

2020
NKUST

National Kaohsiung University of
Science and Technology

Sustainability Report



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About This Report

To respond to the UN Sustainable Development Goals (SDGs), National Kaohsiung University of Science and Technology (hereinafter referred to as NKUST) issues this Sustainability Report (hereinafter referred to as “this report”) in December 2021 to disclose its performance in aspects such as teaching, research, social participation, environmental protection and governance as reference for all stakeholders.

Reporting Framework

This report adopts the reporting tools of the Sustainability Tracking Assessment & Rating System (STARS) developed by the Association for Advancement of Sustainability in Higher Education (AASHE) as the main framework.

Reporting Period

The data and content disclosed in this report mainly regard the time period from January 1 to December 31, 2020. In terms of academic year, the scope covers the 2019 and 2020 academic years (August 1, 2019 to June 30, 2021). Additionally, for completeness, some data also includes information before 2020 or the latest information as of 2021.

Boundary and Scope

The scope of information detailed in this report covers NKUST, while part of the performance covers its affiliated institutions.

Basis for Calculations

All information and statistical data in this report have been collected and compiled by NKUST. The financial data is expressed in New Taiwan Dollars (NTD). Our statistical data is collected, measured and calculated in line with regulatory requirements. Where no specific regulations apply, international standards are referred to instead.

Sustainability Performance Assurance

Part of the information in this report has been assured by PwC Taiwan with a level of Limited Assurance, in accordance with ISAE 3000. The assurance report is attached in the Appendix.

Publication

This report is NKUST's first sustainability report, to be published regularly. It is available for download on our website. Publication date of the current version: December 2021



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A Word from the President

The National Kaohsiung University of Science and Technology (NKUST) was established in 2018 by the merger of three universities. As the largest university of science and technology in Taiwan, NKUST is dedicated to staying updated with the global vision of sustainable development while integrating the three existing strengths, including “strong connections with industries,” “innovation and entrepreneurship” and “ocean technology.” As NKUST enters its 4th year after the merger, our first sustainability report serves as a declaration of our concepts and practices of sustainable development. This report demonstrates our determination and effort for sustainable development, while allowing the society to examine the status of the university affairs related to this field and encouraging continuous growth.

In addition to fulfilling the vision of development and disclosing university performance, universities should take on the responsibility of cultivating talents and contributing to society as higher education institutions. As a university of science and technology that focuses on practical applications, NKUST signed a memorandum of understanding with the Taiwan Institute for Sustainable Energy in 2019. Moreover, NKUST participated in the Times Higher Education Impact Rankings (THE Impact Ranking) by the Times (UK) for the first time in 2020 to create room for progress in sustainable development at different levels such as software and physical facilities, teaching and research and university policy implementation. Published in 2021, this sustainability report responds to the United Nations’ Sustainable Development Goals (UN SDGs) through the dedicated chapter to SDGs. The chapter puts the university’s strengths and performance in the spotlight to demonstrate measures that promote sustainable development such as equality, innovation, economy and technology, as well as maintaining the ecosystem and community well-being. The following chapters, including “Sustainability Teaching and Research,” “Green Campus” and “Inclusive Campus and Society,” showcase the faculty and students’ research and development, practice and results in teaching and research, brainstorming and innovation, campus environment, administrative planning and implementation, public participation, leadership and so on. The report summarizes the effort from every NKUST member. In addition to taking on the mission of global sustainable development, we set clear goals and priorities for change with the hopes of making more positive and concrete contributions to sustainable development.

Over the past two years, the global economic, social and environmental development has faced great challenges from the COVID-19 pandemic, and everything from life to education has had to undergo restructuring. However, the reality has proven that we are once again rising above all the challenges together. NKUST has taken many measures since the merger, such as campus intelligentization, video conferencing system integration, data digitization, process electronization, as well as the total systemization of course selection, staff attendance and library operation. Coupled with appropriate anti-epidemic countermeasures, the campus has been operating smoothly while allowing us to fulfill the university’s social responsibilities even during the pandemic. NKUST continues to develop based on its original strengths as well as incorporating “social concern” into its development plan for the next four years. Not only do we make it our mission to cultivate talents for technological innovations, but we also hope our faculty, students, staff and alumni can maximize the philosophy of sustainable development, namely “one world in peace and co-prosperity,” to bring positive change to different fields.

NKUST is walking side by side with Taiwan and the world on the road to sustainable development. We would like to take the opportunity of publishing this sustainability report to declare that the university will draw up a sustainable development blueprint for 2030 to take strides towards the United Nations’ 17 Sustainable Development Goals through teaching, research, industry-academia collaboration, campus construction and so on. We will start by actively promoting research and applications in the fields of energy conservation and green energy with the ultimate goal of fully adopting renewable energy on campus and becoming a carbon-neutral university by 2028. Second of all, we are committed to strengthening the connections of global citizenship and sustainable development with our courses and research, so that NKUST students can become collaborators in sustainable development. Last but not least, we attempt to make the most of university sources in forming close connections with the local communities to take on the responsibility as the leader in sustainable development trends for the society, the country and the world.

We have worked tirelessly in the past, and we will work even harder in the future. We hereby invite you to witness the progress in sustainable development we have made.



President of NKUST

Yang Ching-yu

2021.12

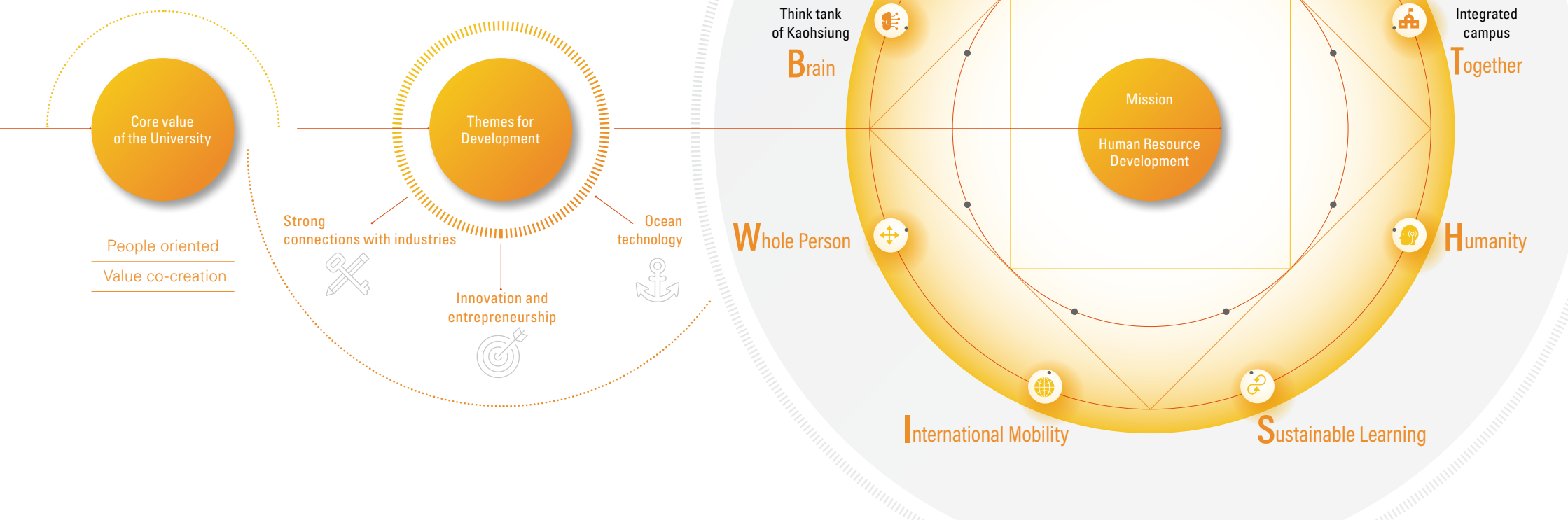
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About NKUST



NKUST was established in 2018 by the merger of National Kaohsiung Marine University, National Kaohsiung University of Applied Sciences and National Kaohsiung First University of Science and Technology. It is now the largest university of science and technology in Taiwan. NKUST has adopted the following three directions for development, including “strong connections with industries”, “innovation and entrepreneurship” and “ocean technology” to create an environment where the industry and academia could collaborate to meet local needs by cultivating pragmatic, innovative and entrepreneurial talents that are tailored for the industry and cross-disciplinary cooperation.

Aimed at becoming the biggest top-notch university of science and technology in Taiwan, the most important mission of NKUST involves striving “for the BEST” by serving as the think tank (“Brain”) of Kaohsiung, the engine (“Engine”) of industries, the base of the southbound plan (“South”) and an integrated campus (“Together”) to create its value. In terms of talent cultivation, NKUST hopes to equip all students with the capacity of WISH, namely a “Whole Person” with cross-disciplinary ability, “International Mobility”, “Sustainable Learning” and “Humanity.”



Campus



Campus Area

216 hectares

Ranked 3rd in the total campus area in Taiwan



Floor Area

Total

608,564 square meters

Space for Healthcare¹

534 square meters

Energy-intensive Space²

43,340 square meters



Note 1 Including the health center, lactation room and health education classroom.

Note 2 Spaces that house equipment with high energy consumption, such as the library and so on.

Note 3 Statistics as of December 31, 2020.

Colleges¹

10



Departments²

47



Graduate Programs

3



College-level Research Centers

30



University-level Research Centers

21



Number of Students³

28,128



Number of Faculty Members⁴

1,614



Number of Staff Members⁵

737



Note 1 Excluding the College of General Education and Center for Innovation and Entrepreneurship Education (CIEE).

Note 2 Departments which have taken part in Cross College Elite Tech Program.

Note 3 Including university and graduate school students.

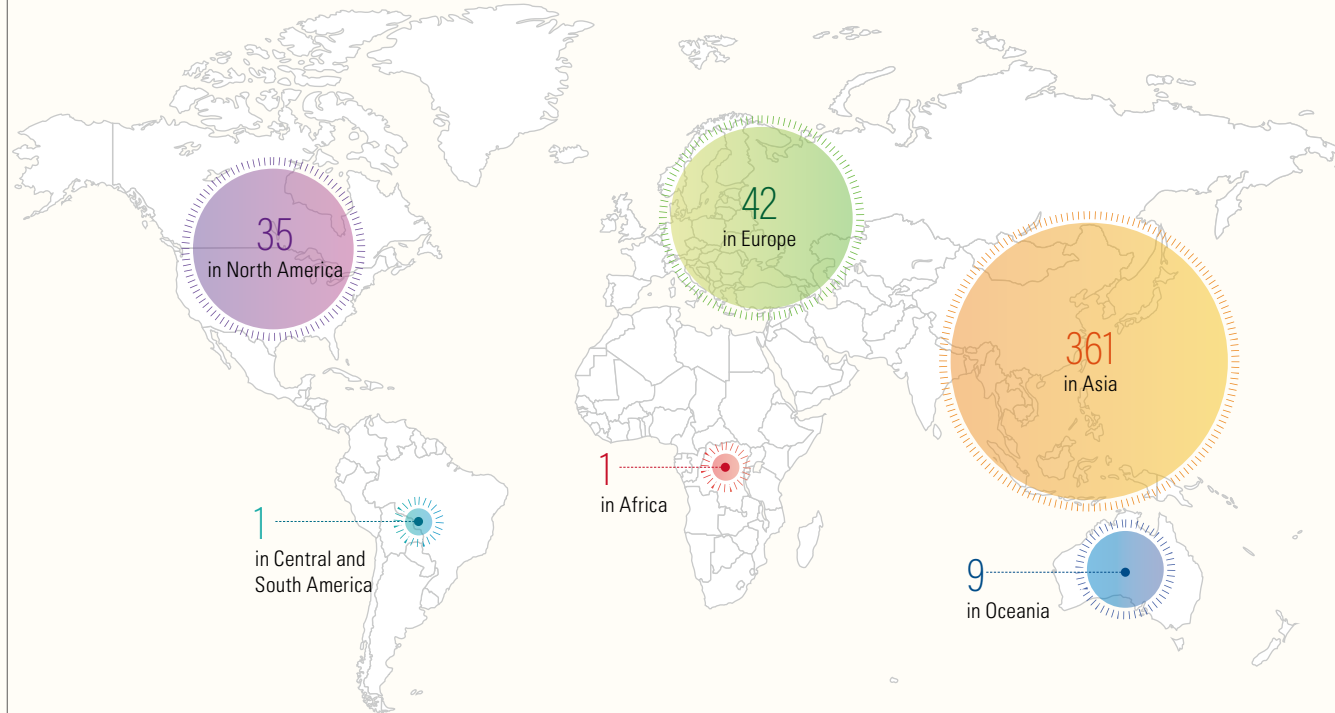
Note 4 Including full-time and part-time faculty members.

