland to align with the National Five-Year Plan for integration into the overall national development.

### *Funding mechanism*

1.6 The operating cost of NAMI is supported by funding from the Innovation and Technology Fund (ITF) on a funding cycle of 3 to 5 years. As at 31 July 2024, the total funding commitment for NAMI approved by FC was \$1,515.3 million, comprising the initial commitment of \$61.4 million in June 2005 and the subsequent

increase in commitments of \$128.4 million, \$195.4 million, \$304.8 million, \$439.5 million and \$385.8 million in June 2009, May 2012, December 2015, June 2020 and July 2024 respectively. The funding commitment from ITF would support the operation of NAMI for 22 years from 1 April 2006 to 31 March 2028. The Government, the host institution (see para. 1.4) and NAMI entered into a tripartite Funding Agreement (Note 2), which sets out the understanding of the three parties on the application of funds from ITF for the operation of NAMI and other related matters.

### ***Income and expenditure***

1.7 ***Income.*** In the period from 2019-20 to 2023-24, the income of NAMI ranged from \$226.8 million to \$290.2 million each year, comprising government funding and other income, as follows:

- (a) ***Government funding.*** Government funding (Note 3) comprised:
  - (i) provisions under Subhead 104 “The Nano and Advanced Materials Institute” of ITF to support the operating expenditure of the Centre (see para. 1.6); and
  - (ii) provisions under Subhead 101 Innovation and Technology (block vote) to support the expenditure of ITF-funded projects.

The amount of government funding ranged from \$166.4 million to \$247.4 million each year; and

- (b) ***Other income.*** Other income mainly comprised sponsorships received from industry and commercialisation income (e.g. income from contract research projects (see para. 1.16(b)), and licensing fees and royalties). The amount of other income ranged from \$42.8 million to \$60.4 million each year.

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**Note 2:** *The tripartite Funding Agreement came into effect in May 2006, and was subsequently revised in April 2011, December 2012, June 2013 and July 2018.*

**Note 3:** *To support NAMI’s operation, funding support from ITF is provided to NAMI according to NAMI’s budget. NAMI is required to return the unspent balance of funds to the Government.*

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1.8        *Expenditure.* In the period from 2019-20 to 2023-24, the expenditure of NAMI ranged from \$226.8 million to \$290.2 million each year, comprising administrative and operating expenses, staff costs and finance costs.

1.9        Table 1 summarises the income and expenditure of NAMI in the period from 2019-20 to 2023-24.

Table 1

**Income and expenditure of NAMI  
(2019-20 to 2023-24)**

	2019-20	2020-21	2021-22	2022-23	2023-24
	(\$ million)				
<i>Income</i>					
Government funding (Note)	166.4	183.9	213.7	222.1	247.4
Other income	60.4	53.8	49.2	56.3	42.8
Total	226.8	237.7	262.9	278.4	290.2
<i>Expenditure</i>					
Administrative and operating expenses	102.3	102.8	117.8	130.0	137.9
Staff costs	123.1	134.2	143.8	147.3	151.9
Finance costs	1.4	0.7	1.3	1.1	0.4
Total	226.8	237.7	262.9	278.4	290.2

*Source:* Audit Commission analysis of NAMI records

*Note:* According to NAMI, in each financial year, the amount of income recognised in the financial statements should match with the same amount of expenditure, as any unspent balance of project grants from ITF were returned to the Government.

### ***Governance and organisation structure***

1.10 ***Board of Directors.*** The Board of Directors (i.e. the Board) provides policy and strategic directions for NAMI and supervises the management of NAMI. The Board holds meetings at quarterly intervals. As at 30 June 2024, the Board had 16 members, comprising the Chairperson, the Commissioner for Innovation and Technology, and 14 members from various sectors including academic institutions,

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industries, trade associations and research institutions. The functions of the Board include:

- (a) steering the research direction of NAMI;
- (b) monitoring regularly the operational and financial sustainability of NAMI;
- (c) examining and endorsing the Annual Plans, the Annual Estimates and the performance targets; and
- (d) examining and approving the Quarterly Reports, the Annual Reports and the annual audited accounts.

1.11 ***Functional Committees.*** The Board established three functional committees (i.e. the Committees), namely the Technology Committee, the Finance and Administration Committee and the Audit Committee to support its work.

1.12 ***Organisation structure.*** NAMI is headed by a Chief Executive Officer, who is responsible to the Board of Directors, for the management of NAMI. As at 30 June 2024, NAMI had a total of 252 staff, comprising 189 R&D staff, and 63 administrative and support staff. An extract of organisation chart of NAMI as at 30 June 2024 is at Appendix A.

## ***Monitoring mechanism***

1.13 ITC monitors the operation and performance of NAMI and submits NAMI's progress reports to the Panel on Commerce, Industry, Innovation and Technology (Note 4) of LegCo on a regular basis. NAMI is required to submit the following to its Board and ITC every year:

- (a) an Annual Plan (including the expenditure budget and performance indicators);

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**Note 4:** *The then Panel on Commerce and Industry was renamed as the Panel on Commerce, Industry, Innovation and Technology with effect from 26 October 2022.*



- (b) Quarterly Reports and an Annual Report on its operation (including the staffing position, major activities and expenditure position); and
- (c) annual audited accounts of its operation and R&D projects.

1.14 ITC has set six performance indicators to assess the performance of NAMI. The performance of NAMI with reference to the six performance indicators for the period from 2019-20 to 2023-24 is shown in Table 2.

**Table 2**

**Performance of NAMI  
(2019-20 to 2023-24)**

<b>Performance indicator</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
(a) Level of industry and other income (Note 1)	47%	42%	43%	35%	46%
(b) Number of on-going projects involving industry participation (Note 2)	45	49	65	76	62
(c) Number of companies participating in on-going projects (Note 2)	57	73	95	117	105
(d) Number of organisations benefitting from the Public Sector Trial Scheme (PSTS) (Note 3)	9	34	40	44	46
(e) Number of researchers engaged under Research Talent Hub (Note 4)	Not applicable	31	28	24	22
(f) Number of patents filed and granted (Note 5)	68 (26)	85 (19)	85 (32)	86 (28)	87 (37)

*Source: Audit Commission analysis of ITC and NAMI records*

*Note 1: The level of industry and other income is calculated as: (industry contribution pledged + other sources of financial contribution pledged + commercialisation and other income received) ÷ project expenditure of projects approved by ITC × 100%. The targets set by ITC was 30% for the period from 2019-20 to 2022-23 and 35% for 2023-24.*

*Note 2: Figures denote the number of on-going projects involving industry participation and the number of companies participating in on-going projects as at the end date of the financial year (i.e. 31 March).*

*Note 3: PSTS is a funding scheme under ITF which provides funding support for the production of prototypes/samples and/or conducting of trials in the public sector to facilitate and promote the realisation and commercialisation of R&D results under ITF-funded projects (see para. 1.16(a)(iv)).*

**Table 2 (Cont'd)**

*Note 4: Research Talent Hub is a funding scheme under ITF which provides funding support to eligible organisations/companies on R&D projects to engage research talents to conduct R&D work. The scheme was launched in July 2020.*

*Note 5: Figures without brackets and figures in brackets denote the number of patents filed and the number of patents granted respectively for the year.*

***R&D projects***

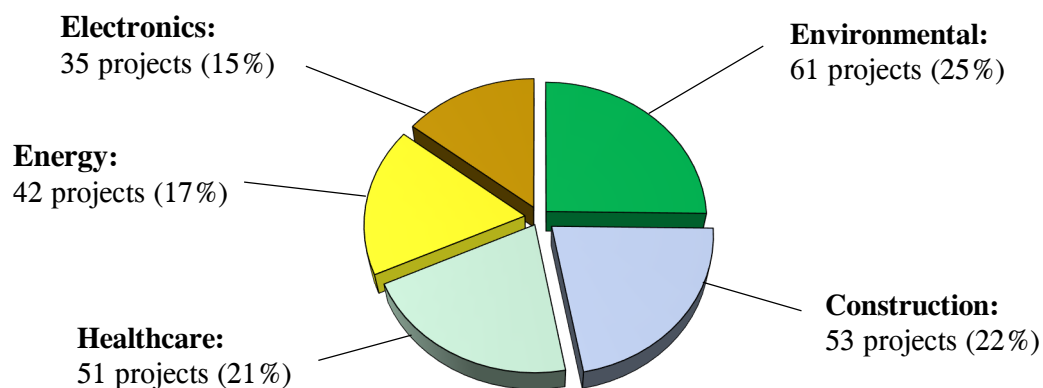
1.15 In the period from 2019-20 to 2023-24, NAMI completed 242 R&D projects (Note 5) with project costs totalling \$717.4 million. The 242 projects were classified into five market sectors, comprising 61 (25%) environmental, 53 (22%) construction, 51 (21%) healthcare, 42 (17%) energy and 35 (15%) electronics (see Figure 1). The results from the completed projects were applied in various market sectors. For example, a new generation of impact dissipating bollard developed by NAMI prevents vehicles from hitting pedestrians in traffic accidents and provides safety protection for vehicle passengers (see Photograph 1). As at 31 March 2024, 116 projects were in progress.

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**Note 5:** *These refer to the projects completed and with the final reports (or final audited accounts for PSTS projects (see para. 1.16(a)(iv)) submitted to ITC.*

**Figure 1**

**Completed R&D projects analysed by market sectors  
(2019-20 to 2023-24)**



*Source: Audit Commission analysis of NAMI records*

**Photograph 1**

**Impact dissipating bollard developed by NAMI**



*Source: NAMI records*

1.16 There are two types of R&D projects:

- (a) ***ITF-funded projects.*** ITF-funded projects are projects to which ITF contributes all or part of the project costs. They include:

- (i) ***Platform projects.*** Platform projects are industry-oriented applied R&D projects undertaken by NAMI with potential for commercialisation. Industry contribution of at least 10% of the total project cost is required. The intellectual property rights generated from the projects are vested with NAMI;
  - (ii) ***Collaborative projects.*** Collaborative projects are projects undertaken by NAMI in collaboration with industry partners. Industry contribution of at least 30% of the total project cost is required. The intellectual property rights generated from the projects are owned by the industry partners if they have contributed more than 50% of the total project cost;
  - (iii) ***Seed projects.*** Seed projects undertaken by NAMI are more exploratory and forward-looking in nature. No industry contribution is required; and
  - (iv) ***PSTS projects.*** PSTS projects are projects that promote the adoption of local technology products and services by public sector organisations, and eligible for funding support from PSTS under ITF (see Note 3 to Table 2 in para. 1.14). No industry contribution is required; and
- (b) ***Contract research projects.*** Contract research projects are projects initiated and financially supported by the industry. No funding support from ITF is involved.

## Audit review

1.17 In April 2024, the Audit Commission (Audit) commenced a review of NAMI. This audit has focused on the following areas:

- (a) project management (PART 2);
- (b) industry income and commercialisation (PART 3);
- (c) administrative expenditure and corporate governance (PART 4); and

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- (d) other issues (PART 5).

Audit has found room for improvement in the above areas and has made a number of recommendations to address the issues.

## **General response from the Government and Nano and Advanced Materials Institute**

1.18 The Commissioner for Innovation and Technology agrees with the audit recommendations and would like to thank Audit for the professionalism throughout the audit review. He has said that ITC will:

- (a) continue to spearhead Hong Kong's drive to become a world-class, knowledge-based economy with a view to charting Hong Kong in moving full steam towards the vision of an international I&T centre as promulgated in the Hong Kong Innovation and Technology Development Blueprint; and
- (b) follow up the audit recommendations related to ITC and oversee NAMI's efforts in following up the audit recommendations regarding their operation.

1.19 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations and will take appropriate follow-up action.

## **Acknowledgement**

1.20 Audit would like to acknowledge with gratitude the full cooperation of the staff of ITC and NAMI during the course of the audit review.

## **PART 2: PROJECT MANAGEMENT**

2.1 This PART examines the project management of NAMI, focusing on the following areas:

- (a) management of ITF-funded projects (paras. 2.2 to 2.15);
- (b) management of contract research projects (paras. 2.16 to 2.22); and
- (c) other project related issues (paras. 2.23 to 2.39).

### **Management of Innovation and Technology Fund funded projects**

2.2 For ITF-funded projects, in the period from 2019-20 to 2023-24, there were 181 projects completed with project costs totalling \$671.9 million. As at 31 March 2024, there were 109 on-going ITF-funded projects (see Table 3).

