

**Final Report on Evaluation of OIST's Efforts and Future
Development for Review Purposes Under Article 14 of
the Supplementary Provisions of the Okinawa Institute
of Science and Technology Graduate University School
Corporation Act**

August 31, 2021

**(Panel on Future Issues for the Okinawa Institute of Science and
Technology Graduate University School Corporation)**

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Panel on Future Issues for the Okinawa Institute of Science and Technology Graduate University School Corporation

The Okinawa Institute of Science and Technology Graduate University (hereinafter referred to as "OIST") (the founder: Okinawa Institute of Science and Technology Graduate University School Corporation ^{※1} (hereinafter referred to as "School Corporation")) had gradually expanded to 1,242 members^{※2} and had grown steadily, although it opened with 614 members in September 2012.

It is stipulated in the Okinawa Institute of Science and Technology Graduate University School Corporation Act (Act No. 76 of 2009, hereinafter referred to as "School Corporation Act"), which is the basis for establishing OIST, that OIST has the aim of contributing to the promotion and self-sustaining development of Okinawa and to the development of science and technology in the world through the world's leading education and research on science and technology.

The concept of establishing OIST came from the fact that the world's leading universities in other countries had created new growing industries founded on science and technology through the world's leading research and education, and thus had produced outstanding outcomes in generating community values as the driving force for social change. As society changes rapidly, the role of the world's leading universities is increasing. OIST, whose basic principles are the world's leading level, flexibility, internationality, global collaboration, and industry-academia collaboration, is expected to solve social issues through the promotion of science and technology and develop in Okinawa.

November of this year (2021) will mark the end of a full decade since the School

※1 Okinawa Institute of Science and Technology Graduate University School Corporation
Established in November 2011 at the enforcement of the School Corporation Act (November 2011).

※2 School Corporation Members
At the inauguration (in September 2012), 614 members;
4 Officers, 46 faculty members, 34 students, 321 research supporters, 209 administrative staff
In the 9th year (in May 2021), 1242 members;
4 Officers, 82 faculty members, 226 students, 571 research supporters, 359 administrative staff

Corporation Act went into effect and, the national government shall review financial support and other execution status of this Act and take necessary measures, based on Article 14 of the Supplementary Provisions of the School Corporation Act. The Panel on Future Issues for the Okinawa Institute of Science and Technology Graduate University School Corporation (hereinafter referred to as "Panel"), in order to provide expertise-based advice to the national government, proposes OIST's future development and the ideal level of financial support to meet the purpose of establishing OIST, after evaluating OIST's efforts heretofore.

I. Background to review

1. Purpose and background of establishing OIST

First proposed in 2001, the concept of establishing OIST was clearly identified as a key measure for development and promotion of Okinawa in the "Okinawa Promotion Plan"^{※3} (approved by the Prime Minister in July 2002), and the national government took the lead in giving this concept more substance to realize the establishment. In 2005, the national government established the School Corporation's predecessor the Okinawa Institute of Science and Technology Promotion Corporation (it was subsequently dissolved in November 2011 in accordance with the establishment of the School Corporation) to begin developing the educational and research infrastructure needed to open OIST.

In "Promotion of Efforts to Open the Okinawa Institute of Science and Technology Graduate University" (December 2008 agreement among relevant cabinet ministers^{※4}), the national government described OIST as "a university that aims to conduct the world's leading education and research in order to form an international education and research base for science and technology in Okinawa", and advocated that "a system of financial support for the School Corporation be established and the necessary budgetary measures be taken by the Cabinet Office to develop and promote Okinawa and achieve the development of our country's economic society by enhancing the

※3 Okinawa Promotion Plan (approved by the Prime Minister in July 2002)

The Plan covers the period 2002 to 2011 and calls for "...a newly conceived world's leading graduate school of natural sciences based on the concepts of internationality and flexibility that will become a model case for the future of other Japanese universities."

※4 Promotion of Efforts to Establish the Okinawa Institute of Science and Technology Graduate University (December 2008 agreement among relevant cabinet ministers)

An agreement reached among the Chief Cabinet Secretary, the Minister of State for Okinawa and Northern Territories Affairs, the Minister of State for Science and Technology Policy, the Minister of Finance, and the Minister of Education, Culture, Sports, Science and Technology

level of science and technology in Okinawa.” The agreement went on to state that “support will be provided for a certain period of time after establishment to encourage a transition to self-sustaining management while enhancing the level of education and research at the Graduate University” and that “the ideal level of this support will be verified at suitable times in view of such factors as the status of the international reputation for the Graduate University and will be reviewed as necessary.”

Subsequently, the School Corporation Act was enacted and it declares the purpose of this Act is “to promote internationally distinguished education and research on science and technology based in Okinawa...and thus contribute to the promotion and self-sustaining development of Okinawa and to the development of science and technology in the world by stipulating necessary matters concerning OIST’s establishment and operation”, and defines OIST’s purpose as being “to conduct internationally distinguished education and research on science and technology.” OIST formulated a mission statement in line with these purposes and has been operating to meet the purposes since it opened in September 2012.

The School Corporation Act designates OIST a special school corporation but Article 8^{※5} makes it possible to provide support beyond the framework of private school subsidies under the Act on Subsidies for Private Schools (Act No. 61 of 1975). Accordingly, the national government has used its budget for development and promotion of Okinawa to cover more than half of the expenses required to operate OIST since it opened.

In response to an amendment pertaining to the aforementioned Article 8 in the bill submitted by the government to the House of Representatives as the bill was deliberating, Article 14 of the Supplemental Provisions was added: "The national government shall review financial support for the School Corporation and other execution status of this Act approximately ten years after the enforcement of this Act, and take necessary measures based on the result of the review."

※5 Okinawa Institute of Science and Technology Graduate University School Corporation Act (Act No. 76 of 2009) Article 8

It is stipulated that “the national government, within the range of its budget, may subsidize the School Corporation for more than one-half of the expenses required for the business specified in Article 3, paragraph (1).”

2. Background to review by the Panel

The Panel began its discussions in June 2018, and comprehensively evaluated OIST's efforts and achievements theretofore to confirm the execution status of the School Corporation Act. It compiled "Perspectives for the Evaluation of OIST's Efforts, etc." in March 2019, evaluated and checked OIST's current status based on the perspectives, and released its findings in September 2020 as an "Interim Report". The Panel conducted hearings^{※6} from October to December 2020 to solicit opinions from Okinawa's local governments, business associations, educational and research institutes and OIST officials on OIST's efforts and achievements as described in the Interim Report, and then comprehensively evaluated OIST's efforts and achievements theretofore.

Based on the evaluation of OIST's efforts and achievements in the context of the concept and background underlying OIST's establishment, the Panel carried out a comprehensive review from April to August 2021 on future development to achieve OIST's intended objectives as it celebrates its 10th anniversary, adopting such perspectives as the ideal scale of a university (in terms of faculty members and research fields) suitable for achieving the world's leading education and research and the ideal level of financial support from the national government that would ensure financial resources befitting a world's leading university in view of the examples provided by other world's leading universities, and then compiled its conclusions into a "Final Report".

※6 Hearings (conducted over 3 sessions)

Opinions were heard from the groups in i. to iii. below, with a particular focus on three areas of evaluation in the Interim Report: organizational management, education and research, and contribution to the promotion and self-sustaining development of Okinawa:

- i. Local governments (Ishigaki City, Uruma City, Okinawa Prefecture, Onna Village, Nago City) and business associations (Okinawa Association of Corporate Executives, Okinawa Prefecture Federation of Chambers of Commerce and Industry, Okinawa Prefecture Federation of Societies of Commerce and Industry, Okinawa Prefecture Small and Medium Enterprise Association) in Okinawa
- ii. Educational and research institutes (National Institute of Technology, Okinawa College, Tokyo Institute of Technology, Japan Advanced Institute of Science and Technology, University of the Ryukyus)
- iii. OIST officials (off-campus governors, off-campus councilors, faculty members, students, graduates)

II. Evaluation of OIST's current status

In comprehensively evaluating OIST's efforts and achievements since it opened, the Panel in March 2019 compiled "Perspectives for the Evaluation of OIST's Efforts, etc." to serve as basic guidelines for evaluation and identify perspectives for evaluation in terms of five items. Data and evidence from OIST's reports and announcements, the results of external evaluations (organized by OIST)^{※7}, the results of outsourced surveys (commissioned by the Cabinet Office)^{※8}, and appropriate international benchmarks, etc., were utilized in evaluations.

1. Basic guidelines for evaluation

In keeping with the following basic guidelines for evaluation, the Panel comprehensively evaluated OIST's efforts and achievements.

[Basic guidelines for evaluation]

- (1) Evaluate the degree to which OIST's Mission Statement^{※9} has been achieved
- (2) Use data and evidence such as suitable international benchmarks to make as objective as possible an evaluation, taking into account the world's leading level, internationality, flexibility and other characteristics of OIST while giving due consideration to the ambitious nature of OIST as an unprecedented endeavor in Japan and to the fact that it is still under development even as it approaches its tenth year in operation.
- (3) The Panel does not as a rule directly evaluate specific educational and research efforts but evaluate from the standpoint of a third party the suitability of self-evaluations conducted by OIST.

※7 External evaluation (organized by OIST in November 2019)

OIST organized an external evaluation team comprising Nobel laureates, former deans of leading international universities, etc., and had them conduct external evaluations of OIST's university management as a whole.

※8 Outsourced survey (commissioned by the Cabinet Office in 2018; results reported in March 2019)

Survey Report for "2018 Okinawa Promotion Survey: Survey on Best Approaches to Evaluation of Domestic and Foreign Universities and Research Institutes for Reviewing Implementation of the School Corporation Act" commissioned by the Cabinet Office

※9 Mission Statement (From "Policies, Rules and Procedures", Okinawa Institute of Science and Technology Graduate University)

The Okinawa Institute of Science and Technology Graduate University shall conduct internationally distinguished education and research on science and technology, and thus contribute to the sustainable development of Okinawa, and promote and sustain the advancement of science and technology in Japan and throughout the world.

Article 1 of Okinawa Institute of Science and Technology Graduate University School Corporation Act (Act No. 76 of 2009)

The purpose of this Act is to provide for necessary matters concerning the establishment and operation of the Okinawa Institute of Science and Technology in order to promote internationally distinguished research and education on science and technology based in Okinawa (within Okinawa Prefecture; the same shall apply hereinafter), and thus contribute to the promotion and self-sustaining development of Okinawa and to the development of science and technology worldwide.

The Panel checked and evaluated OIST's current status from the five perspectives: organizational management; education and research; contribution to the promotion and self-sustaining development of Okinawa; public relations, information disclosure, and other legal compliance; and finance. The results are given in the next section.

2. Evaluation of organizational management

[Perspective for evaluation]

Has OIST put in place an organizational system suitable for administering a university that conducts the world's leading education and research, including securing and training human resources for management and operation, and is this system functioning properly?

(Materials used as references for confirmation and evaluation)

- Materials for the 19th Panel (September 12, 2019)
"Report from OIST in Response to Panel's Perspectives for Evaluation: Organizational Management (Revised Edition)"
"Organizational Structure Diagram"
- Materials for the 22nd Panel (June 24, 2020)
"Summary of Evidence" (submitted by OIST in February 2020)
- Summary of Proceedings (Outline of Hearings) for 25th-27th Panel (October-December 2020)

[Matters confirmed by the Panel]

- OIST is a university established by the Okinawa Institute of Science and Technology Graduate University School Corporation, and this School Corporation is administered by its Board of Governors (BOG) as its highest decision-making body.
- In accordance with the provisions of the School Corporation Act, etc., the School Corporation's Board of Governors (BOG) has 19 members (12 from foreign countries) and includes former administrators and academic researchers from internationally renowned universities and research institutes such as Harvard University, Princeton University, and the Massachusetts Institute of Technology as well as four Nobel laureates and representatives from Okinawa; these members are making the most of their insights and experience on trends in advanced science and technology, the management of famous universities and research institutes, and the development of Okinawa to manage the School Corporation. The BOG has also appointed suitable persons from among candidates worldwide as the CEO in line with the purpose of OIST's establishment, to concurrently serve as the University's President and to manage the University.
- In accordance with the provisions of the School Corporation Act, etc., the School Corporation's Board of Councilors (BOC) has 39 members (around half of whom

are foreign nationals) who include former administrators and academic researchers from internationally renowned universities and research institutes such as Carnegie Mellon University and Stanford University, corporate managers, local officials from campus communities, and officials from Okinawa Prefecture; these members offer opinions to the BOG on university management to achieve OIST's purposes of realizing the world's leading education and research and promoting Okinawa.