Note 5 Including administrative support personnel, contract employees, guards/janitors, research assistants hired after 1994 and rare technicians.

Note 6 Statistics as of December 31, 2020.

Sister Colleges

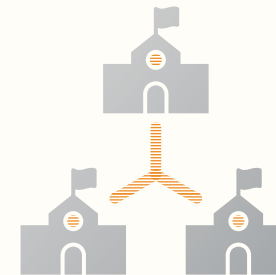
449



Alliances with Universities Abroad

7 alliances

- > HAWtech & TALtech
- > ST9 & E9
- > Cross-strait Innovation and Entrepreneurship University Alliance
- > University Consortium International (UCI)
- > International Association Maritime Universities (IAMU)
- > Global Agriculture Alliance (M) SDN. BHD
- > Polytech Group



University-level Contracts

570



Important Performances

Asia University Rankings 2020

Ranked **3rd** among all universities of science and technology in Taiwan

"2020 Enterprises' Most Favored Job Seekers" survey conducted

Ranked **3rd** among universities of science and technology in Taiwan and **1st** among universities of science and technology in Southern Taiwan

In 2020, the total amount of money received from industry-academia collaboration reached NT\$ **950 million**, far exceeding other universities

2020 University Citizen Rankings (USR)¹

NKUST in terms of the USR plans in the technical and vocational education system with higher subsidies.

NKUST is the only university in Taiwan with subsidies exceeding NT\$ **30 million**

2020 USR Sustainability Plan Award

The "USR plan" received **gold award**, and the "Yanchao-Placemaking plan" received **silver award**

QS

Cheers Magazine

Industry-academic Collaboration

CommonWealth Magazine

TCSA²



Note 1 USR is the acronym for University Social Responsibility.

Note 2 Taiwan Corporate Sustainability Awards (TCSA) are given by the Taiwan Institute for Sustainable Energy (TAISE).

2

Social Responsibility and Sustainable Governance

Comprehensive university governance is the cornerstone of the university's continuous operations. From the President to the university's administrative units, everyone is an important driving force and core player in realizing university governance and strengthening the overall operations of the university's organizational structure. Sustainable governance is the core value for the present and future development of NKUST, and one of the key strategies for sustainable development is that the university should fulfill its social responsibilities while cultivating talents.

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2.1 University Governance

2.1.1 Organizational Structure

To fulfill the needs derived from teaching, research, development and collaboration, NKUST has established a system for hierarchical responsibility to improve efficiency, optimize communication processes and achieve the results with minimum effort.

The President of NKUST is responsible for managing and developing university affairs. With a term of office of four years, the President represents the university with qualifications in line with relevant laws and regulations. The President may appoint two to five Vice Presidents chosen among the professors and researchers or professional technicians of equivalent ranks to assist the President with university affairs. The overall organizational structure of administration operates in accordance with the Rules of Organization. There are a total of 23 level-one administrative units, 87 subordinate units and affiliated institutes.

▼ Organizational structure of NKUST



2.1.2 Diversified Governance

In order to successfully execute university affairs, NKUST has set up 12 meetings headed by the University Affairs Meeting. The ex-officio representatives of the University Affairs Meeting include the President, Vice President, Deans of level 1 administrative units, Deans of college-level academic units and Dean of the Affiliated Institute of Continuing Education, with faculty representatives, staff representatives, student representatives and others as participants. The diversity ensures balanced decisions and implements university governance.

▼ Important Decision-making Meetings

University Affairs Meeting

Consider the following issues:

1. Development and budget for university affairs.
2. Organizational and other important rules.
3. Establishment, changes and abolishment of colleges, departments, graduate programs, degree programs, centers, offices, libraries, divisions, other units and affiliated institutions.
4. Academic affairs, student affairs, general affairs, research and other important matters.
5. Discussion of teaching evaluation methods.
6. The resolutions of the committees or project groups set up by the University Affairs Meeting.
7. Meeting proposals and matters proposed by the President.

Leadership in
University
Affairs

Administrative Meeting

Making decisions on important administrative affairs and regulations.

Academic Affairs Meeting, Academic Meeting, General Affairs Meeting, R&D Meeting, etc.

The Academic Affairs Meeting discusses the important matters and the relevant regulations of the school's academic affairs.

Academic meetings discuss important matters concerning students.

The R&D meeting decides on important matters such as research promotion and school affairs development, as well as relevant rules and regulations.

The general affairs meeting discusses and resolves important matters related to general affairs.

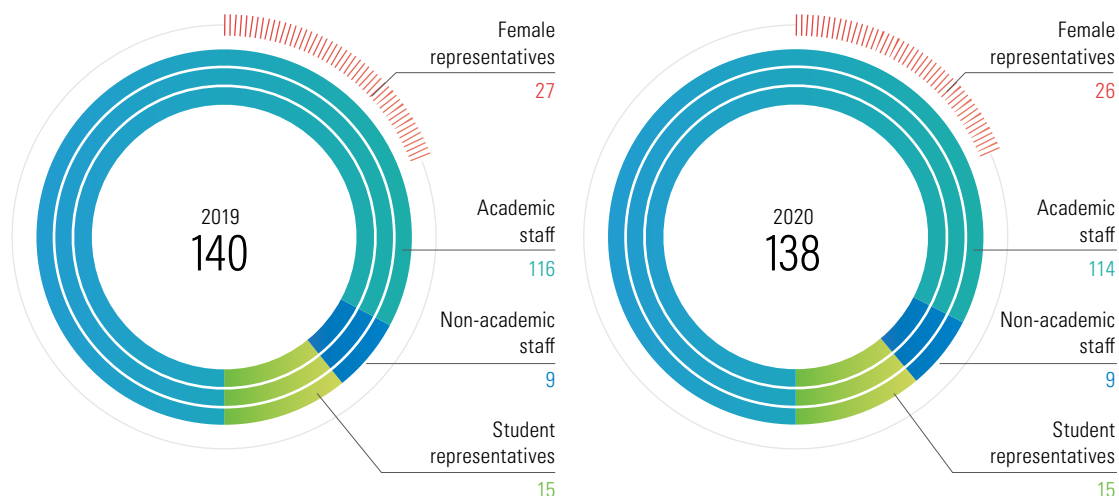
Other Committees

Various committees are set up in order to deal with specific affairs, such as the Academic Staff Review Committee, the Gender Equality Education Committee and the School Funds Management Committee.

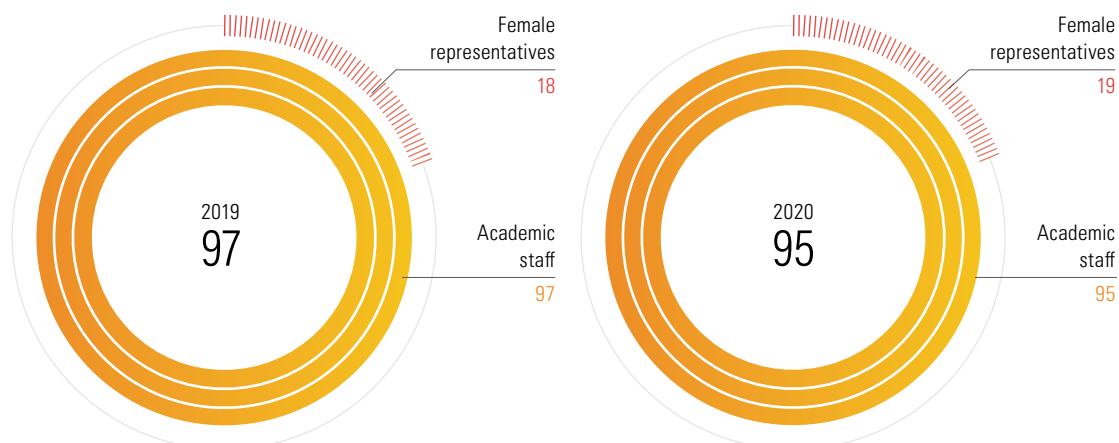
Decision-
making
Councils

▼ Meeting Participants

University Affairs Meeting



Administrative Meeting



2.2 Sustainable Governance

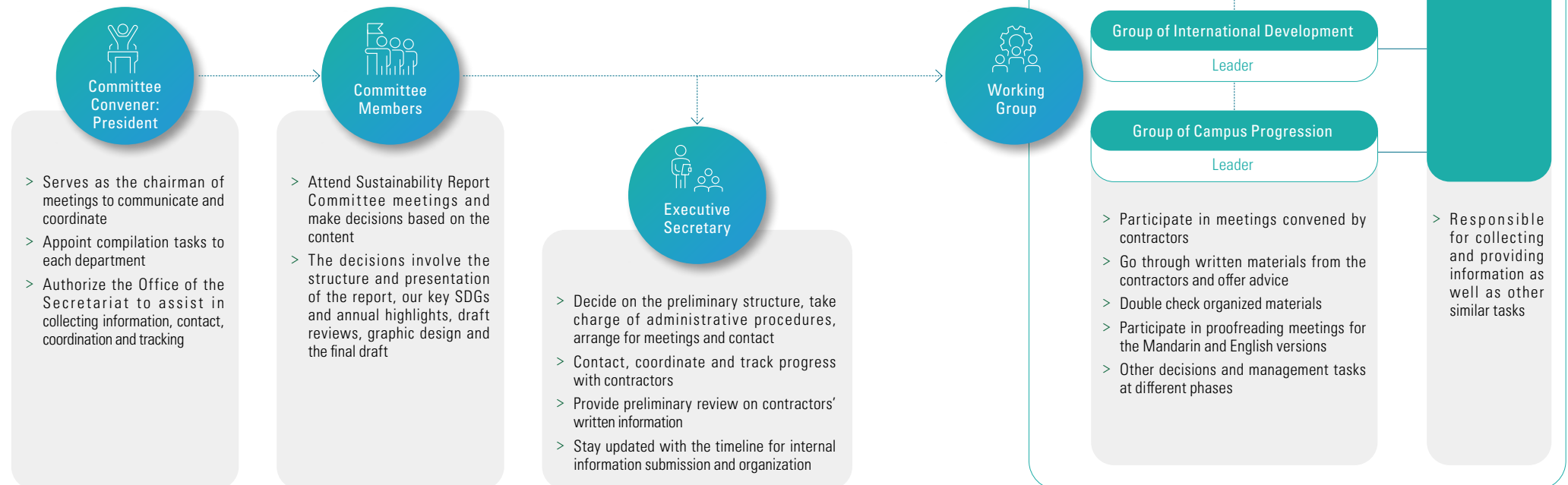
2.2.1 Structure and Responsibilities of the Sustainability Report Committee

NKUST set up the Sustainability Report Committee with tasks divided into different levels to compile this sustainability report and ensure all tasks are completed. The President serves as the convener of the Committee, with many members making decisions before the executive secretary team communicates with each working group. NKUST hopes that the Committee and its clearly defined structure can facilitate communication and operations, allowing the university's highlights in sustainability to be fully coordinated, summarized and presented.