**Table 3****Number of ITF-funded projects  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
On-going projects as at 1 April (a)	67	70	80	95	111
Add: Projects commenced (b)	43	42	52	42	44
Less: Projects completed (c)	40	32	37	26	46
On-going projects as at 31 March (d) = (a) + (b) – (c)	70	80	95	111	109

*Source: Audit analysis of NAMI records*

***Performance targets on number of projects commenced not met***

2.3 NAMI sets performance targets on the number of ITF-funded projects commenced in its Annual Plans and reports the achievements in its Annual Reports. Audit analysed the number of ITF-funded projects commenced in the period from 2019-20 to 2023-24. Audit found that there were shortfalls in the numbers of projects commenced as compared to the targets:

- (a) 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 (see Table 4);



Table 4

**Number of ITF-funded projects commenced  
(2019-20 to 2023-24)**

	2019-20	2020-21	2021-22	2022-23	2023-24
Target (a)	47	49	51	53	54
Actual (b)	43	42	52	42	44
Shortfall/(Surplus) (c) = (a) – (b)	4 (9%)	7 (14%)	(1) (2%)	11 (21%)	10 (19%)

Source: Audit analysis of NAMI records

- (b) among the ITF-funded projects, collaborative projects, seed projects and PSTS projects recorded shortfalls in number of projects commenced. The targets on numbers of collaborative projects, seed projects and PSTS projects commenced were not met in 4 (80%), 4 (80%) and 2 (40%) of the 5 years respectively (see Table 5); and

**Table 5**

**Number of collaborative projects,  
seed projects and PSTS projects commenced  
(2019-20 to 2023-24)**

	2019-20	2020-21	2021-22	2022-23	2023-24
<b><i>Collaborative projects</i></b>					
Target (a)	27	20	20	20	18
Actual (b)	22	14	23	15	9
Shortfall/(Surplus) (c) = (a) – (b)	5 (19%)	6 (30%)	(3) (15%)	5 (25%)	9 (50%)
<b><i>Seed projects</i></b>					
Target (d)	11	15	13	11	15
Actual (e)	11	6	11	9	13
Shortfall/(Surplus) (f) = (d) – (e)	0 (0%)	9 (60%)	2 (15%)	2 (18%)	2 (13%)
<b><i>PSTS projects</i></b>					
Target (g)	4	6	8	7	5
Actual (h)	4	10	6	3	6
Shortfall/(Surplus) (i) = (g) – (h)	0 (0%)	(4) (67%)	2 (25%)	4 (57%)	(1) (20%)

*Source: Audit analysis of NAMI records*

- (c) while the reasons for shortfalls in meeting the targets on the number of ITF-funded projects commenced were discussed at the Board/Committee meetings, such reasons were not always documented.

2.4 Audit considers that NAMI needs to:

- (a) take measures to ensure that the target numbers of ITF-funded projects commenced are met; and
- (b) document the reasons why the actual numbers of ITF-funded projects commenced were less than the targets.

***Performance targets on number of projects completed not met***

2.5 Apart from the number of ITF-funded projects commenced, NAMI also sets performance targets on the number of ITF-funded projects completed in its Annual Plans and reports the achievements in its Annual Reports. Audit analysed the number of ITF-funded projects completed in the period from 2019-20 to 2023-24. Audit found that the 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 (see Table 6). Audit also noted that while the reasons for shortfalls in meeting the targets on the number of ITF-funded projects completed were discussed at the Board/Committee meetings, such reasons were not always documented.

**Table 6**

**Number of ITF-funded projects completed  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
Target (a)	46	46	51	58	63
Actual (b)	40	32	37	26	46
Shortfall (c) = (a) – (b)	6 (13%)	14 (30%)	14 (27%)	32 (55%)	17 (27%)

*Source: Audit analysis of NAMI records*

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2.6 Audit considers that NAMI needs to:

- (a) take measures to ensure that the target numbers of ITF-funded projects completed are met; and
- (b) document the reasons why the actual numbers of ITF-funded projects completed were less than the targets.

### ***Need to ensure that projects commence and are completed in a timely manner***

2.7 For projects with approved funding from ITF, NAMI enters into project agreements with ITC. The target dates of project commencement and project completion are stipulated in the project agreements. Audit examined the 46 ITF-funded projects completed in 2023-24 with project costs totalling \$183.6 million and found that:

- (a) ***Delay in project commencement.*** 1 (2%) project commenced 6 months later than the target date of commencement stipulated in the project agreement; and
- (b) ***Delays in project completion.*** 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 (see Table 7).

Table 7

**Delays in project completion  
(2023-24)**

<b>Delay</b>	<b>Number of projects</b>
6 months or less	11 (32 %)
More than 6 to 12 months	18 (53 %)
More than 12 months (Note)	5 (15 %)
Total	34 (100 %)

*Source: Audit analysis of NAMI records*

*Note: The longest delay was 18 months.*

2.8 In response to Audit's enquiry, NAMI informed Audit in October 2024 that:

- (a) for the project with delay in commencement (see para. 2.7(a)), the industry co-applicant of the project requested to transfer the project collaboration to its wholly-owned subsidiary with a realignment of business scope. The delay was primarily due to the need for thorough discussions and evaluations to ensure that the subsidiary was fully equipped to take on the project responsibilities; and
- (b) for the projects with delays in completion (see para. 2.7(b)), the delays were primarily attributed to unforeseeable technical difficulties encountered during the R&D progress, late shipment of equipment/consumables and difficulty in recruitment of R&D staff during the coronavirus disease (COVID-19) epidemic.

2.9 Audit considers that NAMI needs to take measures to ensure that ITF-funded projects commence and are completed in a timely manner.

### *Delays in submission of final reports*

2.10 According to the project agreements between ITC and NAMI, NAMI is required to submit final reports to ITC within 2 months after the project completion date or a date directed by the Commissioner for Innovation and Technology. Audit examined the submission of final reports of the 46 ITF-funded projects completed in 2023-24 and found that the final reports of 18 (39%) projects were submitted to ITC with average delay of 13 days, ranging from 1 to 53 days (see Table 8).

**Table 8**  
**Delays in submission of final reports**  
**(2023-24)**

Delay	Number of projects
10 days or less	11 (61%)
More than 10 to 20 days	5 (28%)
More than 20 days (Note)	2 (11%)
Total	18 (100%)

*Source:* Audit analysis of NAMI records

*Note:* The longest delay was 53 days.

2.11 Audit considers that NAMI needs to take measures to ensure that final reports of ITF-funded projects are submitted to ITC in a timely manner.

### *Room for improvement in conducting post-project evaluation*

2.12 Upon completion of ITF-funded projects, ITC requires NAMI to submit post-project evaluation reports. The reports contain questionnaires completed by NAMI's project teams and industry partners for evaluation of the projects. The questionnaires comprised questions such as usefulness of the project results and willingness/likelihood for adopting of the project results in the industry. Audit

examined the 47 ITF-funded projects with post-project evaluation reports due for submission in 2023-24 and found room for improvement, as follows:

- (a) ***Post-project evaluation reports not always submitted in a timely manner.*** The submission timeframes of the reports for platform projects, seed projects, collaborative projects and PSTS projects are 2 years, 2 years, 1 year and 6 months after project completion respectively. For 24 (51%) projects, post-project evaluation reports had been submitted to ITC. For 2 (8%) of the 24 projects, post-project evaluation 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) ***No follow-up actions on results of a post-project evaluation report.*** For a project, the respondent indicated in the post-project evaluation report that the project results would not bring benefits to its operation. However, there was no documentary evidence showing that NAMI had taken follow-up actions on the results of the report.

2.13 Audit considers that NAMI needs to take measures to ensure that:

- (a) post-project evaluation reports are submitted to ITC in a timely manner; and
- (b) appropriate follow-up actions are taken on the results of the post-project evaluation reports.

## Audit recommendations

2.14 Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

- (a) **take measures to ensure that the target numbers of ITF-funded projects commenced/completed are met;**

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- (b) **document the reasons why the actual numbers of ITF-funded projects commenced/completed were less than the targets;**
- (c) **take measures to ensure that ITF-funded projects commence and are completed in a timely manner;**
- (d) **take measures to ensure that final reports of ITF-funded projects are submitted to ITC in a timely manner; and**
- (e) **take measures to ensure that:**
  - (i) **post-project evaluation reports are submitted to ITC in a timely manner; and**
  - (ii) **appropriate follow-up actions are taken on the results of the post-project evaluation reports.**

## **Response from Nano and Advanced Materials Institute**

2.15 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations. He has said that:

- (a) NAMI actively incubates and closely monitors the number of different types of new ITF-funded projects to commence in achieving the relevant annual targets. With the enhanced accountability of the Project Administration Team, NAMI will strive to ensure new ITF-funded projects commence and are completed on time so as to align with the yearly target;
- (b) NAMI will step up its efforts in assessing the market needs and collaborate with the industries and relevant departments/organisations for project ideas generation and incubation, as well as promotion of NAMI's technologies to initiate worthwhile projects, and will closely monitor the project progress to ensure that the target numbers of ITF-funded projects commenced/completed are met;
- (c) NAMI has sought to explain the reasons why the actual numbers of ITF-funded projects commenced/completed were less than the targets for



Board/Committee's review but will be mindful of the need to always properly document the explanations;

- (d) NAMI will continue to proactively monitor the progress of project implementation, plan for project commencement and strengthen communications with industry sponsors/industry co-applicants, trial organisations and equipment/service providers, and take appropriate action timely if there is any issue which may affect the timely delivery of the projects;
- (e) from October 2024, NAMI has strengthened the monitoring mechanism by the Project Administration Team and enhanced the workflow and governance for timely submission of progress reports and final reports. New project governance has been set up to segregate technical implementation with project management for clear accountabilities. Such changes have been extended to cover end to end process from incubation to project completion; and
- (f) NAMI has strengthened the monitoring mechanism by the Project Administration Team, and will issue reminders to individual project teams well in advance for timely submission of post-project evaluation reports and follow up projects with room for improvement on application of R&D solutions.

## Management of contract research projects

2.16 NAMI also conducts contract research projects which are initiated and financially supported by the industry (see para. 1.16(b)). For contract research projects, in the period from 2019-20 to 2023-24, there were 61 projects completed. The 61 projects generated income totalling \$52.3 million, with surplus totalling \$6.8 million. The average income generated from each project was \$0.9 million, ranging from \$39,000 to \$4.5 million. As at 31 March 2024, there were 7 on-going contract research projects.

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### ***Performance targets on number of contract research projects commenced not met***

2.17 NAMI sets performance targets on the number of contract research projects commenced in its Annual Plans and reports the achievements in its Annual Reports. Audit analysed the number of contract research projects commenced in the period from 2019-20 to 2023-24. Audit found that:

- (a) the targets 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. There was no documentary evidence showing that NAMI had ascertained the reasons why the targets on the number of contract research projects commenced were not met; and
- (b) the target number of contract research projects commenced decreased by 50% from 10 in 2022-23 to 5 in 2023-24. While there was shortfall in meeting the target by 40% in 2022-23, there was an over-achievement on target number of contract research projects commenced by 60% in 2023-24. There was no documentary evidence showing the rationale for adjusting the performance target significantly (see Table 9).

**Table 9**

**Number of contract research projects commenced  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
Target (a)	12	10	10	10	5
Actual (b)	11	20	8	6	8
Shortfall/(Surplus) (c) = (a) – (b)	1 (8%)	(10) (100%)	2 (20%)	4 (40%)	(3) (60%)

*Source: Audit analysis of NAMI records*

2.18 Audit considers that NAMI needs to:

- (a) take measures to ensure that the target numbers of contract research projects commenced are met;
- (b) ascertain and document the reasons why the actual numbers of contract research projects commenced were less than the targets; and
- (c) document the rationale for making significant adjustments to the performance targets on the number of contract research projects commenced.

### ***Need to consider setting more challenging targets on income from contract research projects***

2.19 NAMI sets performance targets on the income from contract research projects in its Annual Plans and reports the achievement in its Annual Reports. 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. During the period, the over-achievements ranged from 4% to 88% (see Table 10).

**Table 10****Income from contract research projects  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
Target (\$ million) (a)	8.2	6.8	7.0	7.0	5.6
Actual (\$ million) (b)	8.0	12.8	7.3	7.8	9.3
Shortfall/(Surplus) (\$ million) (c) = (a) – (b)	0.2 (2 %)	(6.0) (88 %)	(0.3) (4 %)	(0.8) (11 %)	(3.7) (66 %)

*Source: Audit analysis of NAMI records*

2.20 To ensure effective performance management, Audit considers that NAMI needs to consider setting more challenging targets on the income from contract research projects.