- The composition of the School Corporation's governors and councilors, the requirements for the appointment of auditors, the procedures for project planning, etc., are being administered in accordance with the provisions of the School Corporation Act, etc.
- The councilors' involvement in school corporation management is presently limited to attending regular meetings, but it was suggested that greater use be made of councilors because of their roles in providing a diverse and broad range of opinions on the management of the School Corporation and in ensuring the School Corporation serves the public interest and the common good.
- The President has built a top-down university management system allowing leadership to implement the policies and instructions of the BOG.
- Following the management style of universities and research institutes that conduct the world's leading education and research, Provost has been appointed to serve under the President and the educational and research system is put in place to enable the Provost to supervise three Deans (the Dean of Faculty Affairs, the Dean of Research and the Dean of Graduate School).
- As a means of disseminating the President's intentions to all personnel involved in university management, a university management system has been developed whereby the President's leadership can be broadly and robustly exercised through weekly upper management meetings attended by the President, Senior Vice President, Provost, and Chief Operating Officer (COO) and biweekly Executive Committee meetings attended by the President, the Senior Vice-President, the Provost, the COO, all Vice-Presidents, all Deans and the Chair of the Faculty Council to facilitate decision-making, problem-solving and information exchange on important matters of organizational management and education/research.
- With the scale of the University expanding, the management system has also been improved and enhanced, as seen in the establishment of the Technology Development and Innovation Center (TDIC) in 2016 to promote the self-

sustaining development of Okinawa, and the assignment of a COO in 2018 to supervise the University's clerical and administrative divisions.

[Evaluation]

In accordance with the provisions of the School Corporation Act, etc., OIST has constructed an organizational management structure that enables the President to exercise leadership in managing the University, that allows the Board of Governors, whose membership includes Nobel laureates, former administrators and researchers at internationally renowned universities and research institutes, and persons with exceptional knowledge and experience in the development and promotion of Okinawa, to manage OIST as its highest decision-making body in keeping with the purposes of OIST's establishment, and that selects and appoints a CEO from among candidates worldwide deemed suitable for realizing the purposes of OIST's establishment to oversee university management while concurrently serving as the President. Such a global-scale university management system is a unique reflection of OIST's founding philosophy of internationality and interdisciplinarity. Reviews at the School Corporation have been conducted in a timely and appropriate manner to ensure the management system keeps pace with the University's expansion, with a Provost appointed from the University's opening and a Chief Operating Officer (COO) assigned in 2018 to supervise the University's clerical and administrative organizations in line with the management systems of the world's leading research universities and institutes, and the Panel concludes that an organizational structure suitable for the management of a university engaged in the world's leading education and research has indeed been put in place and is functioning properly.

Future clarification will be needed on key points pertaining to the forms of organizational management that can be referenced and utilized by Japanese research universities. It will also be essential for OIST to continue conducting self-inspections and reviews on whether the organizational management system currently in place is being effectively administered, particularly with regard to segregating the School Corporation's decision-making from the execution of these decisions by the University, and whether the checks of the BOG and other organizations involved in decision-making and management of the University are functioning effectively.

3. Evaluation of education and research

(1) Education

[Perspectives for evaluation]

① Recruitment of students

Is OIST recruiting talented students from Japan and abroad who have the potential and motivation to play leading roles in the world of international scientific research?

② Cultivation of students

Does OIST provide the world's leading education and the support needed by students to maximize their potential and develop as scientifically outstanding and autonomous personnel?

(Materials used as references for confirmation and evaluation)

- Materials for the 21st Panel (January 28, 2020)
"Report from OIST in Response to Panel's Perspectives for Evaluation: Education and Research"
- Materials for the 22nd Panel (June 24, 2020)
"Summary of Evidence" (submitted by OIST in February 2020)
- Materials for the 21st Panel (January 28, 2020)
"OIST External Evaluation (November 6-8, 2019)"
"External Evaluation Committee Report (Japanese translation)"
"Statistical Information Package 2019" (November 2019)
* Materials submitted by OIST to the External Evaluation Committee for external evaluation
- Survey Report on "2018 Okinawa Promotion Survey: Survey on Best Approaches to Evaluation of Domestic and Foreign Universities and Research Institutes for Reviewing the execution status of the School Corporation Act"
- Summary of Proceedings (Outlines of Hearings) for the 25th-27th Panel (October-December 2020)

[Matters confirmed by the Panel]

① Recruitment of students

- Student recruitment is conducted on a global scale, and more than 200 doctoral students (52 Japanese) have been recruited from more than 50 countries so far. High-quality students who have the potential and motivation to play leading roles in the field of international scientific research are selected from among a considerable number of applicants (the application-admission ratio is about 20 in 2019 and about 15 in 2020).

1st class - 2012

208 applicants (14 Japanese), 49 successful applicants (9 Japanese), 34 enrollees (5 Japanese)

7th class - 2018

502 applicants (18 Japanese), 60 successful applicants (7 Japanese), 34 enrollees (1 Japanese)

8th class - 2019

1,540 applicants (18 Japanese), 79 successful applicants (8 Japanese), 52 enrollees (9 Japanese)

* The 8 successful Japanese applicants and 9 enrolled Japanese students were permitted delayed admission from the 7th class to the 8th class due to illness.

9th class - 2020

1,131 applicants (25 Japanese), 75 successful applicants (12 Japanese), 62 enrollees (13 Japanese)

* The 12 successful Japanese applicants and the 13 enrolled Japanese students were permitted delayed admission from the 8th class to the 9th class due to illness.

- Enrollees have conventionally been selected by holding admission workshops (selected candidate students are invited to OIST for interviews, etc.) to recruit motivated students. To increase the number of Japanese students and enrollments from Okinawa, a research internship system was established in 2018 to accept students from other universities for research internships (212 students (73 Japanese students, of whom 15 were from the University of the Ryukyus)), and selection through research internships was begun.
- Institutions of higher education in Okinawa Prefecture are hoping to strengthen cooperation with OIST in human resources, student development, research, and local collaboration and, with internships potentially prompting excellent students to aspire to OIST, they hope OIST will continue to accept interns.

② Cultivation of students

- As the world's leading educational initiatives, OIST provides students selected from around the world with a five-year PhD-level educational program taught in English as the official language (with 38 basic courses and 18 advanced courses available) and a curriculum that requires lab rotations at the time of admission to experience three different labs in order to increase interdisciplinary integration, and offers professional skill training that takes into consideration research ethics, project management, and students' future employment in and outside the academic world. Lab rotation in particular provides students with opportunities to gain new insights into research fields that differ from those they have studied, and the ability to work on research from a broader perspective has been very well-received. Generous support is also available in such forms as paying salaries to students as research support personnel and establishing student dormitories on campus so that students can concentrate on their research.
- The considerable internationality and diversity of faculty and students and the numerous opportunities given to students to hear lectures by world-renowned researchers have proven to be very inspiring for Japanese students.
- In the Japan Institution for Higher Education Evaluation (JIHEE)'s accreditation of individual university institutions for academic year 2018, OIST was accredited on all criteria with no recommendations for revision or improvement, demonstrating that not only its state-of-the-art science and technology research but also its pioneering and interdisciplinary efforts to achieve creative research results are held in high regard.
- The External Evaluation Committee (organized by OIST in 2019), comprising faculty members from world-renowned research universities, conducted an

interview with OIST students and postdocs, and the Committee members were all in agreement that these students/postdocs are extremely ambitious, have a good understanding of their subjects, are articulate, have a pioneering spirit and are adventurous. Additionally, the Committee highly valued the quality of the students and postdocs interviewed which is equal to that of world-famous research universities where the members of the External Evaluation Committee belong.

- OIST's first diploma award ceremony was held in February 2018, and a total of 74 students had completed their studies^{※10} as of July 2021. Graduates are employed by well-known universities, research institutes and private companies such as Harvard University and the Swiss Federal Institute of Technology in Zurich.

[Evaluation]

Excellent students are selected inside and outside Japan through admission workshops and students are provided with a global educational and research environment by outstanding researchers assembled from all over the world. Such a diverse educational and research environment is a praiseworthy model for Japanese universities, which can be highly regarded.

OIST is pursuing interdisciplinary educational activities to produce research abundant in creativity and originality, e.g., unique programs such as lab rotation (rotation among three locations to incorporate research activities in labs outside the student's specialty) that give students the greater understanding of different fields needed to pursue interdisciplinary and integrated research, as well as the shared use of advanced research equipment as an effective means of encouraging exchange between labs regardless of their fields of specialty. The External Evaluation Committee also appreciates the fact that OIST provides the world's leading education and necessary support that makes the quality of its students and postdocs comparable to that of their counterparts at world-renowned research universities.

Much closer collaboration would appear necessary for the sake of students, and this might include outreach activities and other activities outside education and research with educational institutions in Okinawa such as the University of the Ryukyus and the National Institute of Technology, Okinawa College. From the perspective of developing human resources in Okinawa, internships can be expected to create opportunities for exceptional students from the higher

※10 Diploma award ceremonies
1st (February 2018): 14 graduates
2nd (May 2019): 19 graduates
3rd (May 2021): 41 graduates.

education institutions in Okinawa to go on to OIST.

To produce first-rate Japanese graduates who can play active roles globally, stepping up efforts to acquire and cultivate excellent Japanese enrollees is an issue that OIST will need to address. It is hoped that OIST will put in place and augment educational programs necessary for developing global human resources, including English-language instruction.

(2) Research

[Perspectives for evaluation]

① Research implementation system

Has OIST as the world's leading research university created a research implementation system by appointing and encouraging outstanding faculty members with international experience and insight?

② Research level, results, etc.

Is OIST promoting the world's leading interdisciplinary research, pursuing new knowledge through research, and creating internationally distinguished research results in science and technology?

③ Academic collaboration

Is OIST building a close-knit network with the global scientific community?

(Materials used as references for confirmation and evaluation)

- Materials for the 21st Panel (January 28, 2020)
"Report from OIST in Response to Panel's Perspectives for Evaluation: Education and Research"
- Materials for the 22nd Panel (June 24, 2020)
"Summary of Evidence" (submitted by OIST in February 2020)
- Survey Report on "2018 Okinawa Promotion Survey: Survey on Best Approaches to Evaluation of Domestic and Foreign Universities and Research Institutes for Reviewing the execution status of the School Corporation Act"
- Materials for the 21st Panel (January 28, 2020)
"OIST External Evaluation (November 6-8, 2019)"
"External Evaluation Committee Report (Japanese translation)"
"Statistical Information Package 2019" (November 2019)
* Materials submitted by OIST to the External Evaluation Committee for external evaluation
- Summary of Proceedings (Outlines of Hearings) for the 25th-27th Panel (October-December 2020)

[Matters confirmed by the Panel]

① Research implementation system

- OIST has advertised an open position in publicity and offered a position on a global scale to recruit outstanding faculty members. The key recruitment criterion for faculty members is that their research records show they are in the top 10% of researchers in their field or better (top 5%), and based on the faculty

committee's recommendation, the Dean of Faculty Affairs recommends candidates to the President; the Board of Governors then gives final approval to candidates that the President chooses.