▼ Structure of the Sustainability Report Committee

Tasks Divided by Different Levels of the Sustainability Report Committee



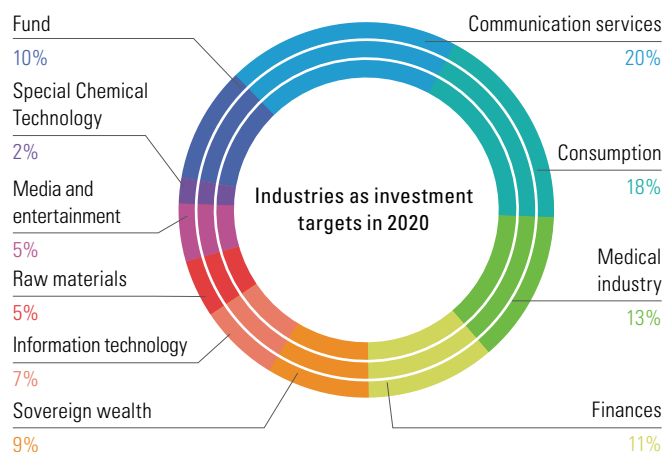
2.2.2 School Funds Management and Sustainable Investment

NKUST formulated the “Regulations Regarding the Management and Supervision of School Funds at National Universities/Colleges” and “Guidelines for Investment Risk Management,” with 5-11 members on the Investment Management Committee, including two ex-officio members (Vice President and Dean of Financial Affairs) and experts and scholars on and off campus with expertise in investment selected by the President. The Investment Management Committee draws up an annual investment plan as well as executing various evaluations and decisions. Please refer to NKUST’s Annual Financial Planning Report for further details.

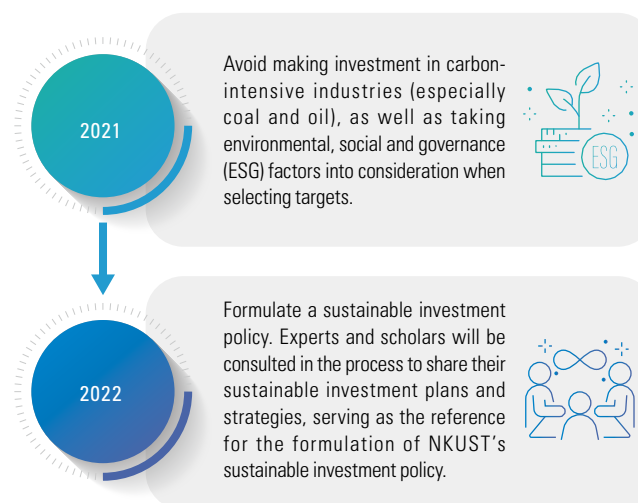
The chart on the right shows the investment targets and size of the school funds, with detailed information from 2018 to 2020 after the merger. The figure below shows the proportion of the investment targets of the school funds in 2020, among which the top three industries include communication services (20%), consumption (18%) and the medical industry (13%).

NKUST revised the “Guidelines for the Management of Investment Income and Expenditure” as the university’s legal basis for the school funds’ sustainable investment, with the goals of stable investment of school funds, making the operations sustainable and supporting the development of university affairs. The figure shows the university’s outlook on sustainable investment for 2021 and 2022.

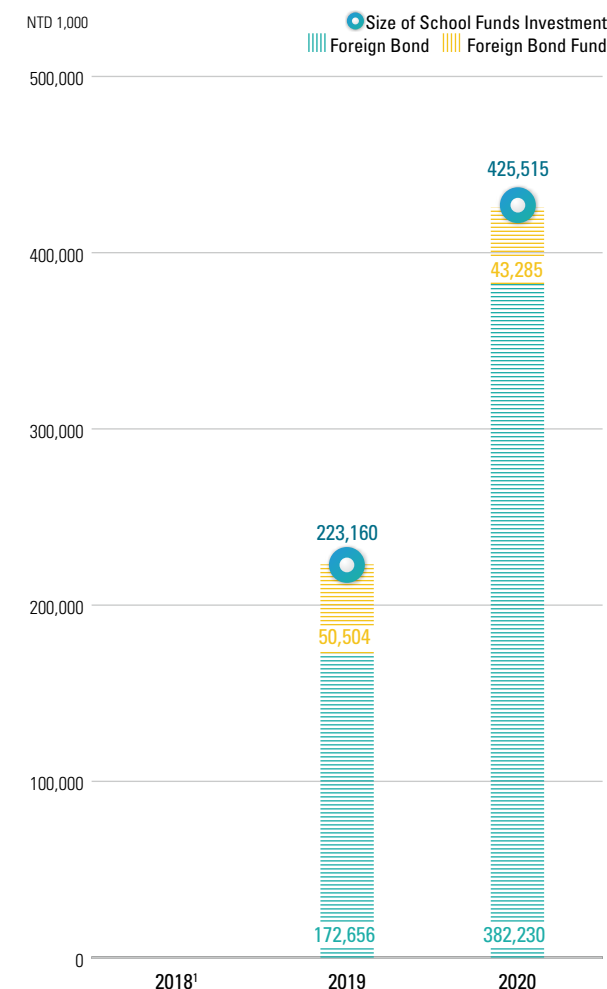
▼ The proportion of industries as investment targets in 2020



▼ Timeline for Sustainable Investment



▼ Investment Targets and Size of School Funds Unit: NTD 1,000



Note 1 NKUST merged on February 1, 2018. There was no investment in 2018.

2.3 Stakeholder Engagement

Stakeholders are defined as internal or external groups or individuals who affect or are affected by NKUST's operations, teaching and research, as well as the environment and society. NKUST looks into the stakeholder organizations and individuals' issues of concern as well as establishing a variety of communication channels to facilitate effective two-way communication and feedback, so as to further the university development and construct a diverse and friendly campus environment.

▼ Group of Stakeholders and Form of Communication

Academics and Administrative Staff

- > Suggestion System
- > Administrative Service Satisfaction Survey
- > University-level meetings and other meetings (department meetings, academic affairs meetings, student affairs meetings, etc.)
- > ISP¹ meetings for students with physical and mental disabilities
- > Various committee meetings (Curriculum Committee, Gender Equality Education Committee, etc.)
- > University-level research center forum
- > Visualized platform of university affairs research, analysis report of university affairs report
- > Public hearing
- > Faculty and staff grievance
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Students

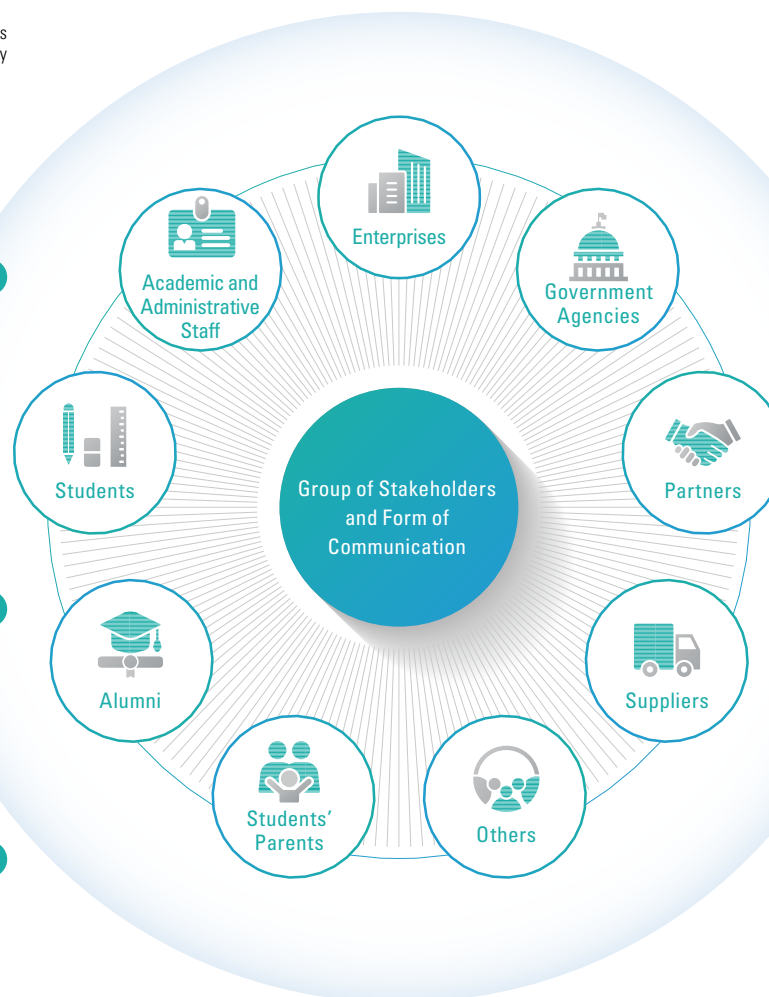
- > Suggestion System
- > Administrative Service Satisfaction Survey and Feedback for Faculty
- > University-level meetings and other meetings (department meetings, academic affairs meetings, student affairs meetings, etc.)
- > ISP¹ meetings for students with physical and mental disabilities
- > Various committee meetings (Curriculum Committee, Gender Equality Education Committee, etc.)
- > Meet the President
- > Student council
- > Dorm conference
- > Student grievance
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Alumni

- > Suggestion System
- > Alumni and employer survey
- > Curriculum Committee
- > Career destination survey and alumni service system
- > Selection of outstanding alumni
- > NKUST Alumni Center website and social media
- > Alumni dinner
- > Alumni Association
- > University anniversary celebration
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Students' Parents

- > Suggestion System
- > ISP¹ meetings for students with physical and mental disabilities
- > Admissions briefing
- > Briefing for parents of prospective students
- > Freshmen orientation
- > University website and section of university affairs disclosure
- > Mailbox of each unit



Enterprises

- > Suggestion System
- > Internship satisfaction survey, employer satisfaction survey
- > Various committee meetings (Curriculum Committee, Gender Equality Education Committee, etc.)
- > NKUST Alumni Center website and social media
- > Meetings, seminars, public websites, etc. for various types of projects
- > Contact enterprises to formulate industry-academia collaboration plans
- > Industry-university match-making meeting, industry-university exchange meeting, enterprise briefing
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Government Agencies

- > Suggestion System
- > Various committee meetings (Curriculum Committee, Gender Equality Education Committee, etc.)
- > Meeting for colleges in Kaohsiung City
- > Dean meeting for all colleges in Taiwan
- > University affairs database
- > Official correspondence and on-site visit
- > Meetings, seminars, public websites, etc. for various types of projects
- > Certification of various professional institutions, self-evaluation of academic units
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Partners

- > Suggestion System
- > Technology transfer/licensing
- > Meetings, seminars, public websites, etc. for various types of projects
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Suppliers

- > Suggestion System
- > Tender evaluation meetings
- > Meetings, seminars, public websites, etc. for various types of projects
- > Meetings with employees of contractors
- > University website and section of university affairs disclosure
- > Mailbox of each unit

Others (Surrounding Communities/High Schools and Vocational High Schools/Media, etc.)

- > Suggestion System
- > Extension education meeting
- > Volunteer service and social practice (visits and exchanges)
- > Landlord forum
- > Advocacy and mock interview for high school students
- > Initiative to issue news articles and hold press conferences
- > Develop self-media to provide a more down-to-earth information disclosure and interactive channels
- > University website and section of university affairs disclosure
- > Mailbox of each unit

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Key Actions on SDGs

The United Nations published *Transforming Our World: the 2030 Agenda for Sustainable Development* in 2015, defining 17 SDGs that should be reached by 2030 and leading the world to work together to respond to the urgent challenges mankind faces. Education, R&D, innovation and leadership are important parts in achieving these goals. As a higher education institution, NKUST plays a unique role and has an inevitable responsibility to assist the society in implementing the SDGs. To this end, NKUST works hand in hand with stakeholders on and off campus to continuously search and realize four dimensions including academic research, social participation, teaching and student affairs as well as campus operations to make the most out of the development opportunities of SDGs and move towards a sustainable future based on shared values.

3.1 Identification of Key SDGs

NKUST has taken both *Getting Started With The SDGs in Universities, Sustainable Development Solutions Network*¹ and *SDG Sector Roadmap, World Business Council for Sustainable Development*² into consideration as below 5 steps to identify its key SDGs. This focuses on areas in which NKUST has the most impact and contribution to formulate its strategies and action plans for sustainable development.

Step
1

Assess
the impact



Review the action plans and tasks based on NKUST's university development plan, as well as evaluate its potential impact on the SDGs based on the development goals and priorities of the university. Please refer to the X axis of Figure on the right side.

Step
2

Evaluate
the contribution



Refer to the SDGs domestic and foreign higher education institutions are concerned about and the policy development direction of the White Paper on Human Resource Development of the Ministry of Education to identify the potential contribution of higher education for each SDG. Please refer to the Y axis of Figure on the right side.