**Audit recommendations**

2.21 **Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:**

- (a) **take measures to ensure that the target numbers of contract research projects commenced are met;**
- (b) **ascertain and document the reasons why the actual numbers of contract research projects commenced were less than the targets;**
- (c) **document the rationale for making significant adjustments to the performance targets on the number of contract research projects commenced; and**

- (d) **consider setting more challenging targets on the income from contract research projects.**

## **Response from Nano and Advanced Materials Institute**

2.22 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations. He has said that:

- (a) NAMI actively incubates and closely monitors the number of contract research projects to commence in achieving the relevant annual targets. With the enhanced accountability of Project Administration Team, NAMI will closely monitor the technical and business related preparation work to ensure that successfully incubated contract research projects commence on time to meet the yearly target;
- (b) NAMI will step up its effort in assessing the market needs and collaborate with the industries and relevant departments/organisations for project ideas generation and incubation, as well as promotion of NAMI's technologies to ensure that the target numbers of contract research projects commenced are met;
- (c) NAMI will continue to be mindful of meeting the target numbers and include reasons for the shortfalls and recommend follow-up actions for Board/Committee's review;
- (d) NAMI will document the rationale for making any significant adjustments to the performance targets on the number of contract research projects commenced for Board/Committee's review; and
- (e) NAMI will consider setting more challenging targets on the income from contract research projects, with due consideration to NAMI's technology R&D achievement, overall economic environment and market needs.

### Other project related issues

#### *Need to improve laboratory safety inspections*

2.23 NAMI has 7 laboratories for conducting R&D activities. To ensure safety of the laboratories and compliance with safety regulations, NAMI conducts laboratory safety inspections on the laboratories on a bi-monthly basis. After the safety inspections, the Laboratory Safety Team (Note 6) prepares laboratory safety inspection reports to document the findings. The report includes a checklist of safety checking procedures on items such as chemicals inventory and storage. NAMI's Directors of Research and Development review and approve the reports.

2.24 In May 2024, Audit accompanied the Laboratory Safety Team in the conduct of the laboratory safety inspections on 2 laboratories (see Photograph 2). Audit observed the following 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. Examples identified by Audit included:
  - (i) the item "First aid kit is present and properly stocked" was not covered in 1 of the 2 laboratories;
  - (ii) the item "Inspection tag is in valid period" was not covered for the fire extinguishers in both laboratories;
  - (iii) the item "Equipment log sheets are properly signed" was not covered in both laboratories; and
  - (iv) the item "All chemicals are in the inventory list, and controlled chemicals are within the allowed quantity" was not thoroughly

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**Note 6:** *The Laboratory Safety Team comprises a Senior Laboratory Manager and two Laboratory Managers.*

covered in both laboratories. The Laboratory Safety Team did not check the chemicals in the laboratories against an inventory list. Furthermore, only 2 to 3 samples of the controlled chemicals were selected for checking in each laboratory. However, there was no documentary evidence showing the basis of determining the number of samples to be checked in each inspection.

### Photograph 2

#### Laboratory safety inspection (May 2024)



*Source: Photograph taken by Audit staff  
in May 2024*

2.25 In Audit's view, laboratory safety inspections are important for minimising the risk of accidents and injuries. Audit considers that NAMI needs to take measures to improve the laboratory safety inspections, including:

- (a) reminding its staff to complete the laboratory safety inspection reports only after the inspections; and
- (b) completing all checking procedures listed on the laboratory safety inspection reports.

### ***Need to ensure that remedial actions are taken on non-compliances found during the laboratory safety inspections***

2.26 In the period from 2019-20 to 2023-24, 120 laboratory safety inspections were conducted. For 62 (52%) inspections, one or more non-compliances were found (e.g. emergency exit was blocked and flammable chemicals were not stored properly). For the non-compliances found, remedial actions to be taken, responsible staff for following up, and target and actual completion dates of the remedial actions are required to be documented in the laboratory safety inspection reports. Audit examined the inspection reports of the 62 inspections with non-compliances found. Audit found that for 15 (24%) inspections with non-compliances found, there was no documentary evidence showing that remedial actions had been taken.

2.27 Audit considers that NAMI needs to take measures to ensure that remedial actions are taken on the non-compliances found during the laboratory safety inspections and the details of the remedial actions are documented.

### ***Some laboratory safety inspection reports were not reviewed or approved by senior management***

2.28 After the laboratory safety inspection reports are prepared, NAMI's Directors of Research and Development review and approve the reports. According to an internal audit report issued by a consultancy firm in August 2022, there was no evidence showing that the inspection reports had been reviewed. In response to the recommendations made in the internal audit report, since August 2022, NAMI has required the senior management to sign on the inspection reports as proof of their review. In the period from August 2022 to March 2024, 40 inspection reports were compiled. Audit found that up to 30 June 2024, for 3 (8%) inspection reports, there was no documentary evidence showing that the Directors of Research and Development had reviewed the inspection reports.

2.29 Audit considers that NAMI needs to take measures to ensure that all laboratory safety inspection reports are reviewed and approved by its Directors of Research and Development to enhance the monitoring of laboratory safety management.



*Need to ensure clarity in reporting performance indicators*

2.30 ITC has set 6 performance indicators to assess the performance of NAMI (see Table 2 in para. 1.14). 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 PSTS for the period from 2019-20 to 2023-24. Audit found that there were differences between the numbers reported in the papers submitted to LegCo and those based on NAMI's supporting records, as follows:

- (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 (see Table 11); and

**Table 11**

**Difference between the number of companies  
participating in on-going projects reported in the papers submitted to LegCo  
and that based on NAMI's supporting records  
(31 March 2020 to 31 March 2024)**

	As at 31 March				
	2020	2021	2022	2023	2024
As reported in papers submitted to LegCo (a)	57	73	95	117	105
Based on NAMI's supporting records (b)	52	60	78	98	88
Difference (c) = (a) – (b)	5 (10%)	13 (22%)	17 (22%)	19 (19%)	17 (19%)

*Source: Audit analysis of ITC and NAMI records*

## Project management

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- (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 (see Table 12).

**Table 12**

**Difference between the number of organisations  
benefitting from PSTS reported in the papers submitted to LegCo and  
that based on NAMI's supporting records  
(2019-20 to 2023-24)**

	2019-20	2020-21	2021-22	2022-23	2023-24
As reported in papers submitted to LegCo (a)	9	34	40	44	46
Based on NAMI's supporting records (b)	6	19	21	27	26
Difference (c) = (a) – (b)	3 (50%)	15 (79%)	19 (90%)	17 (63%)	20 (77%)

*Source: Audit analysis of ITC and NAMI records*

### 2.31 According to NAMI:

- (a) when a company participated in more than one on-going project, this company would be counted as more than one company because the company may benefit from different aspects of different R&D outcomes from different R&D projects conducted by NAMI. For example, in 2023-24, a company participated in four on-going projects and NAMI counted that as four companies participating in on-going projects for the performance indicator; and
- (b) when an organisation benefitted from more than one PSTS project, this organisation would be counted as more than one organisation because the organisation may benefit from different aspects of different R&D outcomes with different application scenarios. For example, in 2023-24, an

organisation benefitted from six PSTS projects and NAMI counted that as six organisations benefitting from PSTS for the performance indicator.

2.32 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. Audit considers that ITC and NAMI need to take measures to ensure clarity in reporting performance indicators and clearly define the performance indicators in the papers submitted to LegCo (e.g. adding an explanatory note on the calculation basis of the performance indicators).

***Number of researchers engaged under Research Talent Hub decreased***

2.33 Launched in July 2020, Research Talent Hub is a funding scheme under ITF which provides funding support to eligible organisations/companies on R&D projects to engage research talents to conduct R&D work. Each ITF-funded project may engage up to four researchers at any one time under open recruitment. The maximum engagement period for each researcher is 36 months in general. ITC reported the number of researchers engaged under Research Talent Hub as a performance indicator of NAMI to the Panel on Commerce, Industry, Innovation and Technology of LegCo. Audit analysed the number of researchers engaged under Research Talent Hub in the period from 2020-21 to 2023-24 and found that:

- (a) the number of researchers engaged under Research Talent Hub decreased by 29% from 31 in 2020-21 to 22 in 2023-24 (see Table 2 in para. 1.14); and
- (b) there was no documentary evidence showing that NAMI had ascertained the reasons for the decrease in number of researchers engaged and taken any improvement actions to address the issue.

2.34 In response to Audit's enquiry, NAMI informed Audit in October 2024 that the ITF-funded projects were primarily carried out by its in-house R&D staff so as to cultivate and nurture a pool of long-term R&D experts in NAMI's technology areas, and would be supplemented by researchers engaged under the Research Talent Hub.

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2.35 Audit considers that NAMI needs to:

- (a) take measures to increase the number of researchers engaged under Research Talent Hub; and
- (b) document the reasons for the decrease in number of researchers engaged under Research Talent Hub.

## **Audit recommendations**

2.36 Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

- (a) **take measures to improve the laboratory safety inspections, including:**
  - (i) **reminding NAMI staff to complete the laboratory safety inspection reports only after the inspections; and**
  - (ii) **completing all checking procedures listed on the laboratory safety inspection reports;**
- (b) **take measures to ensure that remedial actions are taken on the non-compliances found during the laboratory safety inspections and the details of the remedial actions are documented;**
- (c) **take measures to ensure that all laboratory safety inspection reports are reviewed and approved by NAMI's Directors of Research and Development to enhance the monitoring of laboratory safety management;**
- (d) **take measures to increase the number of researchers engaged under Research Talent Hub; and**
- (e) **document the reasons for the decrease in number of researchers engaged under Research Talent Hub.**

2.37 **Audit has also *recommended* that the Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute, should take measures to ensure clarity in reporting performance indicators and clearly define the performance indicators in the papers submitted to LegCo (e.g. adding an explanatory note on the calculation basis of the performance indicators).**

## **Response from Nano and Advanced Materials Institute**

2.38 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations in paragraph 2.36. He has said that:

- (a) NAMI's laboratory safety measures have always been in place and executed. Laboratory safety manual is circulated to all project staff on a quarterly basis and whenever there are updates. Laboratory safety trainings for project staff are also conducted bi-monthly, and for all newly recruited staff during orientation. To ensure safety is the utmost critical consideration, NAMI agrees that the protocol for conducting laboratory safety inspections needs to be tightened up. NAMI has reminded its Laboratory Safety Team to follow strictly the standard protocol for laboratory safety inspections and has revised the template of the laboratory safety inspection report to suit all purposes for inspection of different laboratories. In addition to scheduled laboratory safety inspections, more random inspections will be conducted;
- (b) NAMI has instructed its Laboratory Safety Team to document all remedial actions on the non-compliances and improvement items found during the laboratory safety inspections in the laboratory safety inspection reports for endorsement by the respective Directors of Research and Development and the Chief Technology Officer;
- (c) NAMI has reminded all Directors of Research and Development to review and approve the laboratory safety inspection reports in a timely manner;
- (d) NAMI will keep assessing the possibility of maximising the engagement of researchers under Research Talent Hub; and

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- (e) NAMI will strengthen the monitoring of the performance in meeting the target under Research Talent Hub, and include the reasons for the shortfalls and the recommended follow-up actions for Board/Committee's review.

## **Response from the Government and Nano and Advanced Materials Institute**

2.39 The Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute agree with the audit recommendation in paragraph 2.37. The Commissioner for Innovation and Technology has said that the approach on calculating the number of companies participating in on-going projects and the number of organisations benefitting from PSTS has been consistently adopted since the first reporting to LegCo in 2017-18 and agreed that an explanatory note on the calculation basis of the performance indicators will be added in future reports to LegCo to avoid any misunderstanding.

## **PART 3: INDUSTRY INCOME AND COMMERCIALISATION**

3.1 This PART examines the issues relating to the industry income in projects and commercialisation of project results, focusing on the following areas:

- (a) industry income (paras. 3.2 to 3.13); and
- (b) commercialisation of project results (paras. 3.14 to 3.32).

### **Industry income**

#### ***Performance targets on industry contribution not met***

3.2 For ITF-funded projects, NAMI sets performance targets on the industry contribution in its Annual Plans and reports the achievements in its Annual Reports. Industry contribution is calculated as industry contribution pledged divided by approved project expenditure (Note 7). 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 (see Table 13).

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**Note 7:** *The costs of certain projects with sponsorship waived by the Commissioner for Innovation and Technology are excluded in the calculation.*

**Table 13****Industry contribution  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
Target (a)	29.5%	28.1%	29.7%	27.9%	26.1%
Actual (b)	30.8%	25.9%	28.6%	22.3%	22.5%
Shortfall/(Surplus) (percentage points) (c) = (a) – (b)	(1.3)	2.2	1.1	5.6	3.6

*Source: Audit analysis of NAMI records*

### 3.3 According to NAMI:

- (a) against the backdrop of a challenging global economic environment in 2023-24, many companies had been adopting a conservative approach to R&D investment. As a result, the number of collaborative projects (which require industry partners to contribute at least 30% of the project cost) had dropped; and
- (b) while NAMI would proactively seek industry partners for collaboration, it would also step up its commercialisation efforts so as to enable companies (especially small and medium enterprises) that could not invest in the early stages of R&D to utilise its R&D outcomes by other means, e.g. by licensing.

### 3.4 Audit considers that NAMI needs to take measures to encourage the industry partners to increase their contribution in projects.