2018: Open call for applicants

1,544 applications (267 Japanese), 23 offers (4 Japanese), 20 hires (4 Japanese)

2019: Selection by encouraging applications from specific fields/candidates

7 applications (3 Japanese), 4 offers (1 Japanese), 4 hires (1 Japanese)

2020: Selection by encouraging applications from specific fields/candidates

1 application (1 Japanese), 1 offer (1 Japanese), 1 hire (1 Japanese)

- A global education and research implementation system has been established, with approximately 60% of faculty members being foreign nationals (from about 20 countries, including the United States, the United Kingdom, Russia, India, Germany, Canada, and Italy) and with the official language of instruction being English.
- Faculty members undergo research reviews conducted every five years by the External Evaluation Committee on Faculty Performance Evaluations, and the results are reflected in the benefits and research funding allocated to faculty members. Tenure and promotion reviews are carried out when faculty members are considering granting a lifetime employment position or promotion, and hiring/approval is determined on the basis of the review results.
- Research activities by the faculty are provided the same level of support in the operating budget as that offered by the world's top universities when OIST was established. Newly appointed faculty members are given preferential treatment for two years for equipment purchase costs, etc., as support for launching units.
- Research equipment and facilities such as microscopes, sequencers, and mass spectrometers are managed by research support division, and specialized technical support and training are provided.

② Research level, results, etc.

- The "Nature Index 2019" ranking of the number of research papers normalized by institutional scale placed OIST 9th in the world and 1st in Japan (a ranking equalized by institutional scale has not been released for "Nature Index 2020").
- Using InCites^{※11} to analyze the papers listed in "Web of Science"^{※12} between

※11 InCites

A tool for analyzing research achievements based on research papers and information cited therefrom. This product was created by Clarivate Analytics, the provider of Web of Science, based on the paper data recorded in Web of Science. The company provides various indicators for measuring the research capabilities of researchers and research institutes based on how often papers are cited (number of citations).

※12 Web of Science

A publisher-independent citation database for high-quality influential publications around the world

2012 and 2020 shows that OIST was the only research university in Japan to account for more than 2% (2.07%) of the top 1% most-cited papers^{※13} (for reference, The University of Tokyo accounted for 1.61%). OIST was also the highest-ranked research university in Japan in its percentage of the top 10% of most-cited papers (14.7%) (for reference, The University of Tokyo had a figure of 11.73%).

- OIST promotes interdisciplinary integrated research, and OIST researchers are the principal authors or co-authors of about 20% of interdisciplinary academic papers covering multiple research fields across a broad spectrum (biology, chemistry, environment, information & computer mathematics, medicine & health, physical science, psychology & cognitive science, engineering, etc.).

③ Academic collaboration

- According to "Nature Index 2020", the percentage of internationally co-authored papers at leading research universities in Japan (The University of Tokyo, Kyoto University, Tokyo Institute of Technology, etc.) is 50-60% while that at OIST is a high 80%, a ratio comparable to those of leading research universities overseas (University of Oxford: 75%, Swiss Federal Institute of Technology in Zurich: 83%, Singapore National University: 84%, Institute of Science and Technology Austria: 96%).
- In addition to undertaking academic collaboration with 105 universities and institutions in 28 countries (31 in the US, 14 in France, 8 in the UK, 7 in Germany, 6 in China, and 4 in Canada), OIST has appointed faculty members from outside institutions as part-time faculty members to activate exchange.
- To promote international academic exchange, OIST holds research conferences/workshops (12 were held in 2018) and international symposiums (3 were held independently and 8 co-sponsored in 2018). OIST has also set up its own program (KICKS Program (5 projects per year, 10 million yen annually per Program)) to promote exchange and joint research with overseas institutions, and three of the five projects selected for the Program have led to new development.

※13 Top 1% most-cited papers

This refers to the adjusted number of papers representing 1/100 of the real number of papers after extracting those having the top 1% most citations in each field over a given period.

[Evaluation]

OIST hires outstanding faculty members through international recruitment after establishing clear selection criteria and, although faculty members are accorded considerable discretion in research after they are hired, they are also regularly subject to stringent performance evaluations by External Evaluation Committee members. To engage in interdisciplinary research, OIST has also been implementing efforts distinctive in Japan that are modeled on those of leading research universities and institutions overseas, including organizational management not differentiated by research field and the sharing of research equipment, and high marks can be given to OIST's efforts to establish a research implementation system worthy of the world's leading research university. In particular, "Nature Index 2019", which features rankings of the number of research papers equalized by institutional scale, ranked OIST 9th in the world and 1st in Japan, and the fact that a university less than ten years old has produced such internationally outstanding results is highly commendable.

To further enhance its presence as a research university in future, OIST is expected to present strategies for further expanding the research fields that will serve as OIST's strengths as well as new research areas that have become clear through earlier interdisciplinary research.

Efforts should also be undertaken to utilize OIST's research capabilities and high internationality to help form networks between the Japanese academic community (especially young academics) and the world's scientific and technological community and to increase communication between faculty members from overseas and academic circles in Japan. OIST should also collaborate with the world's leading research universities and other Japanese research universities to encourage active two-way exchange between outstanding students and researchers, especially in research fields that OIST cannot cover.

4. Evaluation of contribution to the promotion and self-sustaining development of

Okinawa

(1) Education and research

[Perspective for evaluation]

Is OIST conducting education and research that utilizes the characteristics and resources of Okinawa and otherwise contributes to the promotion and self-sustaining development of Okinawa?

(Materials used as references for confirmation and evaluation)

- Materials for the 20th Panel (November 25, 2019)
“Report from OIST in Response to Panel’s Perspectives for Evaluation: Contribution to the Promotion and Self-sustaining Development of Okinawa”
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[Matters confirmed by the Panel]

- OIST is engaged in the development of education and research that makes the best use of Okinawa’s characteristics and natural resources, as demonstrated in its development of OIST rice, a variety of rice whose cultivation is suited to the climate of Okinawa and which has the potential to control obesity and diabetes among people who eat rice as a staple, its genome analyses of the crown-of-thorns starfish disrupting Okinawa’s marine ecosystem and of the Mozuku seaweed that is a local specialty product, its environmental restoration of airports and military facilities suffering from soil and groundwater pollution, and its development of renewable energies not relying on resources outside of the islands.
- OIST is taking part in joint research with local Okinawan companies to solve the problems facing Okinawa, e.g., jointly developing wastewater treatment technology using microbial fuel cells for industrial waste treatment.
- It is extremely important that OIST place value on both research that contributes locally to Okinawa and the globally cutting-edge basic research that is OIST’s main mission.

[Evaluation]

OIST deserves praise for making the most of Okinawa’s characteristics and resources in pursuing research aimed at solving the problems facing Okinawa while gaining a high reputation globally for conducting the world’s leading research such as genome analyses of crown-of-thorns starfish and development of renewable energies not relying on resources outside of the islands.

The world’s leading basic research and locally-rooted research do not always move in the same direction but, based on the fact that more than 95% of OIST’s financial resources come from the government’s Okinawa development and promotion budget, OIST should pursue further research leveraging the locational advantages of Okinawa, clarify the issues confronting Okinawa through dialogue among OIST, Okinawa Prefecture, and municipalities within the prefecture on how the world’s leading education and research conducted at OIST can contribute to the development and promotion of Okinawa, and move forward through organized collaboration with efforts that link Okinawa’s issues to OIST’s research.

(2) Industry-academia collaboration

[Perspective for evaluation]

Is OIST encouraging the use of research results to create innovation and form innovation ecosystems?

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- Materials for the 20th Panel (November 25, 2019)
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[Matters confirmed by the Panel]

○ Number of joint research projects (from "Implementation Status of Industry-Academia Collaboration at Universities, etc." (Ministry of Education, Culture, Sports, Science and Technology Survey))

- | | | |
|-----------|--------------|---------------------------------|
| • FY2015 | Projects: 5 | Amount received: 78 million yen |
| • FY2016: | Projects: 7 | Amount received: 79 million yen |
| • FY2017 | Projects: 9 | Amount received: 45 million yen |
| • FY2018 | Projects: 10 | Amount received: 38 million yen |
| • FY2019 | Projects: 5 | Amount received: 26 million yen |

○ Number of commissioned research projects (from "Implementation Status of Industry-Academia Collaboration at Universities, etc." (Ministry of Education, Culture, Sports, Science and Technology Survey))

- | | | |
|-----------|---------------|----------------------------------|
| • FY2015 | Projects: 7 | Amount received: 80 million yen |
| • FY2016: | Projects: 14: | Amount received: 274 million yen |
| • FY2017 | Projects: 19 | Amount received: 369 million yen |
| • FY2018 | Projects: 19 | Amount received: 294 million yen |
| • FY2019 | Projects: 21 | Amount received: 51 million yen |

○ Number of patents acquired (from "Implementation Status of Industry-Academia Collaboration at Universities, etc." (Ministry of Education, Culture, Sports, Science and Technology Survey))

- | | | | | |
|----------|------------------|--------------|--------------|----------------------------------|
| • FY2015 | Applications: 36 | Granted: 23 | Licensed: 14 | Licensing revenue: 3 million yen |
| • FY2016 | Applications: 44 | Granted: 40 | Licensed: 11 | Licensing revenue: 1 million yen |
| • FY2017 | Applications: 42 | Granted: 67 | Licensed: 18 | Licensing revenue: 1 million yen |
| • FY2018 | Applications: 47 | Granted: 103 | Licensed: 17 | Licensing revenue: 1 million yen |
| • FY2019 | Applications: 39 | Granted: 109 | Licensed: 19 | Licensing revenue: 1 million yen |
- Two startups (one company that mainly performs polymer structure analysis and another that mainly manufactures wastewater treatment systems) have been established thus far based on OIST’s research and development results.

- An incubation facility went into operation in April 2019, and 28 companies, including startups from OIST and startups by companies selected for the Startup Accelerator Program^{※14}, have now moved into the facility.
- A "Proof of Concept (POC) Program"^{※15} has been set up as an initiative to support the commercialization of research findings (inventions), providing financial and other support needed when determining commercial viability before technologies and inventions emerging from OIST's laboratories can expect to receive support from venture capitalists and financial institutions (approximately 1.4 billion yen of outside funding was procured for joint research, etc., for 34 projects from the start of FY2015 through FY2019). Over 30% of research units participate in the POC Program or in joint research with outside institutions.
- The Startup Accelerator Program has been underway since 2018 as an initiative to create industries in Okinawa by supporting start-ups and entrepreneurs developing next-generation solutions that meet the needs of domestic and overseas markets with the aim of attracting entrepreneurs from all over the world to Okinawa; five recipients have been selected thus far. Once selected, these recipients can gain access to the use of OIST research facilities and receive specialist advice on commercialization, and three startups have been established through this Program.
- On the other hand, local governments and industries in Okinawa commented that the connections between OIST's research results and the establishment of start-up companies are not clear. It was also suggested that the ties between OIST and Okinawa are not close enough, requiring efforts to deepen relations from various perspectives that might include the provision of a venue in which OIST and Okinawa's local governments and industries can interact on a day-to-day basis. In particular, many commenters voiced hopes that a mechanism would be constructed whereby OIST's research results would promote industry through better matching with companies and through research conducted in

※14 Startup Accelerator Program

A program that supports startups and entrepreneurs who develop next-generation solutions that meet the needs of domestic and overseas markets with the aim of attracting entrepreneurs from all over the world to Okinawa. Relying on financial support from Okinawa Prefecture, the Program aims to bring the developed products to market with the cooperation of the global mentor network provided by OIST.

※15 Proof of Concept (POC) Program

An OIST program aimed at filling in the technical and financial gaps that arise when commercializing research results and bridging the way to commercialization. In addition to supplying additional funding, OIST provides comprehensive support such as guidance from outside experts and surveys of market trends.

response to proposals from companies.