Step
3

Identify
key SDGs



Integrate the previous steps, analyze and rank SDGs based on their impact and contribution to identify NKUST's six key SDGs. Please refer to Figure on the right side.

Step
4

Confirm
key items



The identified key SDGs will be reviewed and confirmed by NKUST's Sustainability Report Committee for relevant units to collect and provide information.

Step
5

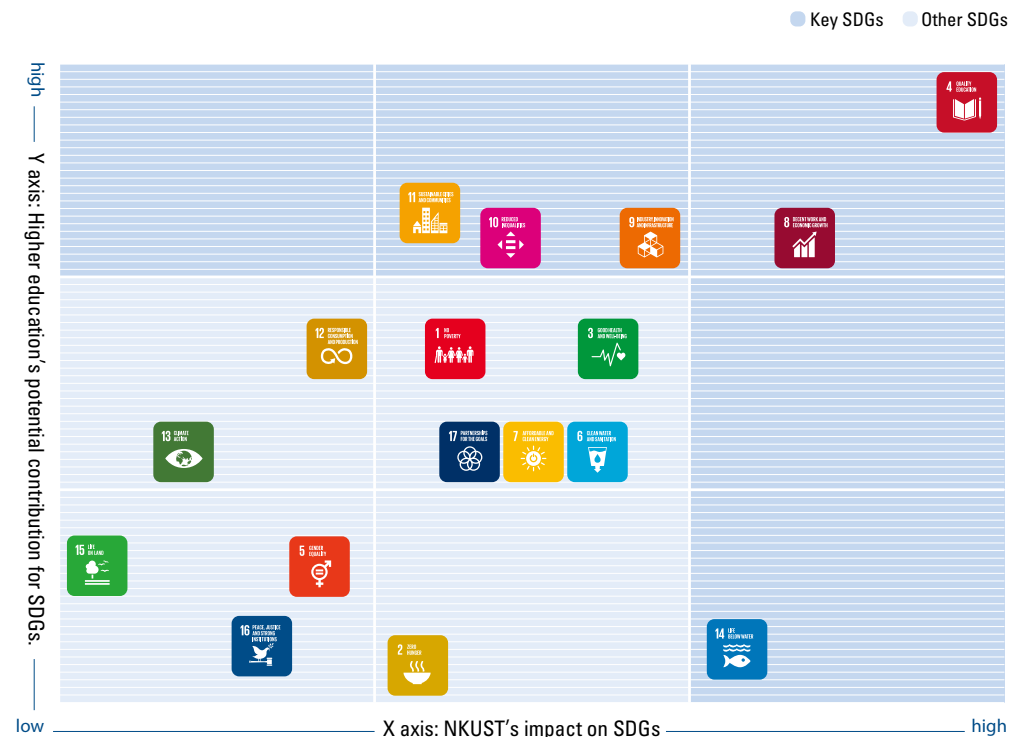
Review
the key items



After the report is completed, the Sustainability Report Committee will conduct a final review to ensure that the relevant information disclosure and performance are not inappropriately or falsely presented through assurance.

This report focuses on the six key SDGs identified with the process above, including SDG 4 Quality Education, SDG 8 Decent Work and Economic Growth, SDG 9 Industry, Innovation and Infrastructure, SDG 10 Reduced Inequalities, SDG 11 Sustainable Cities and Communities and SDG 14 Life Below Water. It is through NKUST's actions based on the four dimensions of "academic research," "social participation," "teaching and student affairs" and "campus operations" in the form of columns to demonstrate its commitment to sustainable development. Actions on other SDGs are summarized in the following chapters. Please refer to the "STARS Index".

Key SDGs Matrix of NKUST



Note 1 Getting Started With The SDGs in Universities, Sustainable Development Solutions Network

Note 2 SDG Sector Roadmap, World Business Council for Sustainable Development

SDG 4 Quality Education

Ensure inclusive and equitable quality education and promote lifelong learning skills.

3.2.1 Academic Research

Cross-disciplinary Learning and Analysis of Student Learning Effectiveness

NKUST is committed to achieving the educational goals of equipping the students with practical skills, innovation and employability. Many innovative changes have been introduced since the merger to build a new teaching ecology. We have conducted research on 11,606 students who had taken cross-disciplinary courses in the Daytime Four-year Technical Program during the academic year 2017-2019 to analyze the students' background variables (such as college, department and year) and the correlation between academic performance and willingness to take the courses in order to understand the current situation of courses and learning of cross-disciplinary courses (such as the creative and entrepreneurship program, forward-looking technology cross-disciplinary calculus module course, problem-based learning and USR, etc.), which are then taken into consideration for continuous course content revision in the future. The result shows that students who have taken cross-disciplinary courses have better academic performance than students who have not, and the average attendance of cross-disciplinary courses is significantly better than that of non-cross-disciplinary ones.

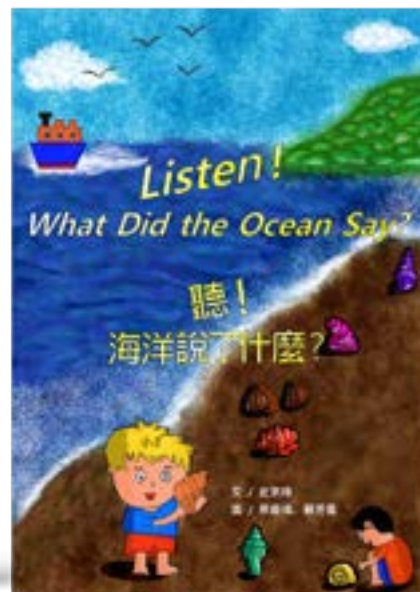




3.2.2 Social Participation

Promote Bilingual and Marine Education

NKUST's College of Foreign Languages promotes and assists elementary school teachers with using Controlled Chinese and online machine translation to develop elementary school marine English textbooks through "Smart Marine Learning:



▲ Marine English materials developed by NKUST

Online Machine Translation and Website Development" to create a Content and Language Integrated Learning (CLIL) model to facilitate marine English teaching.

With many years of experience in machine translation research, NKUST has collected a wealth of Chinese texts on marine topics. They were written in controlled Chinese before putting in the neural machine translation system. The English translation is concise and easy to understand, suitable for students in grades five and six in elementary schools. NKUST organized several workshops on this topic to share the skills of producing English courses with elementary school teachers. The College of Foreign Languages developed marine English picture books with the assistance of machine translation, such as "Go! Let's Explore the Ocean!" and "Listen! What Did the Ocean Say," hoping for more teachers to get involved. In 2020, a one-week marine English summer camp was held at Kaohsiung Municipal Yangming Elementary School. The participants were highly interested in the marine English textbooks. NKUST hopes to implement bilingual and

marine education through teacher training, teaching and summer camps in the future to showcase the spirit of sustainable development through learning and teaching.

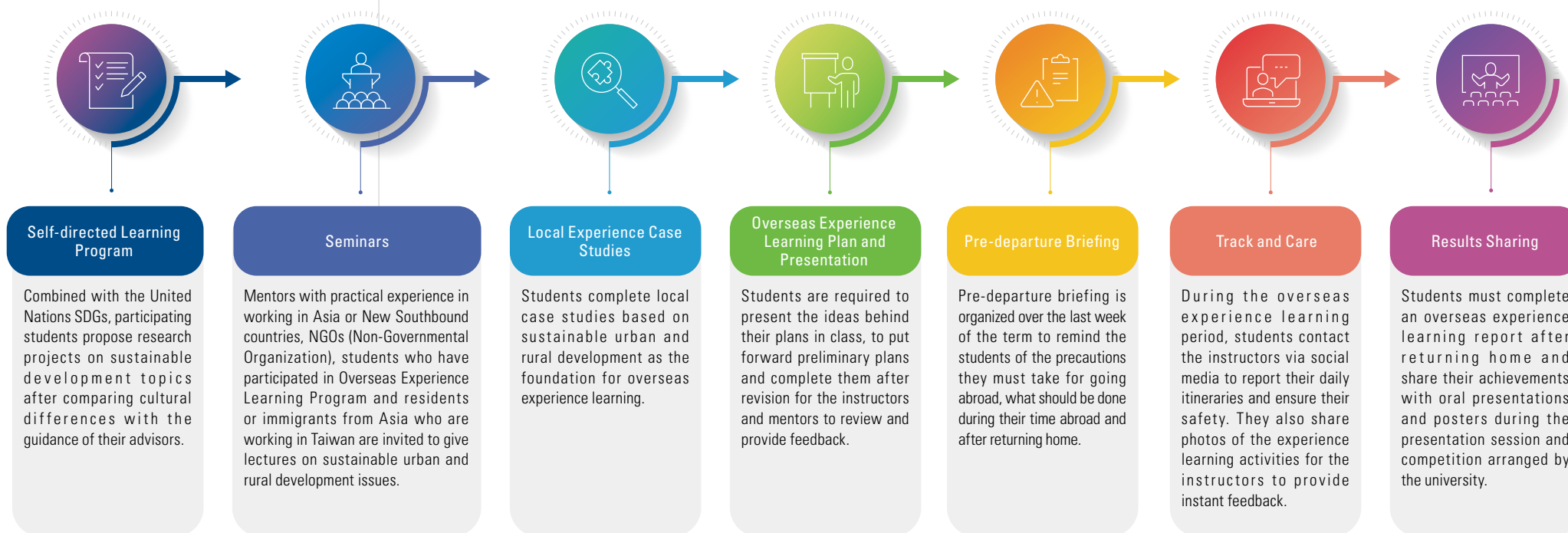
Narrative Program: Innovative Teaching Forum

To promote innovative cross-disciplinary teaching exchanges among universities, the NKUST held the "Kaohsiung and Pingtung Area Community Co-creation and Exchange Base for Narratives and Innovative Teaching Forum and Poster Contest" in 2020. The paper contest centered on the theme of "Innovation Cross-disciplinary Teaching" to solicit works from domestic and foreign scholars, experts, faculty, researchers and graduate students. Experts in different fields were brought together by the forum to discuss research topics of innovative cross-disciplinary teaching in teaching practice. Not only does this broaden the horizon of innovative teaching for the participants, practical teaching experience was shared through the contest and forum to brainstorm innovative strategies with the goal of boosting learning effectiveness.

Overseas Experience Learning Program

The Overseas Experience Learning Program is a series of learning activities that combine cross-cultural experience and realizes the United Nations SDGs and the concept of "Gap Year" with the goal of enhancing the international vision of the younger generation through these activities. Table below shows the learning program's rigorous process and the spirit of the United Nations SDGs. Independent thinking, communication and coordination, as well as proposal writing abilities can be developed through this program. It is of great help for cultivating traits such as social adaptation and cultural understanding in the future.

▼ Process of Overseas Experience Learning Program





3.2.3 Teaching and Student Affairs

Cultivating Our Faculty: Advanced Learning-based Teaching

NKUST is a university that focuses on pragmatic applications. Playing a vital role in cultivating technical and vocational professionals, we pay special attention to teaching results. However, issues of education require in-depth exploration and communication rather than relying solely on the number of publications and programs for evaluation. To this end, NKUST has organized annual professional training courses in teaching for a number of years as well as courses for honing teaching skills for faculty in various fields during the summer vacation to assist them in acquiring different types of innovative teaching skills. Despite the global impact of the COVID-19

pandemic, NKUST hosted two one-week batches of professional teaching training courses in 2020 with excellent attendance and feedback. The courses included teaching methods, teaching strategies, curriculum design, application of technology tools and planning for teaching practice research, helping the faculty develop teaching methods that are both theoretical and practical step by step. NKUST hopes to bring not only learning experience for the students but also growth for the faculty by giving them the opportunity to rediscover and research teaching from the point-of-view of the new generation. This is not only necessary but also particularly precious in the current ever-changing era. In 2020, NKUST hosted the “BEST·WISH Results

and Trends in Education during the Pandemic” with support from the Higher Education Sprout Project to share the plans and results in implementing teaching innovation and teaching quality improvement publicly. The forum centered on how NKUST realized innovative teaching to enhance teaching quality (such as gaining an in-depth understanding of how the students learn and teaching problems through institutional research analysis, upgrading the employment feedback system, etc.), how to integrate the strengths of the university into teaching, improve access to higher education, fulfill social responsibilities and so on, with the hopes of creating education of premium quality together with other universities in line with the times.