### *Performance targets on level of industry and other income not met*

3.5 Apart from industry contribution, the performance target on level of industry and other income (see Note 1 to Table 2 in para. 1.14) also covers commercialisation income (e.g. licensing fees) and other income (e.g. income from contract research projects). Since 2017-18, ITC has set a target of 30%. In 2023-24, the target was raised to 35%. Apart from ITC's targets, NAMI also sets its own targets for each year, which were higher than the targets set by ITC. 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%) of the 5 years, with shortfalls of 4.3 percentage points and 5.8 percentage points (see Table 14); and

**Table 14****Level of industry and other income  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
ITC's target (a)	30%	30%	30%	30%	35%
NAMI's target (b)	44.9%	46.3%	41.3%	40.8%	41.3%
Actual (c)	47%	42%	43%	35%	46%
Shortfall/(Surplus) between NAMI's target and actual level of industry and other income (percentage points) (d) = (b) – (c)	(2.1)	4.3	(1.7)	5.8	(4.7)

*Source:* Audit analysis of ITC and NAMI records

- (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 (see Table 15).

**Table 15**

**Actual level of industry and other income for the R&D Centres  
(2019-20 to 2023-24)**

<b>R&amp;D Centre</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
APAS	44 %	41 %	41 %	47 %	54 %
ASTRI	33 %	34 %	50 %	63 %	65 %
HKRITA	79 %	31 %	47 %	103 %	47 %
LSCM	94 %	65 %	105 %	60 %	54 %
NAMI	47 %	42 %	43 %	35 %	46 %

*Source: Audit analysis of ITC records*

3.6 In June 2024, ITC informed the Panel on Commerce, Industry, Innovation and Technology of LegCo that it was considering to raise the target on level of industry and other income to 40% in 2024-25 and would explore the possibility of raising the target further to 50% in the long run. Audit considers that NAMI needs to step up efforts in achieving the performance target on level of industry and other income.

***Differences in reported level of industry and other income***

3.7 In respect of the level of industry and other income, the achievements of the performance target were included in the progress reports submitted to the Panel of Commerce, Industry, Innovation and Technology of LegCo and NAMI's Annual Reports. 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 that reported in the papers submitted to LegCo respectively (see Table 16).

**Table 16**

**Differences in the levels of industry and other income reported in NAMI's Annual Reports and those reported in the papers submitted to LegCo (2019-20 and 2023-24)**

	<b>2019-20</b>	<b>2023-24</b>
As reported in NAMI's Annual Reports (a)	42.5 %	38.2 %
As reported in the papers submitted to LegCo (b)	47 %	46 %
Difference (percentage points) (c) = (a) – (b)	(4.5)	(7.8)

*Source: Audit analysis of ITC and NAMI records*

3.8 In response to Audit's enquiry, ITC informed Audit in October 2024 that:

- (a) the differences in the levels of industry and other income reported in the papers submitted to LegCo and in NAMI's Annual Reports were because of a different methodology adopted in calculating the level of industry and other income by ITC and NAMI; and
- (b) it had requested NAMI to adopt the methodology in alignment with other R&D Centres in future.

3.9 Audit considers that ITC and NAMI need to take measures to ensure that a consistent basis is adopted in calculating and reporting the level of industry and other income.

## **Audit recommendations**

3.10 Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

- (a) **take measures to encourage the industry partners to increase their contribution in projects; and**
- (b) **step up efforts in achieving the performance target on level of industry and other income.**

**3.11      Audit has also *recommended* that the Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute, should take measures to ensure that a consistent basis is adopted in calculating and reporting the level of industry and other income.**

## **Response from Nano and Advanced Materials Institute**

**3.12      The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations in paragraph 3.10. He has said that:**

- (a) **NAMI will strive to develop competitive technologies to galvanise support from its industry partners, enhance its outreach activities to proactively engage potential industry partners by organising and participating in more exhibitions and roadshows, and extend these efforts to GBA and countries participating in the Belt and Road Initiative; and**
- (b) **notwithstanding the fact that NAMI, as one of the public R&D Centres, needs to strike a reasonable balance between increasing its level of industry and other income and benefitting the industry/community through technology transfer, NAMI will step up its efforts in conducting more technology transfer through licensing and contract research projects by proactively promoting NAMI's technologies and developing different licensing models catered for industry partners with different background.**

## **Response from the Government and Nano and Advanced Materials Institute**

**3.13      The Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute agree with the audit recommendation in paragraph 3.11. The Commissioner for Innovation and Technology has said that**

all R&D Centres, including NAMI, have been required to adopt the same standard methodology provided by ITC to calculate and report the level of industry and other income and the Centres have followed up accordingly.

### Commercialisation of project results

3.14 It is ITC's policy to encourage the R&D Centres to take active steps to disseminate their R&D results widely and encourage transfer, realisation or commercialisation of relevant technologies to the industry for application and further development. According to NAMI, regarding patents, it follows the common practice adopted by many research institutions around the world. When a technology knowhow which is innovative and appropriate for wider commercial use is being developed, NAMI usually files provisional patent applications with respective patent offices to protect its intellectual property rights, which are then followed by standard patent applications, as the entire examination process of a standard patent application takes at least 2 to 3 years for approval. NAMI owns the intellectual property rights generated from the R&D results and files patents for the following types of projects:

- (a) platform projects;
- (b) seed projects; and
- (c) collaborative projects with industry contribution of less than 50% of the project costs.

As at 31 March 2024, NAMI had 229 patents granted. In the period from 2019-20 to 2023-24, NAMI filed 411 patent applications with 142 patents granted (see Table 17).

**Table 17**

**Patent applications  
(2019-20 to 2023-24)**

	<b>2019- 20</b>	<b>2020- 21</b>	<b>2021- 22</b>	<b>2022- 23</b>	<b>2023- 24</b>	<b>Overall</b>
As at 1 April (a)	115	96	137	154	168	115
Add: Filed (b)	68	85	85	86	87	411
Less:						
(i) Granted	26	19	32	28	37	142
(ii) Discontinued (Note 1)	27	8	6	19	21	81
(iii) Expired provisional patent applications (Note 2)	34	17	30	25	23	129
Total (c)	87	44	68	72	81	352
As at 31 March (Note 3) (d) = (a) + (b) – (c)	96	137	154	168	174	174

*Source: Audit analysis of NAMI records*

*Note 1: Figures represent discontinued standard patent applications and expired provisional patent applications without filing standard patent applications.*

*Note 2: According to NAMI, these applications refer to provisional patent applications filed to patent offices. A provisional patent expires in 12 to 18 months from the date of filing. For certain projects, NAMI would initially file provisional patent applications because lower costs were involved and to preserve its intellectual property right interest at an earlier stage. Upon expiry of these provisional patent applications, after critically reviewing whether the technology knowhow warrants filing of a standard patent with regard to a basket of factors (see para. 3.17), NAMI would normally file corresponding standard patent applications in accordance with the requirements of the patent offices.*

*Note 3: Figures represent pending standard patent applications and provisional patent applications in effect.*

## Industry income and commercialisation

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3.15 There are two main modes of commercialisation:

- (a) ***Licensing fees.*** For platform projects and seed projects, NAMI grants licensees the non-exclusive right to make use of the products or technologies developed under the projects for a specific period by paying an upfront licensing fee; and
- (b) ***Royalties.*** For collaborative projects with industry contribution of less than 50% of the project costs, NAMI grants the industry co-applicants making contribution to the project costs an exclusive licence for the use of the products or technologies developed under the projects for a specific period by paying royalties each year. The amount of royalties is accrued from the sales, application, usage or consumption of the products or technologies, or a minimum payment stated in the project agreements, whichever is higher. The minimum payment would recover at least 20% of ITF's funding of the project.

In the period from 2019-20 to 2023-24, commercialisation income from licensing fees and royalties totalling \$27.9 million were generated, ranging from \$4.2 million to \$6.8 million each year.

3.16 Apart from the performance indicator on number of patents granted/filed, NAMI has also set the following performance indicators on the utilisation of research output and the quality of R&D projects:

- (a) number of academic/industry awards;
- (b) number of licensing agreements signed; and
- (c) number of contract research projects commenced (see para. 2.17).

### ***Need to reduce discontinued patent applications***

3.17 According to NAMI, it will critically review whether the technology knowhow warrants filing of a standard patent with regard to a basket of factors, including the commercialisation income generated by the patent, the maintenance cost, the likelihood for the patent to be used as a background intellectual property for R&D



projects in the future, whether there are similar patents utilising more advanced technologies developed by NAMI or in the market, whether the patent is still relevant to NAMI's future development, etc. During the course of standard patent applications, NAMI will continuously review the applications with regard to the aforementioned factors and decide whether the applications should be continued.

3.18 In the period from 2019-20 to 2023-24, 81 patent applications were discontinued (see Table 17 in para. 3.14). Audit examined the 294 patent applications (comprising 195 standard patent applications and 99 provisional 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.

3.19 In response to Audit's enquiry, NAMI informed Audit in October 2024 that:

- (a) those 33 patent applications were discontinued because of a basket of factors, including the latest market and R&D development, scale-up potential and change in filing strategy; and
- (b) for the 25 projects mentioned in paragraph 3.18, there were other patent applications of which 12 patents had been granted while another 19 patent applications were pending filing results.

3.20 Audit considers that NAMI needs to take measures to reduce discontinued patent applications.

### ***Need to closely monitor the large number of pending patents***

3.21 In the period from 2019-20 to 2023-24, a total of 89 projects comprising platform projects, seed projects and collaborative projects with industry contribution of less than 50% of the project costs were completed, in which NAMI had filed patents for products or technologies developed by the projects (see para. 3.14). As at

## Industry income and commercialisation

31 March 2024, only 25 (28%) of the 89 projects had patents granted, ranging from 1 to 10 patents per project (averaging 2.2 patents) (see Table 18).

**Table 18**

**Number of patents granted for 89 projects completed  
in the period from 2019-20 to 2023-24  
(31 March 2024)**

Number of patents granted	Number of projects
0 (Note 1)	64 (72%)
1	12 (13%)
2	8 (9%)
3 to 5	4 (5%)
More than 5 (Note 2)	1 (1%)
Total	89 (100%)

*Source: Audit analysis of NAMI records*

*Note 1: According to NAMI, 51 (80%) of the 64 projects were completed in the past 3 years (viz. 2021-22, 2022-23 and 2023-24). As a standard patent application took at least 2 to 3 years, the progress of patent applications under these projects were under the normal timeframe. All the 64 projects had provisional patents or standard patents filed.*

*Note 2: The largest number of patents granted was 10.*

3.22 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 (see Table 19).

**Table 19**

**Number of pending patents  
(31 March 2020 to 31 March 2024)**

<b>Date</b>	<b>Number of pending patents</b>
31 March 2020	77
31 March 2021	105
31 March 2022	123
31 March 2023	139
31 March 2024	160

*Source: Audit analysis of NAMI records*

3.23 Audit also analysed the elapsed time since filing of patent applications for the 160 pending patents as at 31 March 2024. Audit found that:

- (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 (see Table 20).

Table 20

**Elapsed time since filing of patent applications  
for 160 pending patents  
(31 March 2024)**

Elapsed time	Number of pending patents
1 year or less	75 (47%)
More than 1 to 2 years	48 (30%)
More than 2 to 3 years	23 (14%)
More than 3 to 5 years	13 (8%)
More than 5 years (Note)	1 (1%)
	14 (9%)
Total	160 (100%)

*Source: Audit analysis of NAMI records*

*Note: The longest elapsed time was 5.3 years.*

3.24 Audit considers that NAMI needs to:

- (a) closely monitor the number of pending patents and take measures to increase the number of patents granted; and
- (b) for pending patents filed for a long period of time, ascertain the reasons for the long time taken and take necessary follow-up actions.

***Need to ensure that information of patents granted on NAMI's website is accurate and up-to-date***

3.25 As at 15 July 2024, according to NAMI's website, 252 patents were granted. Audit found that the information of patents granted on NAMI's website was not accurate and up-to-date:

- (a) of the 252 patents granted, 25 (10%) had already expired. Up to 15 July 2024, the 25 patents had expired for 5 to 43 months (averaging 15 months); and
- (b) while 2 patents were granted in March 2024, information of these patents was not listed on NAMI's website.

3.26 In Audit's view, it is important to ensure that the information of patents granted on NAMI's website is accurate and up-to-date, as it helps promote products or technologies to industries and fully exploit their commercial potentials. Audit considers that NAMI needs to take measures to ensure that the information of patents granted on its website is accurate and up-to-date.

### ***A large proportion of platform projects and seed projects did not generate licensing fee income***

3.27 Of the ITF-funded projects, the R&D results of platform projects and seed projects have potential to be commercialised (i.e. granting licences to licensees for the use of the project results). 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. While 9 (18%) of the 50 projects were completed in 2019-20 (i.e. representing an elapsed time of more than 4 years since completion), these projects had not generated any licensing fee income; and
- (b) the remaining 23 (32%) projects generated licensing fee income of \$7.2 million. Audit analysed the licensing fee income as a percentage of the project costs of the 23 projects and found that the average percentage 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 (see Table 21).