[Evaluation]

High marks can be given to the fact that OIST is promoting the use of research results in forming an innovation ecosystem, as indicated in the rising numbers of joint and commissioned research projects through industry-academia collaboration, while at the same time providing start-up support through initiatives such as creating OIST-launched ventures and operating both the POC Program and an incubator facility.

To continue this progress in future, OIST will need to go beyond an abstract vision and, based on its distinctive technologies, engage in concrete locally-rooted efforts with the companies needed for their commercialization, but one issue here is that OIST has not yet identified the technologies that will serve as the basis for industry-academia collaboration and its concrete strategies for future commercialization.

It is necessary for OIST to root itself more deeply in the community, engaging in routine dialogue and striving to understand the issues facing Okinawa to establish closer relations with industries and local governments in Okinawa, and it should construct a mechanism to link OIST's research results to industrial promotion through better matching with companies and through research conducted in response to proposals from companies.

It is important that these efforts be pursued with vigor, that OIST support the development of new industries through its POC Program and Startup Accelerator Program, generate successes that boost employment and income in Okinawa, and ensure that these successes are made tangible for, and recognized by the citizens of Okinawa.

In conjunction with seeking closer cooperation with Okinawa Prefecture and stepping up its endeavors within the prefecture to build an OIST-centered innovation ecosystem, OIST should pursue stronger industry-academia collaboration internationally by utilizing its own international network.

(3) Community interaction, etc.

[Perspective for evaluation]

Does OIST contribute to the development of education and of science and technology in Okinawa through exchanges with Okinawan residents?

(Materials used as references for confirmation and evaluation)

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[Matters confirmed by the Panel]

- Science lectures are held through exchange programs with universities and medical institutions in Okinawa.
- OIST is implementing a “Visit OIST Program” targeting all high schools in Okinawa.
- OIST is conducting educational science activities in Okinawa that include lectures for local children and students and science demonstration talks on outlying islands. These have been well received by local governments in the prefecture, and increased opportunities for such exchange should be pursued in future.
- University officials are dispatched to English classes at local schools to help children improve their English proficiency, better understand different cultures, and learn about diversity.
- Cultural events (music concerts, art exhibitions and presentations on traditional Ryukyu performing arts) are held on the OIST campus to enhance the sense of unity with the local community, and are used as opportunities to help local residents learn more about OIST.
- Liaison meetings between Okinawa Prefecture and OIST have been held regularly since 2019 to exchange information and opinions.
- 204 staff members have been hired from the prefecture (accounting for 23% of OIST’s total staff, not including dispatched staff, as of January 2021).
- In response to the spread of novel coronavirus (COVID-19) infections, OIST has actively cooperated with Okinawa Prefecture’s PCR testing by carrying out 21,139 such tests as of June 30, 2021.

[Evaluation]

OIST’s active efforts to conduct targeted science education and exchange activities, including science lectures and OIST visitation programs for students in Okinawa, are to be commended.

At the same time, OIST needs to work more closely with Okinawa Prefecture and local governments and industries within the prefecture to determine the forms in which the world’s leading education and research conducted at OIST will be tied to the development of education and of science and technology.

5. Evaluation of public relations, information disclosure, other legal compliance, etc.

(1) Public relations

[Perspective for evaluation]

Does OIST provide timely, appropriate, easy-to-understand and accurate

information about its activities to increase its visibility?

(Materials used as references for confirmation and evaluation)

- Materials for the 20th Panel (November 25, 2019)
"Report from OIST in Response to Panel's Perspectives for Evaluation: Public Relations, Information Disclosure, Other Legal Compliance, etc."
- Materials for the 22nd Panel (June 24, 2020)
"Summary of Evidence" (submitted by OIST in February 2020)
- Summary of Proceedings (Outline of Hearings) for the 25th-27th Panel (October-December 2020)

[Matters confirmed by the Panel]

- OIST has increased the number of press releases on research results in recent years, and has also been actively disseminating information through its website.
- The President disseminates information on OIST activities to a wide range of readers by, for instance, contributing columns to national newspapers once a month and to local newspapers every other week.
- OIST is undertaking public relations activities using various media (Flickr, Vimeo, LinkedIn) as well as YouTube, Twitter, Facebook, and Instagram.
- OIST has been holding science cafes (Roundtable meetings for journalists in Tokyo) to build relations between OIST researchers and journalists in Tokyo and has hosted three OIST forums in Tokyo since 2016 aimed at establishing closer ties with opinion leaders.
- OIST conducted a science talk^{※16} at a bookstore in Naha City for the general public in Okinawa.
- OIST held various events such as Science Class for Children at Onna Village (142 participants^{※16}) and Science Festa (4,500 participants^{※16}) as educational science activities in 2019, and 27,673 people^{※16} visited OIST.
- OIST participated in a school trip fair held in Tokyo by the Okinawa Convention & Visitors Bureau and 313 persons^{※16} from five Super Science High Schools (SSH) visited OIST during school trips in 2018, part of a total of 683 students^{※16} from 13 schools outside the prefecture who visited OIST that year.

※16 Measures to prevent the spread of novel coronavirus (COVID-19) infections

Educational science activities such as campus tours for children/students and the general public were suspended in 2020 in terms of preventing the spread of novel coronavirus infections. With various restrictions having been imposed, a science talk distributed video content to YouTube. In addition, a "Science Festa" offering live YouTube streaming of experiments, Q&A sessions and science talks as well as introducing OIST's research endeavors drew in approximately 3,000 viewers.

[Evaluation]

OIST can be commended for increasing its efforts such as press releases and online article distribution year by year, and for actively disseminating information through SNS and events such as science festivals to make information on OIST's activities available in a timely and appropriate manner.

It is important to ensure that public relations activities and the means employed in conducting them serve the aims of gaining the understanding of local communities, communicating findings to companies, and attracting students from other countries. Effective public relations efforts entail further promoting SDGs-related efforts, deepening cooperation with local communities and utilizing the contents of OIST research, including that on the circular economy^{※17}, for educational purposes. Consideration should also be given to pursuing public relations by engaging with opinion leaders and disseminating information on successful industry-academia collaboration programs in an easy-to-understand manner to raise awareness among Okinawans that OIST is helping to promote Okinawa. From the perspectives of promoting international academic research and industry-academia collaboration and attracting excellent faculty and students from all over the world, OIST should pursue public relations efforts on its website and elsewhere in multiple languages and implement public relations strategies from a global perspective.

(2) Information disclosure, other legal compliance, etc.

[Perspectives for evaluation]

- ① Is OIST ensuring transparency in its operational administration by thoroughly disclosing information on the details of its management?
- ② Is OIST fulfilling the other obligations and responsibilities incumbent on it as a public corporation?

(Materials used as a references for confirmation and evaluation)

- Materials for the 20th Panel (November 25, 2019)
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- Materials for the 22nd Panel (June 24, 2020)
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※17 Circular economy

"Circular economy" refers to an economy that minimizes waste generation by preserving and maintaining the value of products and resources for as long as possible, replacing the conventional linear economy of "mass production, mass consumption, and mass disposal (Linear economy)".

- Summary of Proceedings (Outline of Hearings) for the 25th-27th Panel (October-December 2020)

[Matters confirmed by the Panel]

- OIST has been publicly disclosing on its website those items pertaining to the administration of a School Corporation for which disclosure is mandated by the School Education Act, the Private Schools Act and other laws and regulations, and OIST has been giving internal consideration to information disclosure requests made in accordance with the Act on Access to Information Held by Incorporated Administrative Agencies, etc., and responding appropriately in line with the relevant provisions.
- In addition to having in place a system for responding when compliance issues arise and a whistleblower system for illegal incidents, etc., OIST conducts compliance training that is mandatory for all staff members.
- OIST has made the necessary arrangements to meet the standards and systems required of public corporations by the national government, such as protecting personal information, managing corporate documents, avoiding conflicts of interest, preventing unauthorized use of research funds and ensuring robust security trade control.
- The President has set up a risk management committee comprising top university officials to prepare damage assumptions and countermeasures for 25 envisioned risks such as server damage, earthquakes and tsunamis, and share them with relevant personnel at the university, and has put in place a business continuity plan (BCP) to deal with seven contingencies that include earthquakes (as well as tsunamis), novel strains of influenza, fires, huge typhoons, and etc.

[Evaluation]

OIST is evaluated to be appropriately disclosing the information required to be mandated by the School Education Act, the Act on Access to Information Held by Incorporated Administrative Institutions, etc., and ensuring transparency in its operational administration. OIST also can be said to be fulfilling the obligations and responsibilities required of a public corporation, such as establishing the systems and internal regulations necessary for compliance and risk management.

6. Evaluation of finance

(1) Effectiveness, efficiency and adequacy of budget implementation

[Perspective for evaluation]

Has OIST hitherto been implementing its budgets effectively, efficiently and

appropriately?

(Materials used as references for confirmation and evaluation)

- Materials for the 19th Panel (September 12, 2019)
"Report from OIST in Response to Panel's Perspectives for Evaluation: Finance"
- Materials for the 22nd Panel (June 24, 2020)
"Summary of Evidence" (submitted by OIST in February 2020)
- Summary of Proceedings (Outline of Hearings) for the 25th-27th Panel (October-December 2020)

[Matters confirmed by the Panel]

- OIST is striving for proper budget implementation through such means as monthly monitoring of implementation status, mechanisms for same-year reallocations based on the implementation status and schemes for allocating budgets to research units based on comprehensive and objective evaluations of such factors as the levels of external funding acquired.
- To prevent fraudulent expenditures and ensure appropriate use of public funds, OIST is engaged in such efforts as improving the environment through obligatory compliance training for all faculty and staff, formulating a fraud prevention plan covering the use of public research funds, screening optional contracts, and establishing a contract review committee comprising outside experts.

[Evaluation]

OIST does appear to be working to realize appropriate budget implementation by establishing mechanisms for monthly monitoring of budget implementation and same-year reallocations. OIST can also be said to be appropriately working to prevent fraud and deal with improper implementation, etc., by conducting training and formulating fraud prevention plans.

On the other hand, OIST has not sufficiently explained its efforts to make its budget more efficient, and in future OIST will need to improve its operational efficiency to achieve the maximum research results possible within a limited budget and to carefully explain these improvement efforts and other aspects of its financial condition to Okinawan residents and the Japanese public.

(2) Building of an self-sustaining financial base

[Perspective for evaluation]

Has OIST been steadily securing competitive funding, research funding from companies and donations and other self-generated income and strengthened its financial base toward establishing self-sustaining management?

(Materials used as references for confirmation and evaluation)

- Materials for the 19th Panel (September 12, 2019)
"Report from OIST in Response to Panel's Perspectives for Evaluation: Finance"
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[Matters confirmed by the Panel]

- OIST is making efforts to acquire more subsidies, research funds from companies, donations, etc., to strengthen its self-sustaining financial base.
- To gain access to more subsidies, OIST actively supports researchers in their applications for subsidies and provides lump-sum payments and other incentives to researchers who have obtained competitive grants, and both the numbers and amounts of grants-in-aid for scientific research are on the rise.
- To obtain R&D funds from companies, OIST is implementing various initiatives such as partnering with financial institutions and setting up interviews between faculty members and companies.
- The OIST Foundation was established in the United States in 2019 to obtain donations that play an important role in strengthening OIST's financial base.
- Through these efforts, OIST increased its sources of external funding (grants-in-aid for scientific research, contracted research, domestic subsidies, overseas subsidies, donations, etc.) from 86 totaling 456 million yen in FY2015 (3.7% of the baseline^{※18} budget) to 247 totaling 845 million yen in FY2019 (5.6% of the baseline budget).