▲ Professional Teaching Course for the faculty



▲ Forum on BEST·WISH Results and Trends in Education during the Pandemic





Studying and Practice of Theories and Trends in Sustainability

As a university specializing in smart manufacturing, smart business, marine technology and technological cultural creation, NKUST offers a number of courses that advocate and practice the spirit of sustainable development to cultivate the students' awareness of sustainable development. For example, the College of General Education offers the "Introduction to Sustainable Development" which covers the origin and progression of sustainable development to a sustainable campus, energy saving and carbon reduction, circular economy, climate change and greenhouse effect. The course enhances the students' understanding of sustainable development while turning their attention to relevant issues. They will learn how to keep up with the constantly changing society and the world in order to become a member in facilitating sustainable development. NKUST takes advantage of the industry service experience, strong R&D service capacity and

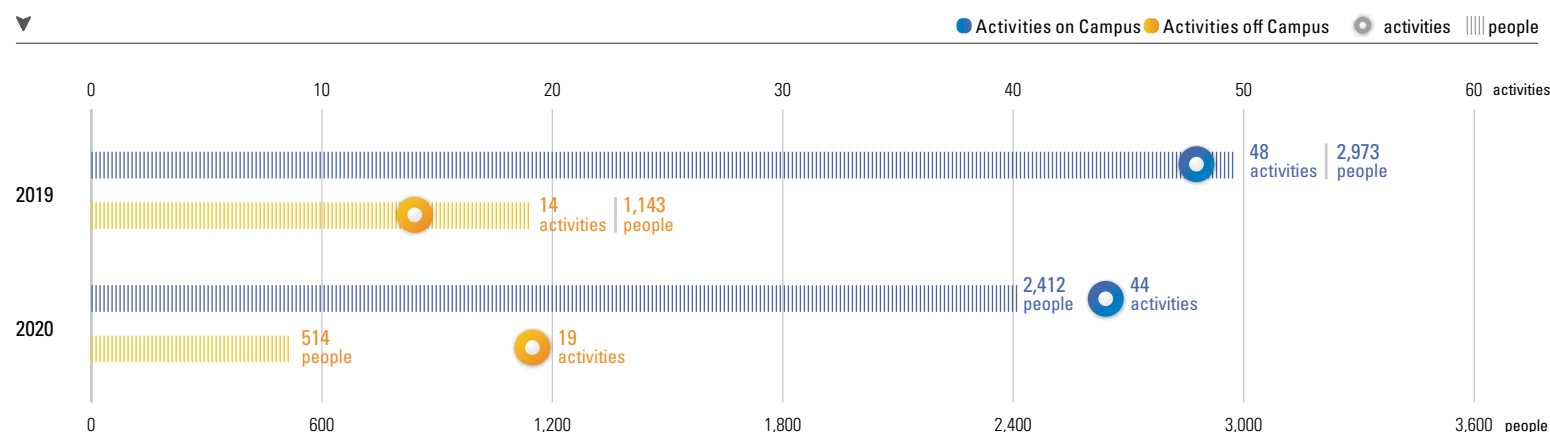
close collaboration between the Center of Industry-academia Collaboration and Ministry of Education to offer the "Smart Urban/Rural Placemaking" and "Sustainable Marine Development" courses through the Narrative Program. The courses combine resources from the universities, local governments and organizations dedicated to assisting the historical monuments and cultural relics industry in the Fengshan district of Kaohsiung and the marine resources industry in Yong'an and Qijin Districts to jointly explore and resolve local issues and create value. Participating students can also learn cross-disciplinary knowledge and apply what they have learned through professional training and on-site experience.

"No Student Left Behind:" Learning Assistance Program

To assist students who are not learning to a satisfactory level, NKUST has specially formulated the "Guidelines for the Implementation of After-

class Tutoring" to execute after-class tutoring programs for subjects with a high failing rate, professional compulsory subjects, basic subjects and subjects with a higher predicted failing rate. Students who perform well are selected by the faculty to provide after-class peer tutoring. In the second semester of 2019 and the first semester of 2020, the proportion of students who participated in the after-class tutoring program reached 85% on average, showing the effectiveness of the program in enhancing the students' performance.

NKUST also encourages disadvantaged students to learn from different sources and engage in self-directed learning. Activities different from classes on campus are provided through the Higher Education SPROUT Project. Regular students and disadvantaged ones learn together through off-campus service training courses, student union, self-governance community, empowerment learning community and so on to create a diverse campus with vitality in their spare time.





In 2020, a total of **12** electronic teaching materials were added to the library system, enhancing the students' ability to take advantage of the collections and cross-disciplinary learning.



3.2.4 Campus Operations

Realizing Universal Education with Free Access to Learning Resources

NKUST signed an agreement to set up an alliance with off-campus platforms such as edX, OpenEdu and TaiwanLIFE to provide online courses for our own students and the public, giving access to the university's learning resources to everyone. In 2020, 11 MOOCs¹ were launched with a total of more than 3,000 students and 30,000 views of the digital material.

Promoting Lifelong Learning

Taiwan has gradually entered the stage of an aged society. Targeting the growing senior population, NKUST offers lifelong learning courses that provide middle-aged and senior citizens with sustainable learning opportunities and environments so that they are not held back by age, while fulfilling self-realization. The university has an excellent track record in organizing high-quality learning camp activities, winning recognition and support from the participants. In 2020, 426 lifelong learning courses were offered with approximately 2,563 participants, which instantly showcased the result. In the future, the university will continue to offer open courses with excellent faculty members to maximize the value of education with the belief in lifelong learning.

With the rapid changes in the professional needs of the workplace, job seekers and employees alike have an increasing need for building on existing knowledge and the understanding of emerging fields. According to statistics from the Ministry of Education, nearly 37% of graduates with a college degree or above who have been employed one year after graduation indicate that what they learnt at university does not correspond with what their positions require. In view of this, NKUST set up additional courses for the

public (such as offering a two-year technical program on the weekend) to respond to the recurrent higher education and second expertise education proposed by the Ministry of Education. Learning is a long process that is likely to span an entire lifetime. NKUST encourages young people to "first work and then study" or "work while you study." By advocating lifelong learning for the middle-aged and senior citizens, it is hoped to improve the quality of life and well-being of all people through education.



▲ Lifelong Learning Courses

Note 1 MOOCs (Massive Open Online Courses) are open to a large number of users through the Internet to take part in the learning process. After the learners register for the course, the faculty provides short teaching videos that are supplemented by tests and assignments. The effectiveness is monitored through the learning platform.

8 DECENT WORK AND ECONOMIC GROWTH



SDG 8 Decent Work and Economic Growth

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

3.3.1 Academic Research

Research on Supporting Measures for Kaohsiung Youth Who Started a Business and Employment Back Home

To understand the services and needs of the young population returning to Kaohsiung for entrepreneurship and employment, NKUST has sought to clarify, aggregate and analyze the situation of population movement based on the statistics of the young people collected by the relevant departments of the Kaohsiung City Government. The result was then used as reference to build the database of young residents in Kaohsiung and City Government Policy Dashboard Services, providing the local government with an important foundation for formulating and promoting future policies or supporting measures for young people who want to return to their hometown to start a business and employment.



► Seed instructor training for open water safety education



3.3.2 Social Participation

Cultivating Talents in Key Areas

Taiwan is an island surrounded by the sea, but the citizens generally lack marine knowledge and skills with unfortunate incidents of people drowning in the sea taking place from time to time. Historical data from the Coast Guard Administration points out the percentage of drowning incidents that occurred in open waters in the past five years was as high as 90%, making open water safety education imperative. In collaboration with experts and scholars from the Education Bureau of the Kaohsiung City Government, the National Academy of Marine Research and the Chinese Taipei Water Sports Association, NKUST organized activities such as the “Open Water Safety Education Seed Instructor Training” and “Kaohsiung Youth Open Water Safety Education Experience” for those who are interested in staying safe in open waters. In addition to theoretical knowledge and teaching skills, the activities covered the most important element of practical training in water. Wulintou in Yongan was selected as a safe area for on-site learning and performing

lifesaving and as a safe teaching field to learn and perform underwater life-saving and survival techniques, equipping the participants with safety knowledge and skills in open waters. This can reduce the occurrence of drowning in rivers, seas, lakes and ponds. The Open Water Safety Education Seed Instructor Training Activity trained 13 instructors and 18 technical instructors in open water safety education. These educators will advocate water safety in elementary schools in Kaohsiung City to achieve a win-win situation with education and employment as well as social progress. Human resources are the most important asset for the future development of Taiwan’s industries and the participation in global competition. The Ministry of Economic Affairs has accelerated the development of the “Six Core Strategic Industries”¹ based on iPAS (Industry Professional Assessment System). The system proposes specific skills training and licenses required by each industry with the recognition of hundreds of companies², facilitating the connection between the industry

and academia as well as providing the industries with the key talents required in a timely manner. NKUST built the iPAS Southern Industrial Elite Training Base and practical examination sites with the subsidy from the Ministry of Education, becoming one of the few universities in Taiwan with a complete environment for iPAS training and examinations. These examination sites are located on various NKUST campuses, maximizing the unique resources of the campus as a place for training young people to obtain certificates and enhance their capabilities. There are a total of 9 practical examination sites with shared facilities, course development and faculty training for subjects such as IoT application engineers, big data analysts, mobile device programmers and so on. As of 2020, 647 seed instructors were trained to assist 2,721 people in participating in the exams (out of which 442 were certified). Kymco, a local company in Kaohsiung, has conducted 4 employee training sessions in the NKUST base with a total of 28 people obtaining certificates in electric vehicles afterwards.

Note 1 The six core strategic industries include information and digital industries, cybersecurity industry, precision health industry, green and renewable energy industry, national defense and strategic industries, and strategic stockpile industries.

Note 2 Please refer to the Industry Professional Assessment System website of the Ministry of Economic Affairs for a list of the companies that recognize iPAS: <https://www.ipas.org.tw/ListOfCompanyIdentity.aspx?mnuno=9da83e91-195a-490c-a9c8-204ed2e2c688&AspxAutoDetectCookieSupport=1>



▲ Exterior Wall Map Creation of Innovation Service Center

Economic Empowerment and Placemaking for Disadvantaged Groups

In order to overcome the obstacles disadvantaged groups of new immigrants, indigenous people and rural residents face in the job market, NKUST collaborates with a number of governmental and non-governmental programs to create a friendly employment environment for disadvantaged groups in the Kaohsiung and Pingtung area. Moreover, long-term prosperity that is

equal and innovative is realized through the combination of regional cultures and industries. In 2020, NKUST executed the Ministry of Education's "Implementation Plan for Senior High School's Vocational Skills Training for New Immigrants' Children." First of all, it investigated the needs of the industries in Taiwan, Pingtung and the ability of local new immigrants' children to find employment and start businesses, taking stock of the professional skills required to plan the

technical vocational intensive course. NKUST works with the Department of Indigenous Peoples of the Pingtung County Government to learn about the working conditions of the indigenous peoples, actively promoting innovation and marketing in their craft industry, as well as promoting the craft culture and skills inheritance of the craft culture with local characteristics. The skill training courses allowed indigenous peoples to learn and pass on traditional skills, as well as building a professional education and training team to complete the training system for aboriginal craft so that the craftsmen, workshops and local organizations could foster traditional skills training, retain the culture while boosting production capacity.

NKUST's USR project "Good Fish Next Door" aims to revolutionize Taiwan's fishing villages. The project collaborated with small fish farmers in local fishing villages to improve aquaculture and competitiveness, while helping the fishermen expanded sales channels. However, as the saying goes, teach a man to fish and you feed him for a lifetime. NKUST set up the "Linbian Innovation Center" in Pingtung to partner with Renhe Care Association and Qifeng Community Development Association. The center organized at least one placemaking meeting a week and one or two workshops or seminars a month to serve as the channel of empowerment and communication for small local fishermen and stakeholders to become the base of local innovation.