**Table 21**

**Analysis on the licensing fee income  
as a percentage of the project costs  
(31 March 2024)**

Percentage	Number of projects
1 % or less	1 (4%) } 9 (39%)
More than 1 % to 5 %	8 (35%) }
More than 5 % to 10 %	9 (39%)
More than 10 % to 15 %	4 (18%)
More than 15 % (Note)	1 (4%)
Total	23 (100%)

*Source:* Audit analysis of NAMI records

*Note:* The highest percentage was 28.6%.

3.28 Audit noted that, while the considerations (e.g. project funding, scale of applications of the technologies being licensed and the projected business returns of the licensee) in setting the licensing fees for the 23 projects were discussed in the meetings of the Business Term Panel with members of NAMI's senior management, there were no guidelines setting out the rationale for determining the licensing fees.

3.29 In response to Audit's enquiry, NAMI informed Audit in October 2024 that:

- (a) among the 50 projects which had not generated any licensing fee income (see para. 3.27(a)):
  - (i) 16 (32%) were completed in 2023-24 (i.e. representing an elapsed time of 1 year or less since completion); and

- (ii) 30 (60%) were seed projects which were exploratory in nature to pave way for further R&D collaboration with the industry. Seed projects often germinate downstream platform projects, collaborative projects and/or contract research projects from which commercialisation income could be generated; and
  - (b) NAMI granted a licence of its technologies for application at a minimal initial licensing fee to encourage industry adoption of the technologies which would generate royalties in subsequent years upon successful commercialisation.
- 3.30 Audit considers that NAMI needs to:
- (a) explore measures to increase the licensing fee income generated from platform projects and seed projects; and
  - (b) formulate guidelines on the rationale for determining the licensing fee.

### Audit recommendations

3.31 Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

- (a) **take measures to reduce discontinued patent applications;**
- (b) **closely monitor the number of pending patents and take measures to increase the number of patents granted;**
- (c) **for pending patents filed for a long period of time, ascertain the reasons for the long time taken and take necessary follow-up actions;**
- (d) **take measures to ensure that the information of patents granted on NAMI's website is accurate and up-to-date;**
- (e) **explore measures to increase the licensing fee income generated from platform projects and seed projects; and**
- (f) **formulate guidelines on the rationale for determining the licensing fee.**

## **Response from Nano and Advanced Materials Institute**

3.32 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations. He has said that NAMI:

- (a) strives to maximise its outreach to local entities, particularly small and medium enterprises, to help them differentiate and remain competitive;
- (b) will continue to be vigilant when considering patent applications filing. NAMI has developed a checklist to set out the parameters to be considered when filing new patent applications and will engage professional patent attorneys to provide additional support if required;
- (c) has established a monitoring mechanism to keep track of the status of the pending patents and will review and streamline the internal process to ensure timely submissions and responses to patent offices;
- (d) will analyse the long pending applications to ascertain the reasons and adjust filing strategy accordingly;
- (e) will update the information of patents on NAMI's website on a monthly basis, and step up the data checking process to ensure that the information is accurate and up-to-date;
- (f) has always been attempting to generate as much licensing income as practicable from its projects, leveraging different go-to market channels to promote NAMI technologies to more entities. NAMI will constantly update its portfolio of ready-to-license technologies for promotion to various industry sectors, including engagement with venture capitalists, investors, and technology incubation platforms in the Mainland, tailor presentations and demonstrations to showcase the value and applications of its innovations to potential licensees, and broaden its outreach to identify new opportunities for licensing. A set of standard pricing structure has been introduced since October 2024; and
- (g) has compiled general guidelines on the rationale for determining the licensing fee.



## **PART 4: ADMINISTRATIVE EXPENDITURE AND CORPORATE GOVERNANCE**

4.1 This PART examines issues related to administrative expenditure and corporate governance, focusing on the following areas:

- (a) administrative expenditure (paras. 4.2 to 4.15); and
- (b) corporate governance (paras. 4.16 to 4.34).

### **Administrative expenditure**

4.2 According to NAMI's guidelines, NAMI staff are required to seek prior approval from Section Head and Chief Executive Officer/Chief Operating Officer for business travels outside Hong Kong. For the passage of Chief Executive Officer, prior approval by the Chairperson of the Board of Directors is required. In 2023-24, expenses incurred on business travels outside Hong Kong amounted to \$2.4 million.

#### ***Need to enhance guidelines on modification of business travel arrangements***

4.3 According to NAMI's guidelines:

- (a) NAMI shall settle all "business related" travelling costs directly with the appointed travel agents; and
- (b) "business related" costs are the airfares for itinerary solely for business related destinations and periods and in the flight class that the staff is entitled. 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.

4.4 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

## **Administrative expenditure and corporate governance**

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9 business travels, the same staff extended the stay for personal reasons. NAMI had compared the costs of the air tickets for the business related period and those for the extended period of stay for the 9 business travels, and found that there were excess travelling costs for 3 (33%) 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 while the staff concerned had obtained separate approvals for the business travels and annual leave for the extended period of stay, approval had not been sought for the 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.

4.5        Audit considers that NAMI needs to enhance guidelines on modification of business travel arrangements for personal reasons and take measures to ensure that approval is obtained from appropriate approving authorities.

### ***Room for improvement in claims for subsistence allowance***

4.6        According to NAMI's guidelines:

- (a)        a staff member who has to travel outside Hong Kong on official duties is paid a daily subsistence allowance on the basis of number of nights the staff member stays outside Hong Kong;
- (b)        60% of the subsistence allowance is deemed to cover hotel accommodation, 5% for breakfast, 10% for lunch, 15% for dinner and 10% for other minor out-of-pocket expenses; and
- (c)        exceptional approval from the Chief Executive Officer or his designate is required for staff claiming extra meal costs or accommodation costs in addition to the entitled subsistence allowance. Only actual costs incurred will be reimbursed if exceptional approval is granted.

4.7 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 the following room for improvement:

- (a) ***Need to enhance guidelines on subsistence allowance.*** There was scope for improving NAMI's guidelines on subsistence allowance claims involving the Chief Executive Officer, as follows:
  - (i) 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 (Note 8); and
  - (ii) 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) ***Actual expenditure exceeded the entitled subsistence allowance.*** There were cases that the actual expenditure exceeded the entitled subsistence allowance:
  - (i) for 10 (33%) business travels (including 7 business travels involving the then Chief Executive Officer), the hotel accommodation costs exceeded the entitled subsistence allowance. The excess amounts ranged from \$5,292 to \$82,644 (Note 9) and were borne by NAMI; and

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**Note 8:** *According to NAMI, the approving authorities of the subsistence allowance claims were set out in its Corporate Governance Manual. The approving authorities were defined by the amount of claims involved rather than by the rank of the claimant.*

**Note 9:** *According to NAMI, the business travel with excess amount of \$5,292 involved 4 nights for 3 staff, and the business travel with excess amount of \$82,644 involved a total of 5 nights, including 4 nights for 6 staff and 1 night for 5 staff.*

## **Administrative expenditure and corporate governance**

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- (ii) for 4 (13%) business travels (all involving the then Chief Executive Officer), the meal costs exceeded the entitled subsistence allowance. The excess amounts ranged from \$607 to \$4,700 (Note 10) and were borne by NAMI.

4.8 In response to Audit's enquiry, NAMI informed Audit in October 2024 that for the cases in paragraph 4.7(b)(i), the amount exceeded the entitled subsistence allowance because the staff concerned had to stay in designated hotels of the events or were subject to price fluctuations of hotel accommodation during large-scale international events.

4.9 Audit considers that NAMI needs to:

- (a) enhance guidelines on subsistence allowance claims involving the Chief Executive Officer and take measures to ensure that approval is obtained from appropriate approving authorities; and
- (b) 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.

### ***Room for improvement in approval of entertainment expenses***

4.10 It is NAMI's policy to reimburse its staff for expenses arising from entertaining NAMI's guests for official purposes. In the period from 2019-20 to 2023-24, entertainment expenses of about \$0.6 million were incurred. The entertainment expenses incurred each year ranged from about \$38,000 to \$0.2 million (averaging \$0.1 million).

4.11 According to NAMI's guidelines, for entertainment expenses:

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**Note 10:** *According to NAMI, the business travel with excess amount of \$607 involved 1 meal for 7 staff, and the business travel with excess amount of \$4,700 involved 8 meals (5 or 6 staff were involved in each meal).*

## Administrative expenditure and corporate governance

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- (a) a maximum meal cost per head is set as \$600 for dinner, \$450 for lunch and \$200 for breakfast for entertaining external guests. For claims involving expenses exceeding the cost-per-head spending limits, the approval from the Chief Executive Officer or the Chief Operating Officer is required;
- (b) all claims on meal costs for entertaining external guests are restricted to Section Directors and above, and those with prior approval from Section Directors or above; and
- (c) there should be a reasonable ratio of NAMI staff to guests on all occasions of entertaining external guests. For exceptional cases, full justifications should be given.

4.12 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) ***Need to enhance guidelines on entertainment expenses.*** The approving authorities for entertainment expense reimbursement claims involving the Chief Executive Officer were not specified in NAMI's guidelines. The reimbursement claims involving the Chief Executive Officer were approved by the Chief Operating Officer or the Chief Technology Officer;
- (b) ***Cases exceeding spending limits.*** Two (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 from the Chief Executive Officer or the Chief Operating Officer. For the latter claim, while approval for exceeding the limit had been granted by the Chief Operating Officer, the justifications for granting approval were not documented;
- (c) ***Entertainment expenses incurred without prior approval.*** 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. According to NAMI, verbal approvals were given for these 8 claims. Covering approvals were obtained 1 to 37 days after the entertainment expenses were incurred (averaging 18 days); and

## **Administrative expenditure and corporate governance**

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- (d) ***NAMI staff significantly outnumbered guests entertained.*** The reasonable ratio of NAMI staff to guests entertained was not specified in NAMI's guidelines. 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.

4.13      Audit considers that NAMI needs to:

- (a) 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;
- (b) remind its staff to observe the spending limits of entertainment expenses;
- (c) take measures to ensure that approvals for entertainment expense claims exceeding the spending limits are only given with sufficient justifications;
- (d) for entertainment expenses incurred by staff at the grade below Section Directors, take measures to ensure that:
  - (i) prior approvals are obtained; and
  - (ii) for exceptional cases with only verbal approvals, covering approvals are obtained as soon as possible; and
- (e) specify the reasonable ratio of NAMI staff to guests entertained in its 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.

## **Audit recommendations**

4.14      **Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:**

- (a) enhance guidelines on modification of business travel arrangements for personal reasons and take measures to ensure that approval is obtained from appropriate approving authorities;**
- (b) enhance guidelines on subsistence allowance claims involving the Chief Executive Officer and take measures to ensure that approval is obtained from appropriate approving authorities;**
- (c) 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;**
- (d) 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;**
- (e) remind NAMI staff to observe the spending limits of entertainment expenses;**
- (f) take measures to ensure that approvals for entertainment expense claims exceeding the spending limits are only given with sufficient justifications;**
- (g) for entertainment expenses incurred by staff at the grade below Section Directors, take measures to ensure that:**
  - (i) prior approvals are obtained; and**
  - (ii) for exceptional cases with only verbal approvals, covering approvals are obtained as soon as possible; and**
- (h) 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.**

## **Response from Nano and Advanced Materials Institute**

4.15 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations. He has said that NAMI:

- (a) has followed the rules set out in its Corporate Governance Manual governing the approvals of relevant expenses. Nevertheless, NAMI agrees that there is room for improvement, and will enhance relevant guidelines to uphold better corporate governance. NAMI will conduct institute-wide communications to all staff to emphasise the importance of the rules and issue reminder on a quarterly basis;
- (b) will enhance the guidelines on modification of business travel arrangements for personal reasons and set out the relevant approving authorities;
- (c) will enhance the guidelines on subsistence allowance claims involving the Chief Executive Officer and set out the relevant approving authority;
- (d) has required all staff to contain actual expenditures for business travels outside Hong Kong to a level within the entitled subsistence allowances as far as practicable. Prior approval should be sought for meal costs and hotel costs which is expected to exceed the entitled subsistence allowance, and exceptional approval for claims exceeding the entitled subsistence allowance should be sought and supported with sufficient justifications;
- (e) will enhance the guidelines on approval of entertainment expense claims involving the Chief Executive Officer and set out the relevant approving authority;
- (f) has reminded all staff to observe the spending limits of entertainment expenses and will re-circulate the relevant requirements on a quarterly basis;
- (g) has reminded all staff that approval for entertainment expense claims exceeding the spending limits would only be given with sufficient justifications, which will be properly documented;



- (h) has reminded its staff at the grade below Section Directors to obtain prior approval for entertainment expenses to be incurred by these staff, and for exceptional cases where proper prior approval cannot be obtained timely, covering approval has to be obtained as soon as possible, with all approval and justifications for covering approval properly documented; and
- (i) will review and specify the reasonable ratio of NAMI staff to guests entertained in relevant guidelines on all occasions of entertaining external guests and document the justifications for exceptional cases.