[Evaluation]

External funding is an uptrend due to efforts such as introducing support and incentives for grant applications to bolster OIST's self-sustaining financial base, promoting joint research and strengthening collaboration with companies, and establishing the OIST Foundation as a conduit for accepting donations on a global scale, and OIST is clearly undertaking efforts to secure a steady stream of self-generated revenues to fortify its own financial base.

Further efforts will be needed in future to achieve the external funding to secure its self-sustaining financial base.

※18 Baseline budget

Inclusive of research, education, computers and IT, facilities, building maintenance, business operations, and related personnel expenses

7. Overall evaluation

Based on the above, the Panel concludes overall that OIST's efforts and achievements over the ten years since the School Corporation Act took effect have generally achieved the mission statement set forth by OIST and the execution status of the School Corporation Act has been generally satisfactory. Above all, it is noteworthy with respect to its research results as a graduate university that OIST has achieved internationally outstanding scientific and technological accomplishments, such as in less than ten years being ranked 9th in the world and 1st in Japan in the scale-adjusted rankings of "Nature Index 2019". Praise is also due to OIST's pursuit of educational activities with new ideas not found at conventional Japanese universities, e.g., establishing laboratories not bound to any specific research field and introducing lab rotation to enhance interdisciplinary integration, and to its endeavors to conduct high-quality education by providing students with a global educational environment in which they can concentrate on their studies and research under the supervision of excellent researchers assembled from Japan and abroad. The Panel expects the efforts undertaken to utilize OIST's research capabilities and high internationality to help forming networks between the Japanese and the world's academic community.

The Panel also appraises regarding the organizational management that an organizational structure suitable for the management of a university engaged in the world's leading education and research has been constructed and the reviews have been conducted in a timely and appropriate manner to ensure the management system keeps pace with the University's expansion.

As to contribution to the promotion and self-sustaining development of Okinawa, OIST deserves praise for making the most of Okinawa's characteristics and resources in pursuing research aimed at solving the problems facing Okinawa. It is also evaluated that OIST is promoting the use of research results toward forming an innovation ecosystem, while at the same time pursuing industry-academia collaboration, creating OIST-launched ventures and providing start-up support. While OIST have earned a degree of appreciation, these efforts still have some way to go in terms of achieving the purposes of the establishment of OIST. It is an issue for OIST to root itself more deeply in the community, engaging in routine dialogue with industries and local governments in Okinawa, striving to understand the issues facing Okinawa and establishing closer relations. OIST also should pursue stronger industry-academia collaboration internationally by utilizing its own international network.

Judging from the evaluations heretofore, it is necessary that OIST will continue to pursue the world's leading education and research and the issue for OIST to address

is how to utilize its high ability to work on research and its international network to develop and promote Okinawa and encourage exchanges and collaboration between academic circles and industries inside and outside Japan.

III. OIST's future development

In the previous chapter, OIST has achieved various accomplishments such as acquiring an internationally high reputation for its research results in less than ten years since its establishment. In this period, the world's leading universities in other countries have achieved continued business growth by their own self-sustaining management, secured superior human resources and used their enormous wealth to advanced research bases in order to respond to uncertain and radical social change. The universities have gave birth to new industries creating a source of innovation, and evolved into an engine for social change contributing to solve social issues. The accumulation of superior human resources and various funds through achievements which are eye-catching in the world has created a virtuous cycle which builds greater level of research bases.

In this chapter, toward OIST's further development as a world's leading university and intended objective achievement, the Panel conducted a comprehensive examination of the direction of OIST's future development from the perspective of ascertaining the ideal scale of the university and the ideal level of financial support from the national government. In doing so, the Panel sought out data/information that was as objective as possible, referencing the "Interim Report" and hearing results as well as OIST's vision for the future ("OIST at a Crossroads": Looking Back Over the Past Ten Years to Determine OIST's Future Prospects", a presentation prepared for President's briefing at the 29th Panel Meeting), the External Evaluation Committee Report (compiled by OIST in November 2019), InCites, and other materials researched/collected by the Cabinet Office, etc.

More specifically, the Panel considered the appropriate scale for OIST in terms of faculty members and research fields to realize the world's leading education and research once its fifth research building, now under construction, has been completed (tentatively in FY2022) and the university will become able to take on about 100 PIs.

In studying the ideal level of financial support, the Panel conducted discussions on structures of financial resources deemed suitable for the world's leading universities, the ideal structure for funding OIST in future and the ideal level of financial support from the national government for the university's ideal scale, noting that financial support from the national government (Okinawa development and promotion budget) constitutes 95% of OIST's current operating budget.

The results of these examinations on the direction of future development were compiled as "1. Scale suitable for conducting the world's leading research and education as a research university", "2. Contributions to the development of Okinawa and our

country's economic society through the promotion of science and technology", "3. Structure of financial resources suitable for conducting the world's leading research and education as a research university", "4. Actions required from OIST for future development" and "5. Financial support from the national government."

1. Scale suitable for conducting the world's leading research and education as a research university

OIST had 82 PIs as of May 2021 but should be able to accept about 100 PIs once its fifth research building currently under construction is completed (tentatively in 2022). The Panel considered the scale the university would subsequently need to pursue the world's leading research and education.

Recognizing in conducting this examination that a university's research capabilities and research results cannot be evaluated by the number of paper citations alone, the Panel confirmed OIST's position among major research universities in Japan and the rest of the world by using the analysis tool "InCites" to look at the quality and number of papers listed in the "Web of Science" and the breadth of the research fields they covered and draw comparisons based on these three consistent and readily accessible criteria.

It was noted in a 2019 meeting of the External Evaluation Committee held by OIST that "with the current staffing of 75 faculty members, OIST has by no means reached the critical mass required to be competitive in the global education market."

① Analysis and evaluation of papers listed in "Web of Science" using InCites

The Cabinet Office used InCites to analyze the quality and number of papers published in "Web of Science" during OIST's first nine years (2012-2020).

Based on this analysis, the world's leading universities, and leading research universities and research institutes in Japan can be roughly divided into three groups using correlations between extremely high percentages of top 1% most-cited papers in various research fields and the number of papers listed in "Web of Science" as shown in Figure 1.

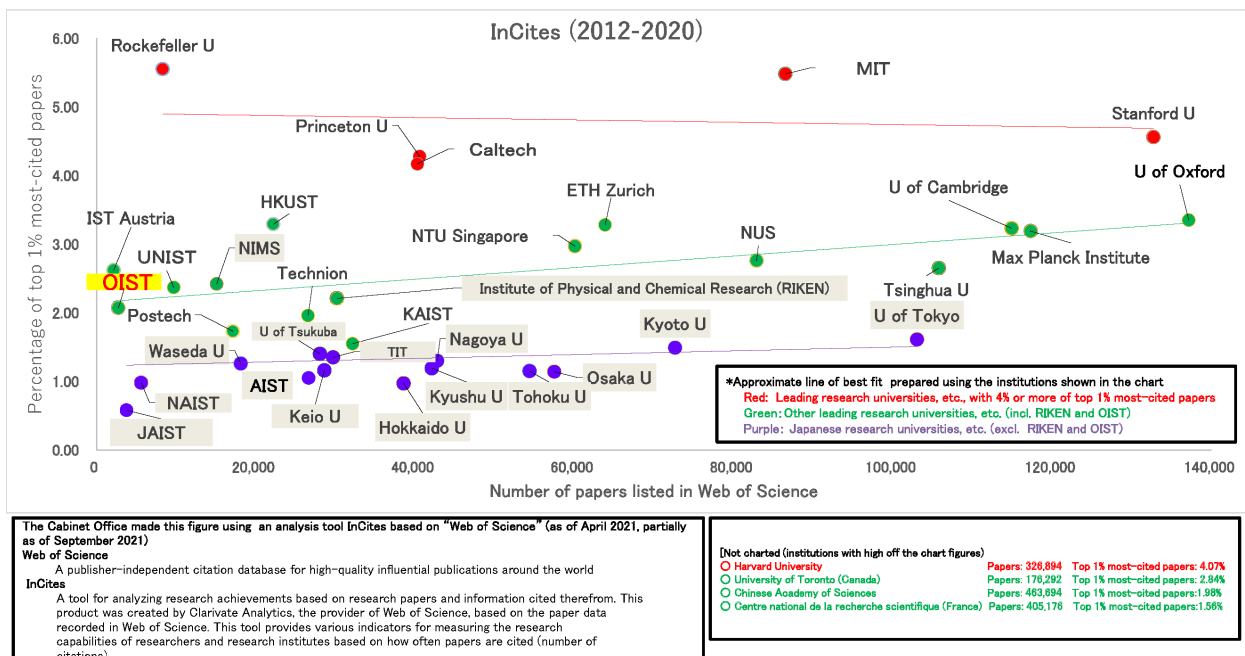
Group 1 (the red dots in Figure 1) comprising Stanford University (US), the Massachusetts Institute of Technology (US), the California Institute of Technology (US), etc., has high numbers of papers listed in "Web of Science" and also high percentages of the top 1% most-cited papers.

Group 3 (the purple dots in Figure 1) consists of leading research universities in Japan.

In the middle is Group 2 (the green dots in Figure 1) comprising the University of Oxford (UK), the University of Cambridge (UK), the Max Planck Institute (Germany), and IST Austria (Austria) as well as the rapidly growing Asian science and technology universities Hong Kong University of Science and Technology (China) and Nanyang Technological University (Singapore), and also including the Institute of Physical and Chemical Research, National Institute for Materials Science and OIST in Japan. Despite its small number of listed papers, OIST is the only Japanese research university with a top 1% most-cited paper percentage (2.07%) above 2%.

Figure 1

Figure 1: Numbers of Papers Listed in “Web of Science” and Percentages of Top 1% Most-Cited Papers



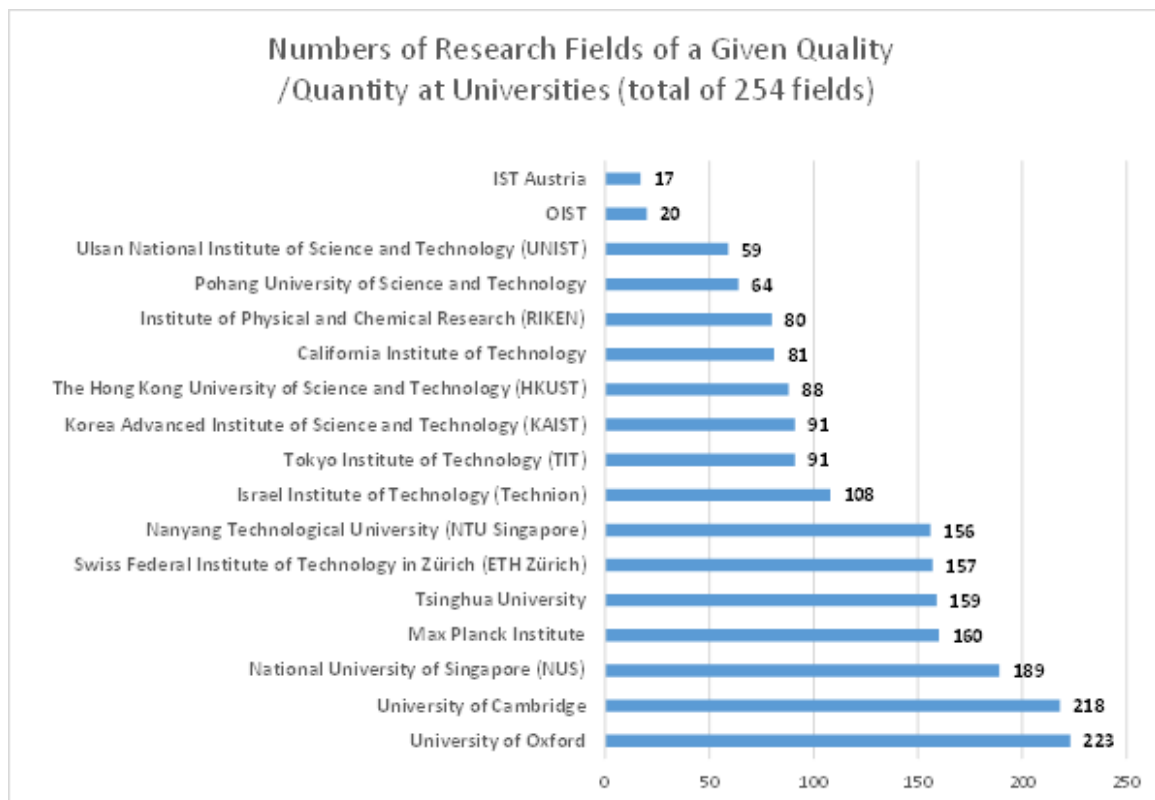
A few high-quality papers (papers with extremely high numbers of citations) among a small production of listed papers generates a high percentage of top 1% most-cited papers becomes high, but it would seem difficult to maintain a high percentage of the top 1% most-cited papers as the number of listed papers increases. Accordingly, it can be seen from Figure 1 that the universities/institutions of Groups 1 and 2 located on the right-hand side produce numerous papers while maintaining high quality, making them truly the world’s leading universities/institutions.