▲ Photo taken outside of Forest Edge Innovation Service Center





New Agriculture and
Placemaking

▼ Agricultural teaching and planting practice on organic farms



3.3.3 Teaching and Student Affairs

Cultivating Talents for Marine Green Energy

To assist with Taiwan's transformation into the center of green energy development in Asia, the NKUST has completed the underwater foundation, marine engineering technology, manpower and industrial development. The Forward-looking Technology Cross-disciplinary Calculus Module Course includes the "Green Energy Technology Calculus Module" to turn marine green energy technology as the field of application, strengthening the application of information management capabilities in the green energy technology industry. In 2020, the course resulted in 12 AI plastic molded boat models with Bluetooth remote control, 10 AI wooden boat models with Wi-Fi remote control and 7 marine power generation projects.

Cultivating Talents for Agricultural Development

To boost the development of Yanchao District in Kaohsiung City with the foundation of new agriculture and youth employment, NKUST has integrated the technical expertise of faculty members in a dozen departments and colleges to create an innovative model based on new agriculture that disrupts traditional agriculture. Agriculture in Kaohsiung's Yanchao District is currently facing the dilemma of insufficient marketing capabilities for agricultural production. Therefore, the university team launched the College of New Agriculture and Placemaking together with the Fa-Hsien Li Organic Farm and the Huiyun Organic Farm in Chungqi for

the students to integrate the product marketing skills they learnt in class and applied it to the industry, satisfying the needs in farming villages and gaining a sense of achievement. In the meantime, NKUST students who are interested in starting a career in agriculture can also obtain practical experience through participating in planting fruit and vegetables so that they were be able to quickly become a part of the industry in the future. The New Agriculture and Placemaking courses include "Introduction to Technology and Agriculture", "Local Culture Exploration", "Introduction to Sustainable Development", "Practice of Agriculture" and so on, with a total of 10 programs and 30 courses.

Bridging Teaching and Practice

In addition to cultivating professionals in key areas, NKUST is also committed to improving the overall knowledge, skills and attitudes for employment of college students. NKUST executes the Employment Program of the Ministry of Labor to assist college students in improving their career planning capabilities, increase competitiveness in the workplace and smoothing the transition into the workplace. In the meantime, the university promotes co-teaching by introducing mentors from the industry to teach courses with full-time teaching staff. Participating faculty and students can obtain practical experience to expand students' understanding of employment in the future workplace. This teaching method once again echoes the NKUST's pragmatic philosophy of "learning by doing and doing while learning."



In 2020, the survey on the class of 2019 graduates one year after graduating tracked down 6,133 out of a total of **7,559** people with a tracking rate of 81.14%.

The survey showed that the employment rate of the NKUST class of 2019 was as high as **93.84%** one year after graduation.



In 2020, an employer satisfaction survey on the graduates' workplace capabilities was conducted. There are a total of **318** valid questionnaires on a 5-point scale.

The survey showed that the average score of company satisfaction with the overall workplace capabilities of NKUST graduates was **4.15** points, proving the performance of the graduates is recognized by their supervisors.



3.3.4 Campus Operations

Upholding Rights at Work for Faculty and Staff Members

NKUST guarantees a friendly work environment for faculty and staff members as well as a grievance channel to create and maintain an equal work environment. The university has a complete grievance channel for faculty and staff members as well as a grievance mechanism for gender equality incidents on campus to ensure that if the rights of the staff are illegally infringed when performing their duties, there is a clear grievance channel for them to defend their rights and interests. In the meantime, the Gender Equality Committee bears the responsibility of both "protection" and "counseling." It protects the rights and interests of the complainant as well as actively asking the perpetrator to make corrections and create a sustainable and friendly work environment. For more basic rights of faculty and staff members, please refer to the chapter in "[Diversity and Well-being](#)".

Leader in Industry Talent Cultivation in the South

NKUST has a wealth of vocational training experience from organizing pre-employment and on-the-job training courses, being commissioned to run government programs, combining the university's diversified professional courses with corporate needs to stabilize the job market and promote reemployment while enhancing the university's operational competitiveness. In 2020, NKUST offered about 45 classes of on-the-job training courses with about 1,500 participants, mainly assisting the companies

in developing human capital and continuously improving labor and workplace capabilities. In the meantime, it offered 35 classes of pre-employment training with about 950 participants to help young people grasp opportunities in national industrial development, acquire key technical capabilities in the 5+2 Innovative Industries¹, as well as successfully matching more than 60 people with the enterprises to show that the industry, academia and research can complement each other.

Matching Knowledge and Skills in Talent Cultivation

The Youth Development Administration's "Improving Employability in Formal Education –

An Investigation Report on University-College Youth" points out that academic qualifications and alma mater are the thresholds for graduates entering the workplace, but the importance diminishes with experience. NKUST conducted a survey on matching knowledge and skills on graduates of the Four-year Technical Program from the academic year 2011-2017. The result shows that as many as 73.7% of the graduates believe that what they learnt at university is in line with the needs of the workplace, and the average monthly income of these graduates corresponds with level of recognition of matching knowledge with skills, proving NKUST's excellent performance in bridging the gap between industry and academia.



▲ NKUST On-the-job training courses

Note 1 5+2 Innovative Industries, serve as the central driver of Taiwan's industrial growth in the next era, and forge a new model for sustainable development.

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



SDG 9 Industry, Innovation and Infrastructure

Build resilient infrastructure, promote sustainable industrialization and foster innovation.

3.4.1 Academic Research

Analysis of Harbor Tranquility and Navigation Safety and Routes at the Port of Taipei

It is no small feat to build a port. It often takes a long time from verifying feasibility, research, planning, design, construction to completion, and facilities might need to be expanded after years of operations (such as facilitating smooth ship scheduling and increasing container throughput, etc.). Careful assessment is required to ensure that existing port operations are not affected. The Port of Taipei is in the phase of gradual expansion with the addition of external breakwater facilities in recent years. As the embankment facilities may change the current distribution which leads to an impact on navigation when the ships sail near the entrance of the water routes, and the occasional strong winds due to the topography near the Port of Taipei, NKUST dedicates itself to the research of the aforementioned complicated port operations to simulate the impact on the harbour tranquility under different weather conditions. This serves as the basis for evaluating the tranquility and assisting the construction in the port area to maintain navigation safety. In the meantime, to better understand the ship position deviation caused by the changes in waves and currents encountered by large ships when entering the Port of Taipei, the project presents the simulation results with realistic 3D animations that are used to plan for a better route and ensure navigation safety.





3.4.2 Social Participation

Committed to Technological Innovation and R&D to Localize Rail Technology

Taiwan is a long and narrow island with mountains and rivers. In ancient times, transportation between all four corners was difficult. Fortunately, modern transportation has become better developed. High speed rail, Taiwan Railway Administration, MRT, and light rail have made life more and more convenient for the people of Taiwan. However, as a global manufacturing center of technology, Taiwan lags behind Japan and South Korea in the development of rail technology. Rail equipment mostly relies on imports. The lack of domestic system integration and problem-solving capabilities has resulted in rail maintenance having to be outsourced to foreign countries.

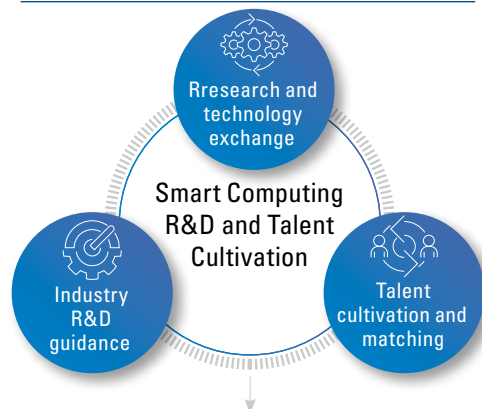
To seek the possibility of localizing rail technology, Taiwan High Speed Rail and the NKUST Railway Technical Center work together to help Taiwan High Speed Rail obtain equipment component technology transfer and domestic

patents through industry-academia collaboration. More than 30 systems have been designed and officially put in operation in the meantime. Having always valued industry-academia collaboration, Taiwan High Speed Rail and the Ministry of Transportation and Communications also stated that "In the past, when the switch of the high-speed rail broke down, we had to wait 3 months for the foreign company to deal with it. The average train delay nowadays is only 8.7 seconds with the assistance of the NKUST team, which is superior to Shinkansen in Japan." This shows that the technical achievements of the NKUST team are outstanding. In response to the need for technical upgrade of Taiwan Railways Administration, MRT and light rail, NKUST started building a training base for people specializing in railway electromechanical technology in 2017, equipped with the turnout and switch training system, interlocking relay training system, railway simulation system, signal education system and other facilities as

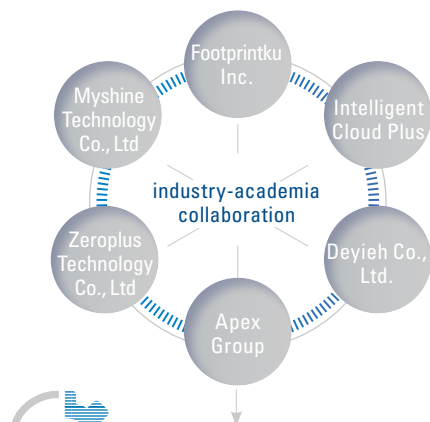
the only university of science and technology in Taiwan that covers the teaching and practice on the four themes of "railway signal, rail power, electronic moving unit practice and switch interlocking communication."

NKUST founded Yalixin Co., Ltd. in February 2019 based on the technologies of the railway lab to accelerate the timeline from technology research and development to industrial application. In 2020, its operating income reached NT\$4 million with multiple orders and tenders from Taiwan High Speed Rail and Taipei Metro. The performance in orders increased by more than 50% compared to the revenue in 2019. Participating in the processes of receiving orders, production and quality assurance through the form of the company helps to understand the situation after the product is put on the market, and promotes the gradual evolution of railway personnel training of NKUST from "laboratory R&D manpower" to "manpower for practical development."

Establishment of a mutually beneficial environment for cooperative enterprises



Cooperation of the Smart Computing R&D Team of NKUST



In 2020, the collaboration accumulated an output value of approximately NT\$14.46 million.



R&D Accelerated by Smart Engineering to Make Infrastructure Sustainable

With the goal of cultivating PhDs and R&D talents, NKUST has selected four major themes, including “smart manpower scheduling system”, “component -based bridge safety assessment system”, “smart bridge dynamic monitoring and detection module” and “smart rockfall warning system.” Moreover, it collaborates with the Industrial Technology Research Institute to integrate advanced technologies such as AI and information communications technology with the traditional construction industry to develop a long-term industry-academia-research collaboration model. In the meantime, an engineering supervision and inspection safety evaluation and training system has been built to cultivate PhDs and R&D talents. An innovative R&D department has also been set up in an engineering consulting company to effectively train professionals and offer high-quality engineering inspection consulting services. With mold design and product verification capabilities, the university is committed to the R&D of “fiber-reinforced polymer composites” widely used in the aviation, shipbuilding and automotive industries. Polymer composites require high-temperature formation to achieve superposition of resin

and fiber to achieve high performance, but the time-consuming manufacturing process greatly limits the application of these composites. NKUST and NAN PAO worked together to develop a fiber-reinforced epoxy resin composite with thermally remoldable properties. In addition to the excellent mechanical and physical properties of thermosetting materials, this material also has the rapid prototyping advantages of thermoplastic materials. Coupled with the mold design and product verification capabilities of the NKUST team, the ability to produce automotive composite structures within 70 seconds has become a reality.