## Corporate governance

### *Governance structure*

4.16 ***Board of Directors.*** The Board provides policy and strategic directions for NAMI and supervises the management of NAMI. The Board holds meetings at quarterly intervals. According to the Corporate Governance Manual issued by NAMI, the Board members shall consist of:

- (a) ***“A” Director.*** One “A” Director, representing the host institution, i.e. the Hong Kong University of Science and Technology;
- (b) ***“B” Directors.*** At least two “B” Directors who serve as non-official members, including representatives from academic institutions with R&D experience, industries related to nano and advanced materials technologies, trade associations, research institutions, and/or public bodies, and/or persons with legal, accounting, financial or management background; and
- (c) ***“C” Director.*** One “C” Director representing the Commissioner for Innovation and Technology.

As at 30 June 2024, the Board had 16 members, comprising one “A” Director, 14 “B” Directors and one “C” Director.

## **Administrative expenditure and corporate governance**

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4.17 The Board established three functional committees to support its work:

- (a) *Technology Committee and its Sub-Committee.* The Technology Committee reviews and endorses R&D project proposals. The Committee holds meetings at quarterly intervals. As at 30 June 2024, 8 of the 16 Board members were members of the Committee. A Sub-Committee assists the Committee to oversee the operation of the R&D programme. As at 30 June 2024, 4 senior management staff of NAMI were members of the Sub-Committee;
- (b) *Finance and Administration Committee.* The Finance and Administration Committee advises on and oversees administrative matters. The Committee holds meetings at quarterly intervals. As at 30 June 2024, 4 of the 16 Board members were members of the Committee; and
- (c) *Audit Committee.* The Audit Committee oversees the governance of NAMI, including internal audit. The Committee holds meetings once a year. As at 30 June 2024, 4 of the 16 Board members and a representative from the host institution were members of the Committee.

### ***Need to ensure healthy turnover of Board members***

4.18 The tripartite Funding Agreement stipulated that NAMI shall not appoint any director and the Chairman to the Board save with the prior written consent of the Commissioner for Innovation and Technology. Each term of the Board is for two years.

4.19 The “Guide to Corporate Governance for Subvented Organisations” published by the then Efficiency Unit (Note 11) in June 2015 provides advice on good practice in corporate governance. According to the Guide, non-official members are not normally appointed to sit in the same advisory or statutory body for more than

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**Note 11:** *The then Efficiency Unit under the Chief Secretary for Administration’s Office was transferred to the then Innovation and Technology Bureau (which was re-titled as the Innovation, Technology and Industry Bureau upon reorganisation of the Government in July 2022) and renamed as the then Efficiency Office. It was then renamed as the Digital Policy Office upon merging with the then Office of the Government Chief Information Officer on 25 July 2024.*

six years (i.e. the “six-year rule”) to ensure healthy turnover of members. Audit reviewed the tenures of the 23 non-official members (i.e. “B” Directors) who served the Board in the period from 2019 to 2023 and noted that up to the end of their tenures, 3 (13 %) members had served (or would have served) the Board continuously for more than six years, ranging from 8 to 14 years. In response to Audit’s enquiry, ITC informed Audit in June 2024 that the 3 members were very familiar with the operation and technology development roadmap of NAMI and it was difficult to identify other appropriate members to take up their roles at the time of relevant re-appointment. The justifications for departure from the six-year rule were provided to ITC for its consideration.

4.20 Audit considers that ITC and NAMI need to monitor the tenure of Board members to ensure healthy turnover as far as practicable in the appointment and re-appointment of Board members.

### ***Meetings for Sub-Committee of Technology Committee not conducted***

4.21 The Sub-Committee of the Technology Committee assists the Technology Committee to oversee the operation of the R&D programme (see para. 4.17(a)). The Sub-Committee’s main functions include examining and endorsing project deliverables, audited accounts and other routine operational matters of R&D projects.

4.22 According to NAMI’s Corporate Governance Manual, the Sub-Committee of the Technology Committee shall convene its meeting normally on a weekly basis. However, Audit found that there was no documentary evidence showing that the Sub-Committee had held any meetings in the period from 2019 to 2023. Instead, the Sub-Committee members discussed and endorsed the agenda items through circulation via emails.

4.23 Audit considers that NAMI needs to take measures to ensure that meetings for the Sub-Committee of the Technology Committee are held in accordance with its guidelines.

### *Room for improvement in declarations of interest*

4.24 NAMI adopts a two-tier reporting system for Board/Committee members to declare matters which may give rise to a conflict of interest:

- (a) ***First-tier declaration.*** The members shall register in writing their personal interest, direct or indirect, pecuniary or otherwise, when they are firstly appointed and annually thereafter. The registration shall be made on a standard form. A register of members' interest shall be maintained; and
- (b) ***Second-tier declaration.*** If a member has any direct personal or pecuniary interest in any matter under consideration, he or she must, as soon as practicable after he or she has become aware of it, disclose to the Chairperson (or the Board/Committees) prior to the discussion of the item. The Chairperson (or the Board/Committees) shall decide whether a member disclosing an interest may speak or vote on the matter, may remain in the meeting as an observer, or should withdraw from the meeting. All cases of declaration of interest shall be recorded in the minutes of the meeting.

4.25 ***Need to improve first-tier declarations of interest.*** 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.

4.26 Audit considers that NAMI needs to take measures to ensure that first-tier declarations of interest are made by Board/Committee members in a timely manner.

4.27 ***Second-tier declarations of interest not made by some Board members.*** Audit examined the minutes of the Board meetings held in the period from 2019 to 2023. Audit found that some Board members had not made second-tier declarations of interest:

- (a) in the two Board meetings held in February and November 2021, the Board discussed and approved the leasing of premises owned by a public organisation (Organisation A). A Board member declared interest that he was an alternate director of Organisation A prior to the meeting held in November 2021. Audit noted that, while the member had been an alternate

director of Organisation A at the time of the Board meeting held in February 2021, the member did not make such declaration in that meeting; and

- (b) each year, the Board discussed and approved in its meetings the arrangement on a service agreement for the provision of administrative support by the host institution at a monthly service fee. Audit noted that, in the period from 2021 to 2023, while 2 members were staff of the host institution, they did not make declarations of interest in the relevant Board meetings.

4.28 Audit considers that NAMI needs to take measures to ensure that the requirements on second-tier declarations of interest are complied with by Board/Committee members.

4.29 *Decisions on declarations of interest made by Board members not documented.* Audit reviewed the meeting minutes for the 20 Board meetings held in the period from 2019 to 2023. In 8 (40%) meetings, there were a total of 10 declarations of interest made by the members regarding the matters under discussion. Audit found that:

- (a) for 5 (50%) declarations, the relevant meeting minutes did not document the decision of the Chairperson or the Board on whether the members concerned should provide advice or vote on the matter, remain in the meeting as an observer, or withdraw from the meeting; and
- (b) for these 5 declarations, there was no documentation showing whether the members concerned had remained in the meetings or voted on the matters concerned.

4.30 Audit considers that NAMI needs to take measures to ensure that the decisions of the Chairman or the Board/Committees on declarations of interest made by Board/Committee members are documented in the relevant meeting minutes.

## **Audit recommendations**

**4.31      Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:**

- (a)      take measures to ensure that meetings for the Sub-Committee of the Technology Committee are held in accordance with NAMI's guidelines;**
- (b)      take measures to ensure that first-tier declarations of interest are made by Board/Committee members in a timely manner;**
- (c)      take measures to ensure that the requirements on second-tier declarations of interest are complied with by Board/Committee members; and**
- (d)      take measures to ensure that the decisions of the Chairman or the Board/Committees on declarations of interest made by Board/Committee members are documented in the relevant meeting minutes.**

**4.32      Audit has also *recommended* that the Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute, should monitor the tenure of Board members to ensure healthy turnover as far as practicable in the appointment and re-appointment of Board members.**

## **Response from Nano and Advanced Materials Institute**

**4.33      The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations in paragraph 4.31. He has said that:**

- (a)      NAMI's Sub-Committee of the Technology Committee discussed and endorsed items including change requests, applications for project extension, progress/final reports, audited accounts and other issues under its purview through circulation via emails for ensuring efficiency. To adhere to the guidelines as set out in the Corporate Governance Manual,**

NAMI has already scheduled weekly meetings for reviewing and endorsing the relevant items;

- (b) NAMI will strengthen the monitoring of first-tier declarations of interest made by Board/Committee members in a timely manner;
- (c) NAMI will remind Board/Committee members to comply with second-tier declarations of interest before convening any meetings; and
- (d) NAMI will remind note-takers of all Board/Committees to ensure that the decisions of the Chairman or the Board/Committees on declarations of interest made by Board/Committee members are properly documented in the relevant meeting minutes.

### **Response from the Government and Nano and Advanced Materials Institute**

4.34 The Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute agree with the audit recommendation in paragraph 4.32. The Commissioner for Innovation and Technology has said that the directors' different background and expertise are important for serving the functions of the Board, which are to steer the research direction of NAMI including commercialisation of R&D deliverables, to monitor regularly the operational and financial sustainability of the centre, and to examine and endorse the Annual Plans, Annual Reports and the audited accounts. Given that non-official directors are expected to have specific expertise and experience in the relevant technology fields and/or from specific professional background, a key consideration in the appointment/re-appointment is whether the candidates possess such needed qualities. As NAMI's technology focus evolves over time, individuals with expertise and experience in the relevant technology fields have been appointed to the Board. Notwithstanding the fact that NAMI's Board is not a government advisory and statutory body and thus the six-year rule does not apply, ITC has all along been making and will continue to make its best efforts in taking into account the six-year rule when appointing/re-appointing non-official Board members.

## **PART 5: OTHER ISSUES**

5.1 This PART examines other issues related to NAMI, focusing on the following areas:

- (a) safeguarding national security (paras. 5.2 to 5.5);
- (b) human resource management (paras. 5.6 to 5.21);
- (c) publicity and promotion (paras. 5.22 to 5.31); and
- (d) way forward (paras. 5.32 to 5.44).

### **Safeguarding national security**

#### ***Need to strengthen guidance and regulation over matters concerning the safeguarding of national security***

5.2 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, must not engage in acts and activities endangering national security, and must provide assistance in accordance with the law in response to a request made by the authorities when conducting the work on safeguarding national security in accordance with the law. Besides, section 8(3) of the Ordinance stipulates that if the law of the HKSAR confers any function on a person, the function is to be read as including a duty to safeguard national security, and accordingly, any person, in making any decision in the performance of the function, must regard national security as the most important factor, and give appropriate consideration to it accordingly. 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 (see para. 1.6).



5.3 Audit considers that ITC, in collaboration with NAMI, needs to take measures to strengthen guidance and regulation over matters concerning the safeguarding of national security (e.g. incorporating clauses in agreements to strengthen regulation over matters concerning the safeguarding of national security).

## **Audit recommendation**

5.4 Audit has *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 (e.g. incorporating clauses in agreements to strengthen regulation over matters concerning the safeguarding of national security).

## **Response from the Government and Nano and Advanced Materials Institute**

5.5 The Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute agree with the audit recommendation. The Commissioner for Innovation and Technology has said that while the prevailing tripartite Funding Agreement has contained a termination clause for the Government to cease providing funding support if NAMI's operation is not permitted under the laws of Hong Kong, ITC has sought legal advice from the Department of Justice to incorporate appropriate clauses in the tripartite Funding Agreement to further strengthen the regulation over matters concerning the safeguarding of national security. It should be noted that specific clauses on safeguarding national security have already been included in the ITF funding application guidelines and funding agreements concerning individual ITF-funded projects. The Chief Executive Officer, Nano and Advanced Materials Institute has said that NAMI has also adopted the Terms and Conditions for Suppliers in the tendering and procurement documents of NAMI's host institution, where there are clauses on safeguarding national security.

## Human resource management

### *Decisions on declarations of interest made by Selection Panel members for recruitment cases not documented*

5.6 According to NAMI's guidelines, all candidates for vacant positions are required to be assessed by a Selection Panel on their suitability for appointment. The Selection Panel arranges to present their findings and assessments to the Chief Executive Officer or his delegate for approval on offer of appointment to the recommended candidates. Members of the Selection Panel are required to declare interests for each recruitment case, as to whether they have any personal or working relationships with the candidates. There were no guidelines stipulating that whether the members who declared interests for recruitment cases should remain in the Panel or withdraw from the Panel.