② Research fields covered by the world's leading universities

InCites can classify the papers published in the "Web of Science" for the five-year period 2016 to 2020 into 254 research fields (interdisciplinary and integrated fields are counted in multiple related fields), and the Cabinet Office in its analysis in ① above looked at how many research fields are covered by the 17 world's leading universities and research institutes mainly located in Group 2 (Figure 2). Here the papers listed in "Web of Science" have been tabulated on the presumption that research activities are being carried out to a certain degree in those research fields in which a university/research institution has published 50 or more papers over a period of five years.

The California Institute of Technology, on which OIST was modeled in the planning phase of OIST, has 81 research fields, four times OIST's 20 fields. Looking at the other world's leading science and technology universities, the Swiss Federal Institute of Technology in Zurich has 157 fields, Nanyang Technological University 156 fields, the Tokyo Institute of Technology 91 fields, the Hong Kong University of Science and Technology 88 fields, the Institute of Physical and Chemical Research 80 fields, the Pohang University of Science and Technology 64 fields and the Ulsan National Institute of Science and Technology 59 fields, all possessing more research fields than OIST.

Figure 2



Based on the analyzes in ① and ②, it can be said that OIST covers a small number of research fields and produces a small number of papers but the quality of its research is high and it has produced superior world-class research results. At the same time, the Panel recognized that a bird's-eye view of major universities around the world including Japan shows that the world's leading universities produce large numbers of high-quality papers across a broad range of research fields.

Recognizing the need for OIST to broaden and diversify its research fields further in order to take on advanced cross-field research that will trigger the creation of innovation and give OIST a greater global presence, the Panel agreed that the university's scale should be expanded to some extent. It will be essential not simply to increase the number of PIs and research fields but also to maintain and improve the quality of research cultivated thus far and assess the strengths of research fields and the need for new fields in carrying out such an expansion.

With regard to OIST's future position within Figure 1, the Panel believes that OIST should first aim to move toward the upper right within Group 2 by improving both the quality and quantity of its papers, with the hope that this will plant the seeds for innovation that will produce new industries and thereby contribute to economic development in both Okinawa and Japan as a whole.

2. Contribution to the development of Okinawa and our country's economic society through the promotion of science and technology

The concept for establishing OIST stated that "the University should aim to steadily accumulate the results of education and research and contribute to the development of science and technology worldwide as well as endeavor to contribute to the self-sustaining development of Okinawa and the development of our country's economic society by creating a truly international and flexible education and research environment and encouraging activities in cutting-edge interdisciplinary fields" (December 19, 2008 agreement among relevant cabinet ministers).

It is frequently the case that the world's leading universities are located in regions known as active producers of innovation because these regions have established innovation ecosystems characterized by a sustained virtuous cycle in which universities and industries exert a positive influence on each other and the seeds of innovation produce one new industry after another.

OIST has been seeking out cooperation with industries to build an innovation ecosystem since it was first established and it has developed programs and an

incubation facility to generate startups from research results. While innovation must be aimed for, it is not always possible to achieve it, and the Panel recognizes the difficulty of the university's achieving this on its own. The Panel thus believes that OIST should first produce internationally outstanding research results with the mindset of tackling social issues, and then develop a structural outline so that these efforts induce innovation.

The Panel recognizes the following viewpoints as important for contributing to Okinawa's self-sustaining development, and ultimately development of our country's economic society, through the promotion of science and technology.

- With regard to those research results and research fields that can seed innovation, the fact that innovations in recent years have been produced by interweaving technologies from various fields makes it imperative to foster an environment in which research personnel from various fields can be brought together at OIST to provide stimulus among research fields and in which a continual stream of interdisciplinary research projects are pursued.
- The key lies in how to spin these research seeds out from OIST. Producing early successes in OIST's "Startup Accelerator Program," which provides support for domestic and foreign entrepreneurs, is also important.
- The contributions of students and graduates are also a significant factor in the development of startups, and creating innovation will require establishing an environment in which people can continue to take on challenges without fear of failure and firmly positioning entrepreneurship education within graduate school education.
- Collaboration with companies is indispensable for the formation of an innovation ecosystem. OIST should make parallel efforts to pursue thematic research collaboration through joint research, etc., as well as more systemic comprehensive collaboration, by actively highlighting OIST's research to companies. Sharing a long-term vision on creating new social value with companies is particularly necessary for comprehensive collaboration. Another crucial perspective is that of pursuing collaboration with overseas companies by taking advantage of OIST's distinctive internationality.
- To contribute to the development and promotion of Okinawa, it is vital that OIST engages in research that makes the best use of Okinawa's location (climate, nature, geographical position, etc.) by grasping the issues facing Okinawa through active collaboration with business, academic and governmental

organizations in Okinawa. It is also essential that OIST researchers and graduates start businesses in Okinawa and become leaders in forming new growth industries to revitalize Okinawa's industries.

- Based on these results, OIST must endeavor to become a node for resolving the problems facing Okinawa, Japan and the world through promoting science and technology.

3. Structure of financial resources suitable for conducting the world's leading research and education as a research university

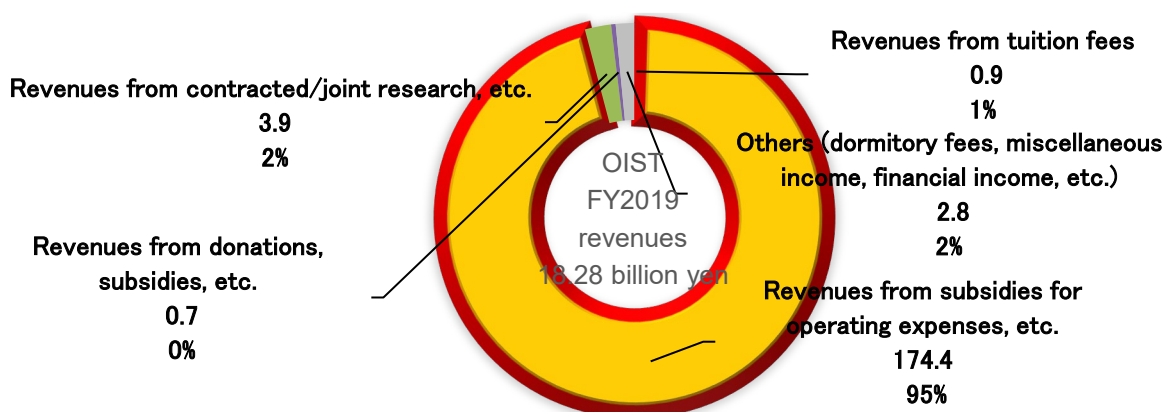
①Structure of financial resources of the world's leading universities

A key point of discussion in developing OIST as a world's leading university is that of the structure of financial resources supporting OIST. The Panel therefore ascertained and analyzed the structure of financial resources at the world's leading universities.

The Panel selected the five world's leading universities below as reference points for its analysis because these universities bear similarities to OIST in terms of scale, composition, years since establishment, establishment process, etc., because they are universities centered on science and engineering, and because their financial information is available (the numbers of faculty members and students given below for each university are those posted on that university's website as of April 2021).

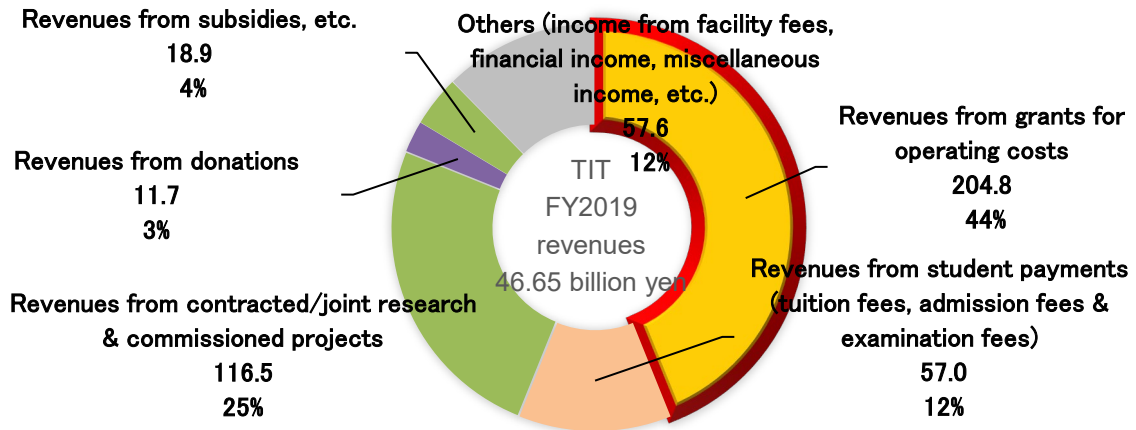
○OIST / private university / Established in 2012 / 9th year / 82 PIs / 226 graduate students

OIST receives 95% of its financial support from the national government, with the second largest source of income (2%) being contract/joint research.



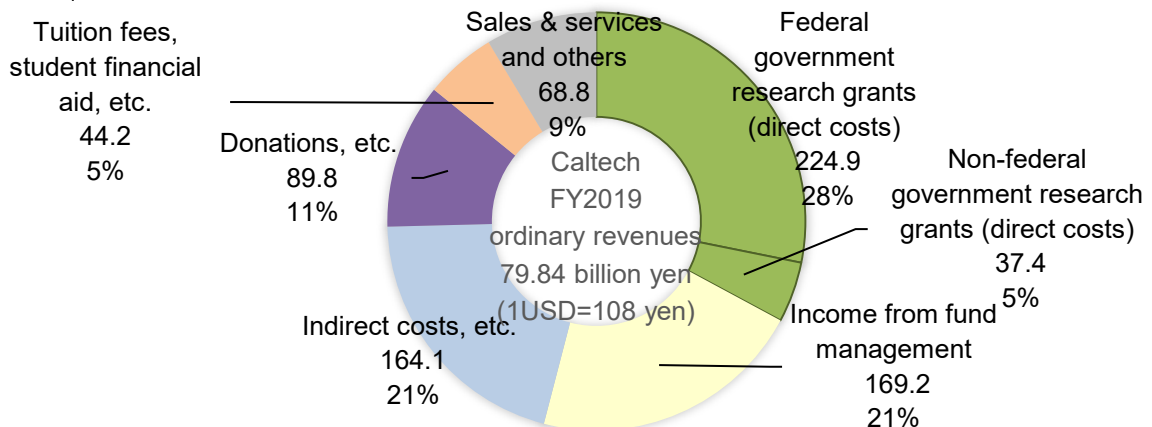
○Tokyo Institute of Technology / national university / Established in 1929 / 92nd year / 348 professors / 5,526 graduate students

TIT receives less than 50% of its financial support from the national government; contract/joint research accounts for 25% of revenues.