The Driving Force of Digital Transformation: Smart Computing R&D and Talent Cultivation Team

The President of the International Monetary Fund (IMF) once pointed out that the impact of the COVID-19 pandemic has on the global economy and led to the “new normal” of various industries facing a high degree of uncertainty. The world’s leading companies expect to cope using digital transformation, thereby activating their assets and increasing resilience to different challenges. Service quality is increased with data, thereby transforming itself into a data-driven smart enterprise. In the wave of digital transformation, “data governance” is

an issue that cannot be taken lightly. Data governance is the standard for data quality control, which is used to manage, use, improve, maintain, monitor and protect the data in the enterprise. NKUST focuses on the computing and analysis technologies required in the data governance ecosystem to build a mutually beneficial environment with companies based on the three major aspects of research and technology exchange, industry R&D guidance as well as talent cultivation and matching. It allows PhD-level researchers to participate in innovative technology R&D and entrepreneurship training through practical training, as well as solving technical problems for the industry, meeting industry needs and solving industry talent shortage and gap in the meantime. The Smart Computing R&D team of NKUST has engaged in industry-academia collaboration based on the model of resource-sharing, including Footprintku Inc., Intelligent Cloud Plus, Deyieh Co., Ltd., Apex Group, Zeroplus Technology Co., Ltd. and Myshine Technology Co., Ltd. In 2020, the collaboration accumulated an output value of approximately NT\$14.46 million. This model hopes to assist enterprises with digital transformation in the future, providing the innovative technologies, products and service models required for data governance to accelerate industrial innovation.



Industry-Academia Matchmaking Platform: One-stop Industry-Academia Services

Office of Industry-Academic Cooperation of NKUST set up the Industry-Academia Matchmaking Platform to increase the industry-academia collaboration opportunities and the efficiency of matchmaking for the faculty and industry. This website also showcase the R&D results of the faculty, industry trend analysis, introduction to university-level research centers, the latest event information and introduction to faculty selected as the “stars of industry-academia collaboration.”¹

The platform has a membership mechanism for the companies to explore the technical expertise of the faculty and engage in industry-academia collaboration. As a member, the company can search for the technology in need by connecting to the faculty with the platform’s assistance.

This platform not only allows companies to quickly understand the NKUST’s capacity and research fields of the faculty, it facilitates product technology upgrades and developments for them to boost the university’s industry-academia collaboration capacity, including research projects, patent technology transfers and so on. In addition, it helps match the faculty’s R&D results with the industry for commercialization and spin-off start-up consultation to build strategic alliances and create a one-stop industry-academia services.



3.4.3 Teaching and Student Affairs

Cultivating New Force for Green Energy Industry

Climate change and global warming are issues mankind must face in the 21st century, and various energy conversion programs have emerged as a result. According to the Ministry of Economic Affairs' "Green Energy Technology: Estimation on the Demand for Professionals in Offshore Wind Power Industry 2019-2021," the offshore wind power industry will create 20,000 jobs by 2025 with the number of core professionals required as high as 2,100 people. NKUST upholds the vision of cultivating outstanding talents for the construction of urban infrastructure to meet the demand of manpower in green energy technology with employment and practical courses for offshore wind power engineers. Students in any field can explore the field of offshore wind power from basic introductory courses before moving on to core professional courses for in-depth knowledge required by each job market and learning about relevant laws and regulations, technology, maintenance, analysis, investigation and verification to equip the students with capabilities step by step through advanced application courses. Foreign mentors with dozens of years of experience in the offshore wind power industry, Taiwanese mentors who are familiar with ships and faculty from other fields are hired to introduce practice-oriented content from European countries with more experience in the green energy industry. This ensures what the students learn is closer to what they will need on the job market in the future. In addition, the "Offshore Wind Power Industry Maritime Engineering Elite Training Center" is a training site certified by the Global Wind Organization (GWO). Students who perform well in the course could be recruited or recommended to work in the industry by the mentors to apply what they have learnt in the workplace.





Contributing to Environmental Sustainability with Smart Fishery

NKUST develops practical technology and cultivates PhD researchers through engaging in industry-academia collaboration with Seaview World Enterprise Co., Ltd. and the National Museum of Marine Biology & Aquarium. Beginning with talent cultivation, the university established a startup called NKUST Marine Biotechnology Co., Ltd. to provide original aquaculture-related professional technical services. Doctorate-level professionals are recruited and cultivated while executing tasks to solve the issue of R&D and manpower shortage while allowing them to enter the industry by minimizing the gap.

Secondly, the university focuses on technologies required by the industry such as smart aquaculture, smart detection and identification, smart technology application and data analysis to address the needs for smart technology applications for companies in relevant industries. In addition, NKUST has set up locations for offering friendly aquaculture management technology application

demonstrations and services in Changhua, Yunlin and Kaohsiung areas. For example, the “Taiwan Clam Industry Technology Upgrade and Competitiveness Enhancement Project” led by the Department of Aquaculture aims at providing solutions to bottlenecks faced by the industry, including improving the environment with innovative breeding management technology, alien shellfish invasion, subsoil disinfection and activation as well as disease prevention. These technologies have been promoted to major fish species bred in Taiwan (such as grouper, threadfin, whiteleg shrimps, etc.), with excellent results of great significance to the stability of industrial development and competition on the international market.

Inspiring Innovative Cross-disciplinary Thinking

NKUST is committed to training pragmatic, innovative and entrepreneurial talents with the ability for cross-disciplinary collaboration. To this end, it has organized multiple workshops through the “Design Thinking Miaopu Project.” In addition to introducing the concept of design thinking, the workshops took students on off-campus visits to observe and discuss the issues they can help change in real life, giving them the opportunity to solve the problems with design thinking. The training of participation, observation and immersion helps the students develop logical thinking. Besides an innovative thinking model, this allows the students to understand the existence of cross-disciplinary issues in real life, thereby applying different social practices acquired in the past with an innovative spirit.

In addition, NKUST’s Center for Innovation and Entrepreneurship Education (CIEE) also offers a number of “practical cross-disciplinary topic” courses to provide opportunities for teams with specific or innovative ideas, or those who are passionate about technology or service commercialization to realize their creativity. Among them, the team of “RINA Rider Protector” in the practical cross-disciplinary topic course designed an innovative smart technology product that serves as an universal substitute for motorcycle rear mirrors. It takes advantage of a connected mobile phone app for real-time road condition recording and push notifications. The invention won the C-IDEA Design Award Excellent Team Award in industrial design as well as a Gold Medal from the 2020 11th IIIC (International Innovation and Invention Competition). Another team won an opportunity for industry-academia collaboration with their “Aluminum Ladder Anti-falling Support Design” with Guangyi Co., Ltd. for NT\$300,000 as well as patents in Japan and China.



▲ Riders' Nanny of RINA



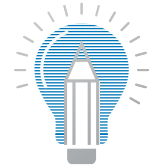
In 2020, the “Creativity and Innovation” and “Innovation and Entrepreneurship” credit programs were offered with **1,929** students enrolled. A total of **82** projects received subsidies, out of which 2 teams received NT\$100,000 in startup subsidy from the EC-SOS platform of the Ministry of Education.



Realizing Student Creativity and Sharing the Results with the Consumers

To encourage cross-departmental collaboration, professional division of labor and application of professional knowledge, as well as commercial promotion of the faculty and students’ R&D results, the Office of Educational Programs and Product Promotion has been running the “Student Creativity and Marketing Proposal Contest” for 3 years in a row. The faculty and students form teams to submit proposals, with experts and representatives from the industry work as judges. The award-winning team’s proposal not only receives subsidies through the contest but the products are available in the DK Shop to boost sales and realize a mutually beneficial internship business ecosystem.

The “Fresh Shrimp,” “Fresh Bass” and non-woven eco bag in the shop are the fruit of the product and marketing proposal of the 2020 winning team. All products sold well in 2021. Among them, “Good Shrimp” is the white leg shrimp with good quality. The laboratory of the Department of Seafood Science used the soy pulp by-product from producing bean products such as tofu to cultivate probiotics. The probiotics then replaced the chemicals often adopted by fish farmers to stabilize the water quality. This ensures water quality and reduces the frequency of water changes. This improved breeding method has passed multiple SGS inspections with the technology transferred to two shrimp farms in Rende, Tainan and Linbian, Pingtung.



3 English courses divided into **6** classes were offered in 2020, including “Creativity and Innovation,” “Design Thinking” and “Service Innovation” for both international and local students.



▲ Fresh Shrimp



▲ Fresh Bass



▲ Non-woven eco bag



NKUST alumni and entrepreneurs founded the “NKUST Angel Investment Co., Ltd.” as the first angel investment company in southern Taiwan. Since its incorporation, it has approved 10 startup teams with the amount reaching NT\$23.7 million, covering business incubation alliance universities and startups on campuses around Taiwan. Due to the pandemic, no investment was made in 2020.



NKUST and the Kaohsiung Community of Enterprises jointly create a “Startup CEO Class.” The community has a total number of 158 industry experts who exchange and share innovative and entrepreneurial resources from time to time.



3.4.4 Campus Operations

Cradle of Student Innovation and Entrepreneurship

In recent years, NKUST has achieved outstanding results in implementing the Ministry of Education’s U-Start Plan for Innovation and Entrepreneurship. Based on the philosophy of “strong connections with industries” and “innovation and entrepreneurship,” NKUST connects universities and colleges nearby, public associations, corporate entities, and industry experts to form a high-quality entrepreneurial guidance mechanism that can provide guidance to different startup teams. The forms of guidance include angel investment, faculty training, entrepreneurial competitions, camp guidance instructors, lectures and so on. From 2015 to 2020, a total of 39 innovation and entrepreneurship projects were approved by the Ministry of Education’s U-Start Plan, ranking number 1 in the country. Moreover, the amount of U-Start entrepreneurship subsidies obtained over the years has exceeded NT\$10 million, giving birth to over 20 campus spin-off enterprises. The above campus spin-off enterprises were established. In 2020, NKUST assisted 18 teams in entering the Innovation Incubation Center with venture capital. For two consecutive years, teams have been coached to win the first prize in the “Excellent Entrepreneurship Award” of the “From IP to IPO Program (FITI)” of the Ministry of Science and Technology, with a total of over NT\$5 million in venture capital.

DK Shop

Starting out as an online store, the physical DK Shop officially opened its doors in November 2020. The majority of the products are jointly developed by NKUST faculty and students, industry-academia collaboration products, school badge souvenirs and co-branded goods. The products are reviewed twice a year, and only the ones that pass the review can be put on the shelves to ensure compliance with laws and regulations for the consumers’ peace of mind. The Product Promotion Center is responsible for promotion activities, packaging marketing design, merchandise integration and other consulting services. The “Fish Floss Trilogy Gift Box” with marlin, tuna and vegetarian fish floss was a product the center integrated, designed and marketed for the Moon Festival in 2020. It ranked among the top 3 bestsellers of the year.



▲ The physical DK Shop



10 REDUCED INEQUALITIES



SDG 10 Reduced Inequalities

Dedicated to reducing all inequalities by valuing the needs of the disadvantaged and minority groups.

3.5.1 Academic Research

Balance between Gender Equality and Traditional Culture — Observation of Judicial Review in Taiwan and Japan

The faculty of the NKUST Center for the Liberal Arts have expertise in gender equality, gender studies, gender equality education and so on. Prof. Hsiao-ti Li looked into the balance between gender equality and conflicts with traditional culture in judicial review in a paper titled “Balance between Gender Equality and Traditional Culture — Observation of Judicial Review in Taiwan and Japan.” This paper is based on two cases in 2015 from Taiwan’s Justices of Constitutional Interpretation and Japan’s Supreme Court respectively. The disputes in the two cases show that the objective and neutral texts in terms of form in the civil law are actually detrimental to a specific gender. The research points out that if judicial review can grasp the core connotation of traditional culture does not equal to means of “gender discrimination” or “discriminatory treatment based on gender,” it should be able to achieve the gender equality pursued by the Constitution when balancing conflicts between traditional culture and gender equality. Moreover, it can help traditional culture adapt to societal changes and be passed on.





3.5.2 Social Participation

The Youth Who Harnessed the Wind Putting down Roots in Rural Chiayi Action Study Plan

Due to massive population loss and lack of convenient access to transportation in the coastal and mountainous towns of Chiayi, 70% of the children in school come from disadvantaged families. NKUST takes advantage of the faculty and students of the Department of Computer and Communication Engineering and university resources to provide remote after-school tutoring in Dongshi, Chiayi. The university students accompany and assist rural primary school students with their homework to minimize the urban-rural learning gap. In addition, the faculty and students of the Department of Computer and Communication Engineering organize camps with their expertise in Dongshi, which is mainly engaged in aquaculture and fishery. The themes of the activities include air quality detectors, water quality detection systems, water pumping systems, LED display panels and so on. The university students teach elementary school ones scientific and technological skills and knowledge of environment and ecology so that they can assist their parents with daily tasks at work in their free time. A glimpse of the activities can be seen in Figures below.