5.7 Audit examined 20 recruitment cases in the period from 2019-20 to 2023-24 and found that:

- (a) for 10 (50%) recruitment cases, members of the Selection Panel declared that they had personal or working relationships with the candidates, but the members concerned had remained in the Selection Panel. There was no documentary evidence showing the Selection Panel's decision on whether the members concerned should remain in the Panel or withdraw from the Panel; and
- (b) in 9 (90%) of the 10 cases (see (a) above), the candidates concerned were selected for appointment.

5.8 Audit considers that NAMI needs to:

- (a) stipulate guidelines to require the Selection Panel to make decisions on whether members who have declared interests for recruitment cases should remain in the Panel or withdraw from the Panel; and
- (b) take measures to ensure that the decisions on declarations of interest for recruitment cases made by the Selection Panel are documented and complied with.

### *Need to take measures to reduce staff turnover*

5.9 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% (see Table 22).

**Table 22**

**Staff turnover rate  
(2019-20 to 2023-24)**

	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
Number of staff leaving NAMI (a)	55	57	70	58	47
Average number of staff strength (Note) (b)	238	245	259	260	255
Turnover rate (%) (c) = (a) ÷ (b) × 100%	23.1%	23.3%	27.0%	22.3%	18.4%

*Source:* Audit analysis of NAMI records

*Note:* The average number of staff strength is calculated by averaging the number of staff strength at the beginning (1 April) and end (31 March) of the financial year.

5.10 In response to Audit's enquiry, NAMI informed Audit in June 2024 that:

- (a) it had conducted exit interviews with staff leaving NAMI, during which staff were invited to complete a questionnaire and provide the reasons for leaving; and

- (b) from time to time, it had used the information collected from the exit interviews to compile statistics on the reasons for high staff turnover rates.

5.11 Audit considers that NAMI needs to draw experience from the exit interviews on the reasons of staff leaving NAMI and take measures to reduce the staff turnover.

### *Need to monitor overall distribution of staff performance grades*


5.12 NAMI staff (excluding Chief Executive Officer) are entitled to annual salary adjustment. The management proposes a salary adjustment for each staff effective from 1 April every year and seeks approval from the Board of Directors. The adjustment reflects inflation, which is captured by pay trend indicators, and the performance grade received by each staff in the performance appraisal for the past financial year. A scale of performance grades from “A” to “F” is assigned to measure staff performance standards, with “A” being the highest grade and “F” being the lowest grade.

5.13 In the Board meeting held in February 2020, an overall distribution of performance grades of staff was approved by the Board to ensure the fairness of the system, and efficiency in human resources deployment and budgeting. Audit analysed the performance grades of staff for the period from 2019-20 to 2022-23. Audit found that the actual distribution of performance grades deviated from the approved overall distribution, in particular for that of performance grade B throughout the period (see Table 23).

Table 23

**Audit analysis on performance grades of NAMI staff  
(2019-20 to 2022-23)**

Performance grade	Overall distribution approved by the Board in February 2020	Actual distribution			
		2019-20	2020-21	2021-22	2022-23
A	Not more than 20 %	16 %	18 %	18 %	23 %
B	Not more than 35 %	46 %	54 %	54 %	49 %
C	Not more than 60 %	38 %	28 %	28 %	28 %
D	0 to 5 %	0 %	0 %	0 %	0 %
E and F	0 to 5 %	0 %	0 %	0 %	0 %

Legend:  Shaded boxes indicate that the actual distribution of performance grades deviated from the approved overall distribution.


Source: *Audit analysis of NAMI records*

5.14 In the Board meeting held in January 2024, it was approved that the overall distribution of performance grades would be updated and take effect from 2023-24. Audit analysed the performance grades of staff for 2023-24 and found that the actual distribution of performance grade B still deviated from the updated overall distribution (see Table 24).

**Table 24**

**Audit analysis on performance grades of NAMI staff  
(2023-24)**

<b>Performance grade</b>	<b>Updated overall distribution approved by the Board in January 2024</b>	<b>Actual distribution in 2023-24</b>
A	Not more than 25 %	23 %
B	Not more than 55 %	60 %
C	Not more than 40 %	15 %
D	0 to 5 %	2 %
E and F	0 to 5 %	0 %

Legend:  Shaded box indicates that the actual distribution of performance grades deviated from the updated overall distribution.

*Source: Audit analysis of NAMI records*

5.15 In response to Audit's enquiry, NAMI informed Audit in October 2024 that:

- (a) the overall distribution of performance grades was meant to serve as a general guide. The generally high levels of staff performance had rendered the actual distribution of performance grades irreconcilable with the overall distribution. Furthermore, performance underrating could cause staff dissatisfaction; and
- (b) the Board accepted the management's explanations on the deviation of actual distribution of performance grades from the general guide.

5.16 Audit considers that NAMI needs to monitor the overall distribution of staff performance grades and take measures to ensure that the actual distribution of performance grades do not deviate from the approved overall distribution as far as possible.

### ***Need to expedite recruitment of Chief Science Officer***

5.17 In January 2022, the Board of Directors approved the reorganisation of the senior management of NAMI. Four new key posts were created to take charge of various principal functions starting from 2022-23 onwards, namely Chief Commercial Officer, Chief Operating Officer, Chief Technology Officer and Chief Science Officer. Audit found that, up to 30 June 2024, the Chief Science Officer post had not been filled, representing a delay of 27 months.

5.18 According to NAMI:

- (a) the Chief Science Officer would provide leadership and direction for developing/implementing the scientific vision and strategy aligned with NAMI's organisational goals, and guide research directions for technological advancements. The job duties include devising technology roadmap and strategic planning for laboratory infrastructure; and
- (b) the Chief Science Officer post was created together with other Chief Officer positions to facilitate NAMI's next phase of development.

5.19 Audit considers that NAMI needs to take measures to expedite the recruitment of Chief Science Officer.

## **Audit recommendations**

5.20 **Audit has recommended that the Chief Executive Officer, Nano and Advanced Materials Institute should:**

- (a) **stipulate guidelines to require the Selection Panel to make decisions on whether members who have declared interests for recruitment cases should remain in the Panel or withdraw from the Panel;**

- (b) **take measures to ensure that the decisions on declarations of interest for recruitment cases made by the Selection Panel are documented and complied with;**
- (c) **draw experience from the exit interviews on the reasons of staff leaving NAMI and take measures to reduce the staff turnover;**
- (d) **monitor the overall distribution of staff performance grades and take measures to ensure that the actual distribution of performance grades do not deviate from the approved overall distribution as far as possible; and**
- (e) **take measures to expedite the recruitment of Chief Science Officer.**

## Response from Nano and Advanced Materials Institute

5.21 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations. He has said that NAMI:

- (a) has enhanced the relevant procedures where a Selection Panel member who has declared interests or relationships with the interviewees should be exempted from being a member of the Panel, unless there are exceptional reasons which are accepted by the Human Resources Team, and properly documented in the report of the subject interview;
- (b) will document the decisions on declarations of interest for recruitment cases made by the Selection Panel and ensure that the decisions are complied with;
- (c) will continue to draw information from the exit interviews on the reasons for staff leaving, and to formulate effective strategies for staff retention, such as enhancing remuneration packages, increasing training opportunities and promotion prospects, etc.;
- (d) will remind all appraising officers to observe the distribution of staff performance grades in making the performance assessment, and provide and document the justifications for approval where there are deviations



from the approved overall distribution before commencement of the annual staff appraisal exercise; and

- (e) will keep reviewing its organisational structure to align with the technological, business and staff development progress with a view to determining an appropriate timeframe for filling the vacancy of Chief Science Officer by suitable candidate, and to report to the Board as appropriate.

## Publicity and promotion

### *Need to evaluate the effectiveness of publicity and promotional events*

5.22 According to ITC, NAMI has placed great emphasis on publicity and promotion in recent years with a view to promoting its R&D results and facilitating technology exchanges. In the period from 2019-20 to 2023-24, the number of publicity and promotional events organised by NAMI increased by 143% from 14 in 2019-20 to 34 in 2023-24. In the same period, the expenditure incurred on the events increased by 58% from \$1.9 million in 2019-20 to \$3.0 million in 2023-24 (see Table 25).

**Table 25**

**Publicity and promotional events and related expenditure  
(2019-20 to 2023-24)**

<b>Year</b>	<b>Number of events organised</b>	<b>Expenditure (\$ million)</b>
2019-20	14	1.9
2020-21	23	2.1
2021-22	22	2.4
2022-23	22	2.1
2023-24	34	3.0
<b>Total</b>	<b>115</b>	<b>11.5</b>

*Source: Audit analysis of NAMI records*

5.23 Audit examined the 115 publicity and promotional events organised by NAMI in the period from 2019-20 to 2023-24. Audit found that:

- (a) for 45 (39%) events, it was feasible for NAMI to collect feedback from the participants. However, NAMI had not conducted opinion surveys on the 45 events to gauge the views of the participants on NAMI and its technologies showcased in the events; and
- (b) 64 (56%) events were conferences/seminars/workshops which required enrolment by potential participants. However, NAMI had not recorded the actual attendance of 23 (36%) of the 64 events.

5.24 Audit considers that NAMI needs to take measures to evaluate the effectiveness of its publicity and promotional events (e.g. conducting opinion surveys and recording the attendance).

***Need to step up efforts in achieving the performance targets relating to publicity***

5.25 NAMI sets 4 performance targets relating to publicity in its Annual Plans and reports their actual performance in its Annual Reports, namely:

- (a) number of visitors to corporate website;
- (b) number of exhibitions/roadshows organised/participated;
- (c) number of conferences/seminars/workshops organised/participated; and
- (d) number of other publicity activities organised/participated.

5.26 Audit examined the achievements of the 4 performance targets in the period from 2019-20 to 2023-24. Audit found that there were shortfalls in the achievement of 3 (75%) performance targets, as follows:

- (a) the performance targets on number of visitors to corporate website were not achieved in 2 (40%) of the 5 years. The shortfalls were 11% and 21%;
- (b) the performance target on number of exhibitions/roadshows organised/participated was not achieved in 1 (20%) of the 5 years. The shortfall was 45%; and
- (c) the performance targets on number of conferences/seminars/workshops organised/participated were not achieved in 4 (80%) of the 5 years. The shortfalls ranged from 9% to 49%.

5.27 Audit considers that NAMI needs to:

- (a) ascertain the reasons for not meeting the performance targets relating to publicity; and
- (b) step up efforts to achieve the performance targets relating to publicity.

### ***Need to maintain supporting records for performance information relating to publicity***

5.28 Audit examined NAMI's records on the 4 performance targets relating to publicity (see para. 5.25) and found that for 3 (75%) performance targets, namely "number of exhibitions/roadshows organised/participated", "number of conferences/seminars/workshops organised/participated" and "number of other publicity activities organised/participated", NAMI did not maintain supporting records to substantiate the performance information for the period from 2019-20 to 2023-24.

5.29 In order to ensure the reliability of the performance information relating to publicity, Audit considers that NAMI needs to maintain supporting records for performance information relating to publicity.

### **Audit recommendations**

5.30 Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

- (a) **take measures to evaluate the effectiveness of NAMI's publicity and promotional events (e.g. conducting opinion surveys and recording the attendance);**
- (b) **ascertain the reasons for not meeting the performance targets relating to publicity;**
- (c) **step up efforts to achieve the performance targets relating to publicity; and**
- (d) **maintain supporting records for performance information relating to publicity.**

## Response from Nano and Advanced Materials Institute

5.31 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations. He has said that NAMI:

- (a) has enhanced the process in conducting publicity and promotional events to evaluate its effectiveness by recording attendance and conducting opinion surveys for conferences/seminars/workshops organised by NAMI, and will do the same for events co-organised with other parties wherever practicable;
- (b) would keep reflecting on reasons for not meeting publicity-related performance targets. For example, publicity activities scheduled to be held during 2020 to 2023 were affected by the pandemic, with many events postponed or cancelled;
- (c) had stepped up efforts to organise and participate in relevant publicity events. In 2023-24, NAMI organised and participated in 168 activities related to publicity, representing a 107% increase over 2019-20, and will keep the momentum to achieve the targets; and
- (d) keeps all details of individual publicity activities it organised, including the programme, budget items, logistics arrangements, etc. NAMI has taken steps to collate and maintain a full list of activities by year from 1 April 2024 as supporting records to substantiate the performance information.

## Way forward

### *Need to improve cost-effectiveness of NAMI's operation*

5.32 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

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- (b) the ratio of operating expenditure to R&D project costs increased from 66 % in 2019-20 to 74 % in 2023-24 (see Table 26).