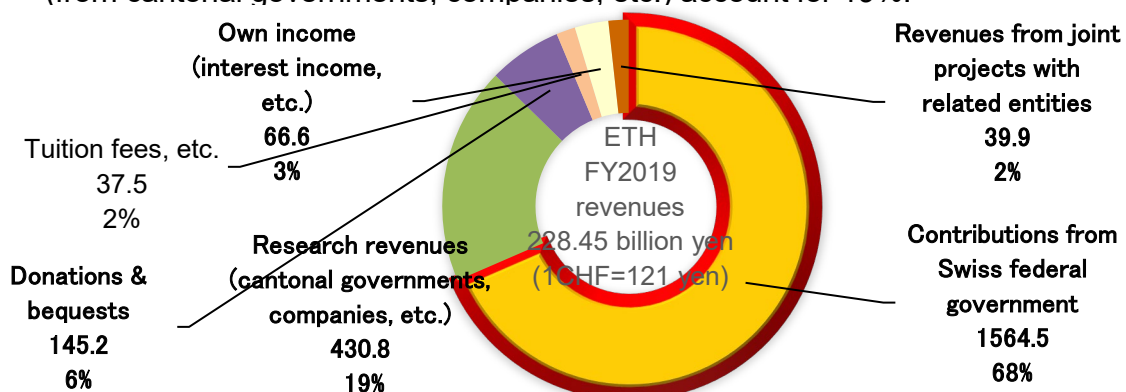
○California Institute of Technology / private university / Established in 1920 / 131st year / About 300 PIs / 1,330 graduate students

No federal subsidies are provided for university operation. Research grants account for 33% of revenues, fund management revenues for 21%, and donations, etc.. for 11%



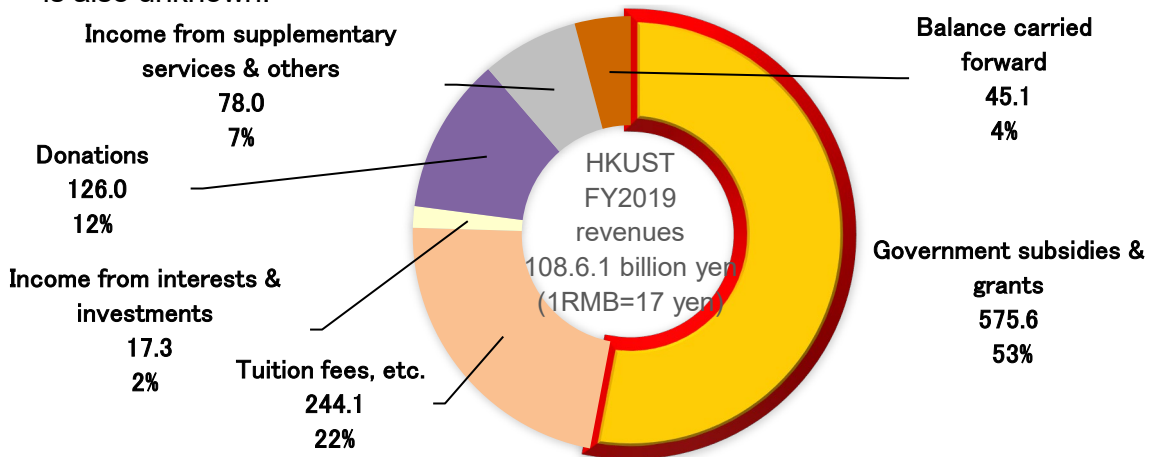
○Swiss Federal Institute of Technology in Zurich / national university / Established in 1855 / 166th year / 520 professors / 4,960 graduate students

The Swiss federal government provides 68% of ETH's revenues (the percentages for administrative support and research grants are unknown). Research revenues (from cantonal governments, companies, etc.) account for 19%.



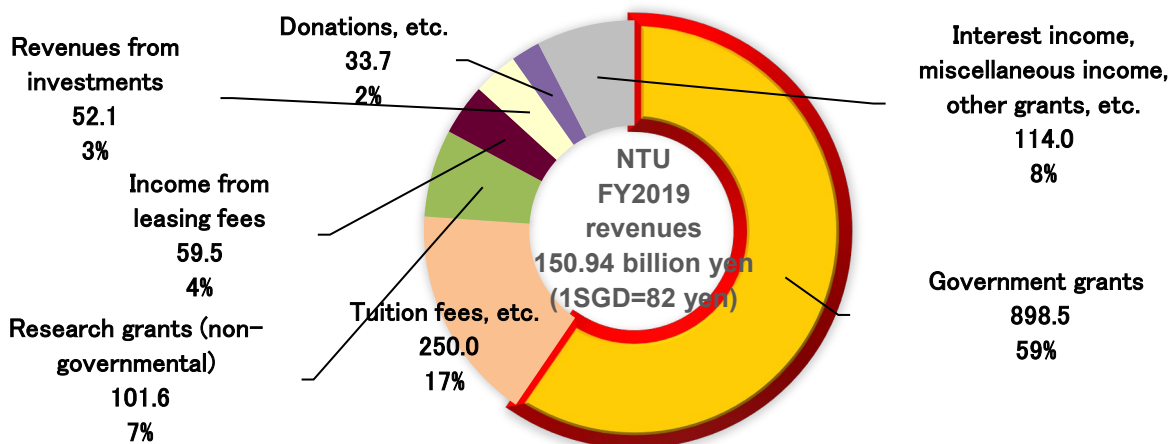
○Hong Kong University of Science and Technology / Public university / Established in 1991 / 30th year / 467 professors / 5,890 graduate students

Funding from the Hong Kong regional government accounts for 53% of HKUST's income (the percentages for administrative support and research grants are unknown). The ratio of research revenues (from companies, etc.) to total revenues is also unknown.



○Nanyang Technological University / national university / Established in 1991 / 30th year / 217 professors / 7,767 graduate students

Subsidies from government ministries and agencies make up 59% of NTU's revenues (the percentages for administrative support and research grants are unknown). Tuition fees, etc., account for 17% of total revenues.



The ratios of financial assistance provided by the national government for university operation to total revenues are 44% for the Tokyo Institute of Technology, 0% for the California Institute of Technology, 68% for the Swiss Federal Institute of Technology in Zurich (the percentages for administrative support and research grants are unknown), 53% for the Hong Kong University of Science and Technology (the percentages for administrative support and research grants are unknown), and 59% for Nanyang Technological University (the percentages for

administrative support and research grants are unknown).

The ratios of government research grants and revenues from joint/contracted research with companies to total revenues are 33% for the California Institute of Technology (direct revenues only; 21% for indirect revenues, etc.), 19% for the Swiss Federal Institute of Technology in Zurich (the 68% of revenues from federal government contributions also includes government-sponsored research grants), 53% for the Hong Kong University of Science and Technology (note that this is the sum of administrative support and research grants paid by the regional government), 7% for Nanyang Technological University (the 59% of revenues from government subsidies also includes government-sponsored research grants) and 25% for the Tokyo Institute of Technology.

The ratios of student payments (tuition fees, etc.) to total revenues are 5% for the California Institute of Technology, 2% for the Swiss Federal Institute of Technology in Zurich, 22% for the Hong Kong University of Science and Technology, 17% for Nanyang Technological University, and 12% for the Tokyo Institute of Technology.

The ratios of donations to total revenues are 11% for the California Institute of Technology, 6% for the Swiss Federal Institute of Technology in Zurich, 12% for the Hong Kong University of Science and Technology, 2% for Nanyang Technological University, and 3% for the Tokyo Institute of Technology.

Fund management revenues account for 21% of total revenues at the California Institute of Technology.

The Panel recognized through this analysis that the structure of financial resources at the world's leading universities is dependent on universities' particular circumstances, but a common factor among these universities was that none of them rely entirely on subsidies from the national government but instead earn their own revenues from various other channels.

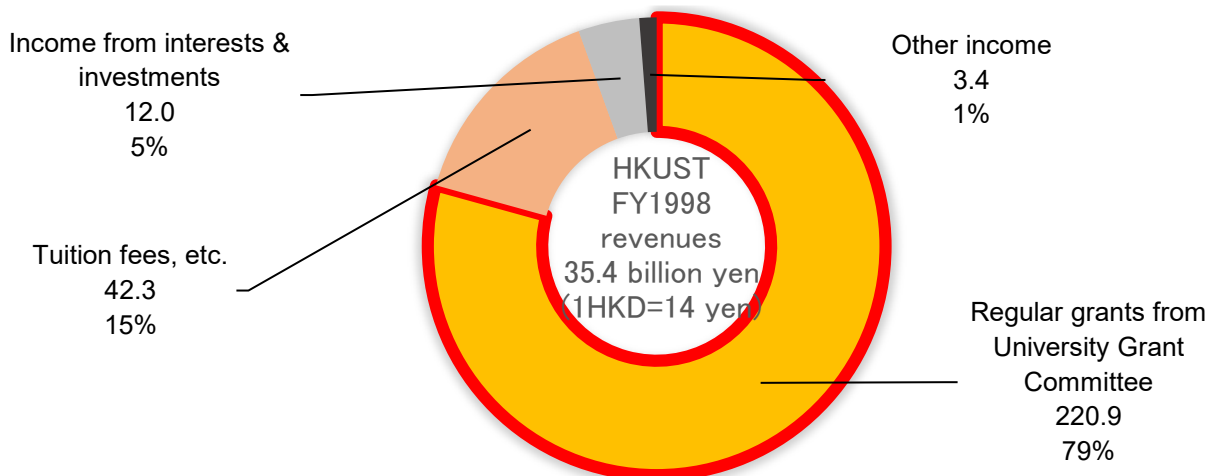
② Changes over time in the structure of financial resources at the world's leading universities

For use as a reference in determining how the structure of financial resources at OIST, now in its 10th year, will change over the next two decades, changes in the structure of financial resources at two universities whose financial data for previous years was available – the Hong Kong University of Science and Technology and the Tokyo Institute of Technology – were compared.

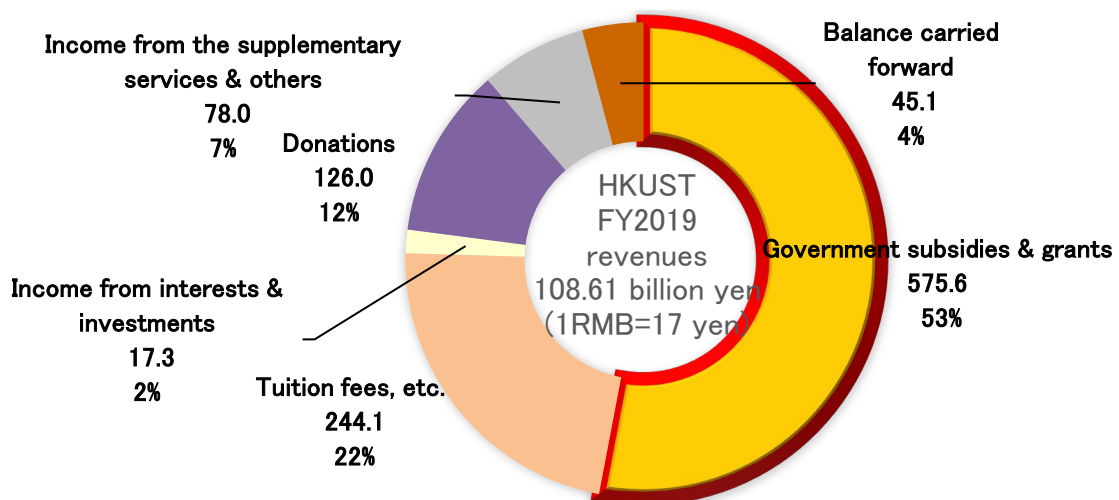
○ Hong Kong University of Science and Technology (8th year (1998) and 28th year (2019) of its establishment)

Looking at the Hong Kong University of Science and Technology, whose financial statements for its 8th and 28th years were available, the university's income tripled over 20 years as the university grew and, in the process, the ratio of government subsidies/grants (University Grants Committee regular grants) to total revenues declined from 79% to 53% while subsidies / grants revenues increased by a factor of 2.6. Instead, the ratio of tuition fees rose from 15% to 22%. While donations were not clearly indicated for the 8th year, they had come to account for 12% of total revenues by the university's 28th year.

8th year (FY1998): 543 faculty members (including 467 professors) / 1,467 graduate students



28th year (FY2019): 699 faculty members / 5,890 graduate students

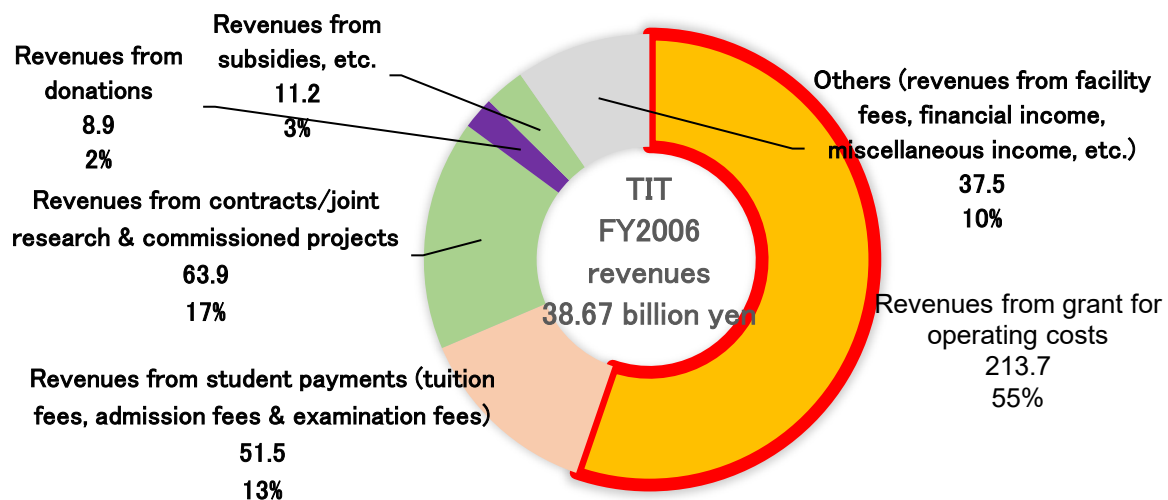


○ Tokyo Institute of Technology (3rd year (2006) and 16th year (2019) of incorporation)

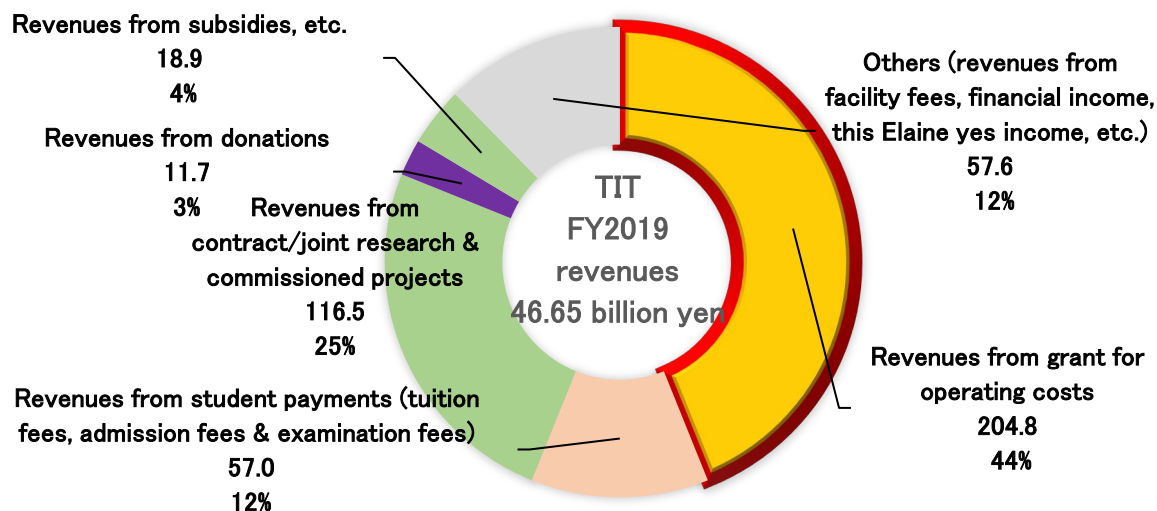
To see how the structure of financial resources at national universities have changed amidst the incorporation of national universities to significantly expand their discretion and degree of freedom in management and the stagnation in financial support from the national government, the Panel looked at the Tokyo Institute of Technology and compared figures from its third year of incorporation (2006) and its 16th (2019).

While total revenues increased by a factor of 1.2, the revenues provided by the national government through grants to cover operating expenses decreased (the share of these revenues to total revenues decreased from 55% to 44%) but this drop was covered by a 1.8-fold increase in revenues from contracted/joint research, etc. (the share of these revenues to total revenues climbed from 17% to 25%); in addition, donation revenues went up by a factor of 1.3 (the share of these revenues to total revenues rose from 2% to 3%) and subsidy revenues by a factor of 1.7 (the share of these revenues to total revenues moved up from 3% to 4%). It is apparent that TIT met the decline in financial support from the national government by diversifying the makeup of its financial resources.

FY2006 / 3rd year of incorporation as a national university / 15 years ago / 1,150 faculty members (plus 85 specially appointed faculty members) / 5,080 graduate students



FY2019 / 16th year of incorporation as a national university / 2 years ago / 1,054 faculty members (plus 468 specially appointed faculty members) / 5,491 graduate students



The Panel thus recognized that the world’s leading universities have transitioned to structures not dependent on specific financial resources in response to the rapid changes taking place in the environments surrounding these universities as they grow and established self-sustaining financial bases.

4. Actions required of OIST for future development

In view of the analyses and discussions above, the following is required of OIST in order to achieve the purposes of the establishment of OIST.

○Future expansion of scale

OIST’s scale needs to be expanded in order to sustain the excellent reputation for research that the university has garnered over its ten-year history and to spur innovation by diversifying its research fields and ensuring that these fields stimulate each other. OIST currently belongs to Group 2 in the above analysis of the relationship between quality and quantity of papers (Figure 1). The Panel recommends that OIST aim for growth by moving to the upper right from its current position in Group 2, accomplishing this by broadening research fields as it expands in scale and improving both the quality and quantity of papers. In expanding its scale, OIST needs to assess the strengths of existing fields and the need for new fields rather than simply increasing the number of PIs and research fields. OIST also needs to consider extending its scope by collaborating with domestic and overseas research universities/institutes and taking the initiative in those partnerships.

○Contribution to the development of Okinawa and our country's economic society through the promotion of science and technology

OIST needs to strive to identify social issues and induce innovation by continuing to produce outstanding science and technology research results internationally. Collaboration with companies is indispensable for fostering an innovation ecosystem, and comprehensive collaboration with companies able to share a long-term vision of creating new social value as well as collaboration with companies overseas leveraging OIST's distinctive internationality are both needed.

To contribute to the development and promotion of Okinawa, it is also important that OIST conduct research that makes the most of Okinawa's location (climate, nature, geographical position, etc.).

OIST needs to utilize its accomplishments in these areas to become a node for solving the problems facing Okinawa, Japan, and the world through science and technology. OIST is thereby expected to gain the understanding of Okinawans and the Japanese public as a whole.

○Diversification of the structure of financial resources

OIST currently covers about 95% of its ordinary expenses with financial support from the national government (Okinawa development and promotion budget). Given that the world's leading universities have changed the structure of their financial resources as they have grown and established self-sustaining financial bases and given that self-sustaining operation was part of the concept of the establishment of OIST, OIST needs to in the future increase the share of external funding and diversify the structure of its financial resources.

OIST has not heretofore mostly achieved the external funding targets it has set and has even lowered these targets in recent years, so clear improvements are needed in this regard. In obtaining external funding, OIST also needs to acquire research funds from overseas by enhancing its international reputation for research.

○Evolution of governance

OIST needs to evolve the governance, with the School Corporation growing organizationally, to become a world's leading research university in the future. As a key point in corporate management, continual self-inspections and reviews, in terms of the forms of the Board of Governors and the Board of Councilors and whether the checks and constraints towards the President and other university executives exercised by the Board of Governors, the Board of Councilors and Auditors are

functioning effectively, are vital. At that time, it is necessary to respond based on the direction of governance reform^{※19} in school corporations currently being considered.

From the perspective of financial transparency, OIST also needs to be accountable to the Japanese public and the people of Okinawa for the use of large sums of government-subsidized funding and the results produced thereby.

5. Ideal level of financial support from the national government

To achieve the purposes for which OIST was established – “promoting internationally distinguished education and research on science and technology and thereby contributing to the promotion and self-sustaining development of Okinawa and the development of science and technology in the world” – the Panel recognizes that financial support from the national government is still necessary, and advises the national government to provide appropriate support.

Therefore, Article 8 of the School Corporation Act that “the national government, within the range of its budget, may subsidize the School Corporation for more than one-half of the expenses required for the operation specified in Article 3, paragraph (1)” is necessary to be maintained for the time being. The Panel also advises the national government to encourage OIST to establish a self-sustaining financial base through securing its own financial resources and efficient execution, and to consider the appropriate level of financial support every time after a certain period of time, based on OIST’s strategy and performance.

※19 Governance reform in school corporations

Based on “the basic direction of future efforts for the development of the governance in school corporations (March 19, 2021 Experts conference on school corporation governance),” “School Corporation Governance Reform Conference” is currently considering the specific content of the reform, and the amendment of the Private School Act, etc. will be held in the future.

IV. Advice

OIST, which was established on the purposes of contributing to the promotion and self-sustaining development of Okinawa and the development of science and technology in the world through the world's leading education and research on science and technology, has promoted internationally high-quality research and education and has a high international reputation for its achievements for 10 years since its establishment. The Panel also judged that OIST has accomplished sufficient achievements. However, while its efforts hitherto to develop and promote Okinawa and contribute to the development of our country's economic society have earned OIST a degree of appreciation, these efforts still have some way to go. Expecting that OIST, while being rooted in Okinawa, becomes a world's leading research university that connects Japan and the world through science and technology, and achieve its intended objectives, the Panel proposes the following:

- OIST needs to address social issues by promoting science and technology. Furthermore, in the process of innovation sprouting from OIST research outcomes and new industries being born and growing in Okinawa, OIST is expected to serve as a node and contribute to the development and promotion of Okinawa and the development of our country's economic society.
- It is important that the financial base that supports the development of a university is sustainable. OIST needs to early break away the current situation in which about 95% of its operating budget is covered by the national government subsidy. The Panel advises OIST to diversify its financial resources by, for example, acquiring private funds, and to establish a self-sustaining financial base, following the examples of the world's leading universities.
- In order to achieve the objectives of the establishment of the OIST, financial support from the national government is still necessary, and the Panel advises the national government to provide appropriate support. Therefore, it is necessary to maintain Article 8 of the School Corporation Act for the time being. The Panel also advises the national government to encourage OIST to establish a self-sustaining financial base through securing its own financial resources and efficient execution, and to consider the appropriate level of financial support every time after a certain period of time, based on OIST's strategy and performance.

- Compared with the world's leading universities, OIST is currently small in size and does not have a wide and diverse range of research fields, which limits the sustainable creation of internationally distinguished science and technology. It is also concerned that mutual stimulation and fusion among research fields, which are necessary to generate buds of innovation, will not easily occur. Therefore, it is necessary to expand its scale for the future.