**Table 26**

**Ratio of operating expenditure to R&D project costs  
(2019-20 to 2023-24)**

	2019-20	2020-21	2021-22	2022-23	2023-24
Operating expenditure (\$ million) (a)	78.7	79.8	96.0	108.6	115.9
R&D project costs (\$ million) (b)	120.0	128.9	146.3	146.9	156.2
Ratio (%) (c) = (a) ÷ (b) × 100%	66%	62%	66%	74%	74%

*Source: Audit analysis of NAMI records*

5.33 In July 2024, ITC informed FC of LegCo that it proposed adopting a “zero-growth” principle over the R&D Centres’ operating expenditure in the following three financial years, i.e. the average operating expenditure in the following three financial years shall be capped at the level of 2024-25, with a view to controlling the operating expenditure of the R&D Centres and encouraging them to increase the industry and other incomes. Audit considers that NAMI needs to ascertain the reasons for the increase in operating expenditure and take effective measures to contain operating expenditure to a lower level with a view to improving the cost-effectiveness of its operation.

***Decreasing gross domestic product contributions from NAMI***

5.34 ITC commissioned an independent consultant to carry out a study to analyse the gross domestic product (GDP) contributions (Note 12) towards Hong Kong as generated by the five R&D Centres' operation. The consultant engaged stakeholders of the R&D Centres through interviews, focus group discussions and surveys. Among others, the consultant interviewed companies that collaborated with the R&D Centres to understand and estimate the GDP contributions generated by the R&D Centres. 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 (see Table 27).

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**Note 12:** *The GDP contributions include the economic contributions generated from the R&D Centres' operation towards Hong Kong, economic contributions generated from the operation and income brought about by the R&D Centres for industry partners in Hong Kong, as well as additional economic contributions towards industry partners' business partners or clients as brought by the R&D Centres.*

**Table 27**

**GDP contributions generated from R&D Centres' operation  
(2020-21 to 2022-23)**

	<b>APAS</b>	<b>ASTRI</b>	<b>HKRITA</b>	<b>LSCM</b>	<b>NAMI</b>
2020-21 (\$ million) (a)	139	1,498	246	390	1,531
2021-22 (\$ million) (b)	139	1,395	313	392	1,302
2022-23 (\$ million) (c)	152	1,393	390	389	1,092
Variance between 2020-21 and 2022-23 (%) (d) = ((c) – (a)) ÷ (a) × 100%	9.4%	(7.0%)	58.5%	(0.3%)	(28.7%)

*Source: Audit analysis of ITC records*

*Remarks: According to ITC, the GDP contributions generated from R&D Centres' operation in 2023-24 was not yet available.*

5.35 According to ITC, in the past three financial years, the GDP contributions by the R&D Centres had inevitably dropped because:

- (a) the overall economic situation had been severely affected by the COVID-19 epidemic; and
- (b) some R&D Centres, including NAMI, had conducted more upstream R&D projects or provide pandemic-related technology support for the Government.



5.36 In June 2024, ITC informed the Panel on Commerce, Industry, Innovation and Technology of LegCo that it planned to commission an independent consultant to assess the impact of R&D Centres' work regularly (every three years) and report to the Panel on the findings. Audit considers that ITC and NAMI need to keep under review the GDP contributions from NAMI and formulate effective strategies to increase the GDP contributions.

***Need to step up efforts on deepening co-operation with the Mainland***

5.37 According to ITC:

- (a) it recognised the clear support from the National 14th Five-Year Plan for Hong Kong's development into an international I&T centre, and the need for better integration into the overall development of the Country as well as deepening of the co-operation between the Mainland and Hong Kong in I&T; and
- (b) it placed great emphasis on the R&D Centres' work on enhancing communications and co-operation with the Mainland (in particular Mainland cities of GBA) with a view to developing Hong Kong into an international I&T centre.

5.38 The guiding principles of NAMI include:

- (a) commercialising R&D outcomes by collaborating with industries in Hong Kong and the Mainland; and
- (b) deepening research co-operation with the Mainland to align with the National Five-Year Plan for integration into the overall national development.

5.39 According to NAMI:

- (a) it recognised the huge potential of GBA for its continual growth and to create deeper impact of its technologies;

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- (b) the COVID-19 epidemic had inevitably prevented it from establishing closer collaborations with its counterparts and identifying potential partners in GBA; and
- (c) with the cessation of the anti-epidemic entry control measures between the Mainland and Hong Kong, it had stepped up its promotional effort and organised/participated in a number of business activities in the Mainland, especially in GBA. Examples of its recent work in the Mainland included:
  - (i) among the 24 projects involving industry participation commenced in 2023-24, 8 (33%) projects involved Mainland companies. In 2023-24, it concluded 6 licensing arrangements and 2 contracts for contract research projects with Mainland companies. In addition, it had signed 6 Memorandum of Understanding with company/institutions in GBA for the purpose of exploring future closer collaboration opportunities;
  - (ii) in 2023-24, it organised/participated in 12 promotional activities in GBA and other major cities in the Mainland; and
  - (iii) in 2023-24, 24 (55%) of 44 new hires were from the Mainland or with Mainland background.

5.40 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. Audit considers that NAMI needs to:

- (a) step up efforts on deepening co-operation with the Mainland with a view to better integrating into the overall development of the Country; and
- (b) consider setting performance targets or indicators relating to its work in the Mainland (e.g. number of Mainland companies engaged, and number of publicity and promotional events held in the Mainland).

## Audit recommendations

5.41 Audit has *recommended* that the Chief Executive Officer, Nano and Advanced Materials Institute should:

- (a) ascertain the reasons for the increase in operating expenditure and take effective measures to contain operating expenditure to a lower level with a view to improving the cost-effectiveness of NAMI's operation;
- (b) step up efforts on deepening co-operation with the Mainland with a view to better integrating into the overall development of the Country; and
- (c) consider setting performance targets or indicators relating to NAMI's work in the Mainland (e.g. number of Mainland companies engaged, and number of publicity and promotional events held in the Mainland).

5.42 Audit has also *recommended* that the Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute, should keep under review the GDP contributions from NAMI and formulate effective strategies to increase the GDP contributions.

## Response from Nano and Advanced Materials Institute

5.43 The Chief Executive Officer, Nano and Advanced Materials Institute agrees with the audit recommendations in paragraph 5.41. He has said that:

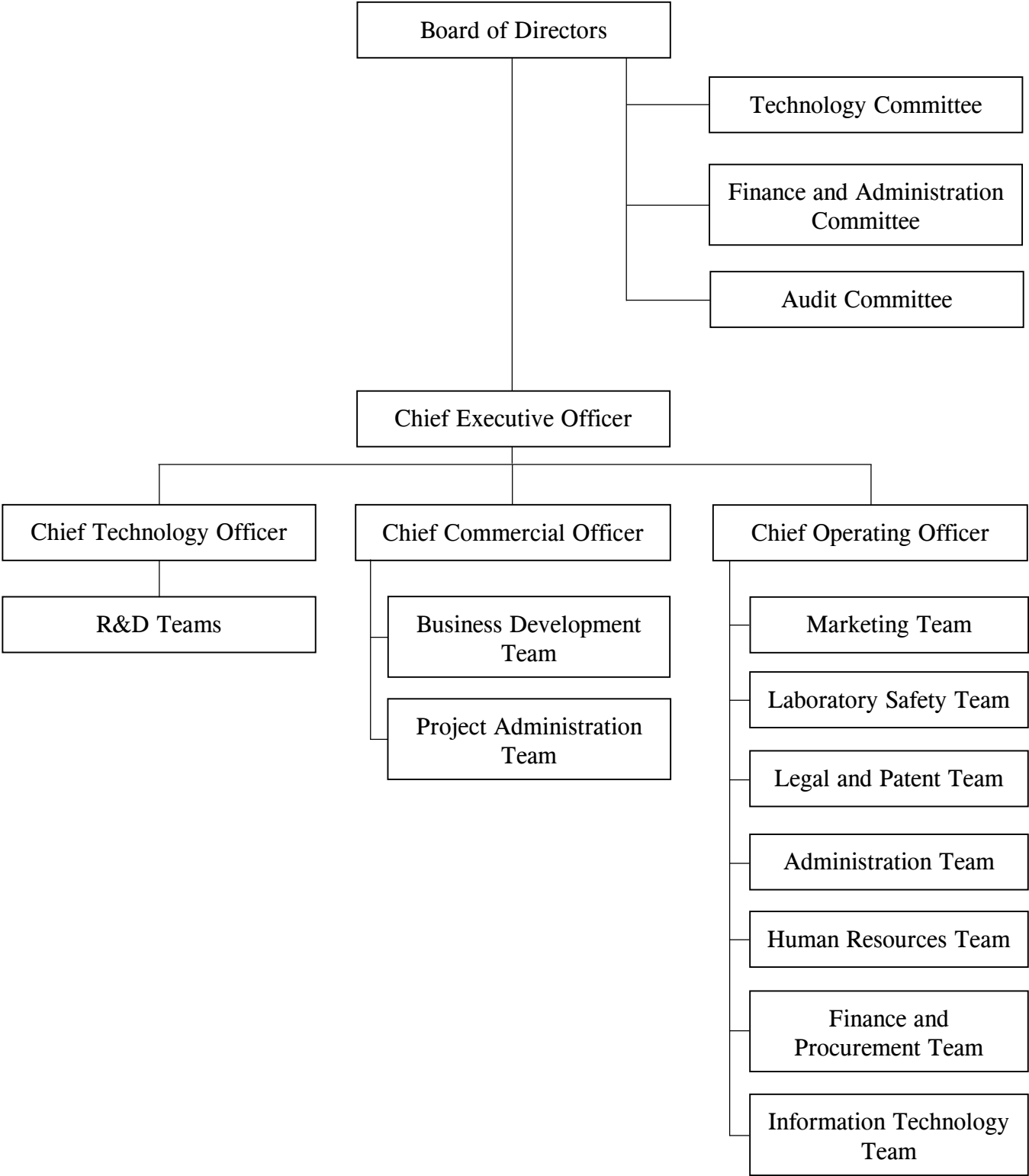
- (a) NAMI is dedicated to conducting applied R&D in nanotechnology and advanced materials. As at end-March 2024, there were 109 ongoing projects, 62 of which involving industry participation. NAMI has won over 100 local and international awards, including the prestigious ones such as R&D 100 Awards, Edison Awards, etc. NAMI will continue to facilitate technology transfer with a view to enabling technology upgrade of the industry;

- (b) to fulfil NAMI's mission in supporting the industries in technology upgrade, acquiring core competence for innovative technologies on nanotechnology and materials and developing world class talents, NAMI has continuously invested in acquiring new research infrastructure and equipment, upgrading existing facilities, hiring top research talents, increasing promotion and marketing activities, stepping up the publicity of NAMI's technologies, etc., which required additional resources and hence an increase in operating expenditure. NAMI will exercise close monitoring and cost-saving initiatives to contain the operating expenditure to the current or lower level, optimise the use of existing resources, and conduct regular financial reviews to assess the effectiveness of cost management strategies;
- (c) NAMI has significantly stepped up its promotional effort in the Mainland, especially in GBA since early 2023 with the cessation of the anti-epidemic entry control measures between the Mainland and Hong Kong, and will further deepen co-operation with the industries, research institutions/universities, etc. in the Mainland for project collaboration, technology presentations and other promotional activities; and
- (d) NAMI will consider setting performance targets or indicators relating to NAMI's work in the Mainland. These may include the number of exhibitions/roadshows organised/participated, the number of seminars/workshops organised/participated and other publicity activities organised/participated, etc.

## **Response from the Government and Nano and Advanced Materials Institute**

5.44 The Commissioner for Innovation and Technology and the Chief Executive Officer, Nano and Advanced Materials Institute agree with the audit recommendation in paragraph 5.42. The Commissioner for Innovation and Technology has said that regular review will continue to be conducted to assess the GDP contributions as well as other performances of the public R&D centres, including NAMI. The Chief Executive Officer, Nano and Advanced Materials Institute has said that NAMI will strive for more opportunities for collaboration with and technology transfer to the industries for applications and commercialisation to drive the economic growth and GDP contributions.

Nano and Advanced Materials Institute:  
Organisation chart (extract)  
(30 June 2024)



Source: NAMI records

**Acronyms and abbreviations**

APAS	Automotive Platforms and Application Systems R&D Centre
ASTRI	Hong Kong Applied Science and Technology Research Institute
Audit	Audit Commission
FC	Finance Committee
GBA	Guangdong-Hong Kong-Macao Greater Bay Area
GDP	gross domestic product
HKRITA	Hong Kong Research Institute of Textiles and Apparel
HKSAR	Hong Kong Special Administrative Region
I&T	innovation and technology
ITC	Innovation and Technology Commission
ITF	Innovation and Technology Fund
LegCo	Legislative Council
LSCM	Logistics and Supply Chain MultiTech R&D Centre
NAMI	Nano and Advanced Materials Institute
PSTS	Public Sector Trial Scheme
R&D	Research and Development