▲ Smart cloud irrigation system



▲ Circuit board course and smart magic wand



▲ Gender, Culture and Society course

3.5.3 Teaching and Student Affairs

Concern for the Disadvantaged and Gender, Culture, Society, Human Rights

The vital element in eliminating inequalities is perhaps developing empathy. The “Human Rights and Concern for the Disadvantaged” course has enlightened the students with a preliminary understanding of human rights before leading them to discuss human rights issues of homosexual people, people with disabilities, new immigrants and migrant workers, children, women and the elderly. The course is supplemented by board games and experience with assistive devices so that the students can empathize with the disadvantaged groups. The “Gender, Culture and Society” course (Figures above) asks the students to observe, explore and reflect based on their own experience, combining lectures, group discussions, films and experience sharing to engage in multi-dimensional discussions on personal and interpersonal interactions and social structures. The course adopts a sociological and multicultural perspective to raise the students’ awareness of hidden gender prejudice and discrimination in daily life, expecting them to develop the ability to critically reflect on the myths in mainstream culture through this course.



Student Club
Fair

▲ Student club fair
experience activity

▲ Stand at the student club fair

Special Education Promotion Activities

To enhance the understanding of people with physical and mental disabilities for faculty members and students, the Office of Student Affairs organized special education promotion activities, such as special education film festivals, chief of counseling training, and promotion during the student club fair. The special education film festival equips the

students with better understanding of people with disabilities by showing movies on these issues and hiring external instructors to discuss the movies with the students after screening. NKUST also trains chiefs of counseling to introduce the common obstacles of students with disabilities and the ways in which the peers can assist, so that the chiefs of counseling can assist more special education students. The Office of Student Affairs also designs scavenger hunts at crowded student club fairs so that the students can experience the lives of people with disabilities and develop empathy. A total of 14 sessions were arranged in 2020 with 406 participants. Please refer to Figures above for photos of the activity.

Social Service Education Course

Service learning is an educational experience that values both "service" and "learning." The stages of "preparation," "service," "reflection" and so on are adopted to

systematically connect the services and knowledge, as well as reflecting on the benefits and meaning of the actions for oneself, those receiving the service and society. Therefore, different from regular lecture courses, service learning is not only a bridge between theory and practice but also inspires the students' sense of responsibility in caring for the society in the future.

There are many dimensions to service learning. For example, NKUST works with the Warmer Social Welfare Foundation, Huashan Social Welfare Foundation and Huayuan Children's Service Center in service learning for the disadvantaged. The NKUST students serve children and elderly from disadvantaged families with after-school tutoring and visits. We also design presentation and feedback forms so that the students can better understand the groups they serve and learn from the process of reflection. Different types of service activities and the heartwarming interactions are shown below.



▲ Service learning activity



▲ Offering services at Huashan Social Welfare
Foundation



▲ Training for volunteer after-school tutors

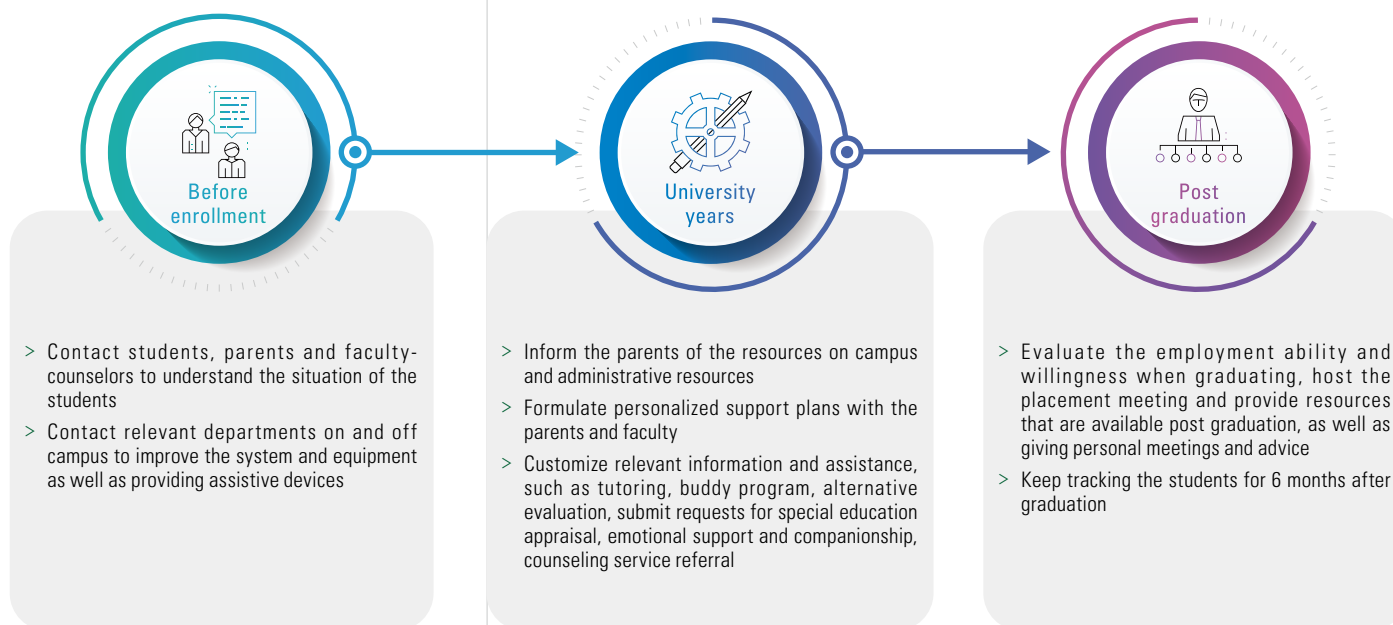


3.5.4 Campus Operations

To help every student complete their studies with peace of mind, NKUST provides different assistance from enrollment to employment for disadvantaged students such as special education students, indigenous students and financially disadvantaged students.

Assistance for Special Education Students

The resource classroom of the Office of Academic Affairs provides complete support and guidance for special education students from before enrollment to after graduation as seen in Figure below.



Assistance for Indigenous Students

The Indigenous Center provides indigenous students with cultural empowerment and guidance on career, life and learning, as well as organizing indigenous cultural experience activities so that non-indigenous faculty members and students can better understand indigenous cultures. The activities and number of participants in 2020 are shown below. Rather than labeling these activities as “assistance,” they are beautiful interactions on campus. After all, they are also valuable cultural lessons for non-indigenous faculty and students.

▼ Assistance Measures for Indigenous Students

Cultural empowerment

Help indigenous students understand their cultures better through tribal visits, participation in festivals, cooking specialty dishes



119
participants



Career guidance

Give students the opportunity to understand what life could be like after returning home through field study to inspire them to think about the possibility of going home

Life guidance

Assist indigenous students in applying for subsidies in order to reduce their financial burden and focus better on their studies

320
people
assisted



44
people
assisted



Learning guidance

Provide support on the phone for indigenous students whose academic performance needs to be improved

Indigenous culture experience

Arranged visits to Siaolin Village in Kaohsiung (Dawulong), Ulajuc in Pingtung (Paiwan), Taromak in Taitung (Rukai), as well as giving the faculty members and students the opportunity to experience the weaving culture of the Seediq people

557
people
participated



◀ Visit

▶ Experience in weaving culture





In 2020, a total of **633** NKUST students received the award from the targeted scheme.



Assistance for Financially Disadvantaged Students

NKUST alleviates the students' financial burden by covering their fees for the entrance examination. After enrollment, there is an "independent study plan" that replaces part-time jobs with studying and provides stable financial support on a monthly basis to encourage the students to study during fixed hours. Approximately 70% of the students believe that "replacing part-time jobs with studying" is of

great help to their schoolwork, and the subsidies granted are the most helpful to their lives. There are also tutoring and license counseling subsidy programs to help the financially disadvantaged students concentrate on their studies.

Gender Mainstreaming Lectures

To strengthen the awareness of gender equality among its faculty and staff, NKUST invited external experts and speakers to provide a series of lectures on gender

mainstreaming on campus. The topics include the handling of gender incidents on campus, how to create gender-friendly workplaces and other issues. As faculty and staff may face such issues, the series of gender mainstreaming lectures provide a very practical, open and transparent communication channel to invite everyone to learn and improve together. In 2020, 4 lectures on gender mainstreaming were held on the 5 campuses with a total of 192 participants.

11 SUSTAINABLE CITIES AND COMMUNITIES



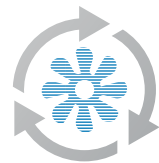
SDG 11 Sustainable Cities and Communities

Make cities and communities with human settlements inclusive, safe, resilient and sustainable.

3.6.1 Academic Research

e-WATCHER Project: Development and Application of Indoor Air Purification Technology

PM2.5 and air pollution are topics of concern for the general public in recent years. Among the current removal methods of volatile organic compounds (VOCs) in the air, the photocatalytic method has the advantages of being easy to use with low cost and high efficiency compared with other methods. As a result, the Department of Safety, Health and Environmental Engineering developed an indoor air purification technology that removes organic vapors with rGO/ TiO₂-PSF thin film photocatalysts. Another technology was developed to monitor the nitrogen oxide and ammonia fluxes in the soil in real time through the new cabin technology. The amount of ammonia nitrogen in the soil has an effect on the production of nitrogen oxides and ammonia. Once in the atmosphere, these gases will undergo photochemical reactions to become secondary pollutants, namely derived aerosols, which become PM2.5 pollution and human health hazards. The aforementioned technologies can evaluate and monitor the output of derivative PM2.5, which is beneficial for keeping air pollution under control.



The e-WATCHER project has assisted 5 local elementary and junior high schools to optimize air purification equipment. It is expected to reach 25 schools within the project period.





3.6.2 Social Participation

Living in Utopia: Harbor City Mountain Line and Urban/Rural Resilient Construction Project

Climate change has led to a higher frequency in complex disasters such as floods, landslides and collapse in mountainous areas. In addition, nearly half of Kaohsiung's landslide potential stream is located in the Liugui District, Taoyuan District and Maolin District, which are the key planned fields for this project with the local residents suffering from this serious threat. In addition, the restoration of ecological resources is also a local issue. Therefore, this project

adopts "sustainable environment - disaster prevention education" as its core value to design strategies for "urban and rural resilience" to respond to the local needs of "living in peace and enjoying a prosperous life." Residents can improve safety through easy-to-understand data analysis and disaster prevention education, combined with disaster potential investigation, prevention and other strategies.

Disasters, and to evacuate in time in case of disasters, the faculty members and students of the Department of Construction Engineering conducted environmental

disaster potential investigation and planned campus evacuation routes (Left figure below) at Maolin Elementary School and Junior High School based on meteorology, hydrology, geology, terrain, disaster records and so on to analyze the potential of disasters in the simulated area and divide them into different levels of early warning data. Campus and cloud monitoring systems (Right figure below) have also been set up to improve the integrated disaster prevention and relief resources and information system to help prevent disaster and relief personnel to efficiently obtain the information they need.



▲ Campus Evacuation Routes



▲ Campus Disaster Prevention Monitoring





▲ Multi-accessory disaster prevention pack

The vital element in the process of escaping from a disaster is to quickly obtain the necessities in a short time, and to maintain basic survival needs before rescue arrives. With this in mind, the faculty and students of the Department of Industrial Design designed a “multi-accessory disaster prevention pack” that can change the form according to the needs. The disaster prevention pack can be carried cross shoulder, on the back or hand held to work better for individual needs. Each accessory pocket could contain tools needed for the escape, first aid supplies and daily necessities for survival that can be used in different situations.

Due to the deforestation in the mountainous area of Kaohsiung, the habitat of Taiwan’s unique purple crow butterfly is fast disappearing. The faculty members and students of the Department of Construction Engineering led the voluntary architecture project. With local ecological experts and the school, were introduced the department’s professional courses. From base to construction, the project successfully built an ecological pond for purple crow butterflies in Maolin Junior High School to contribute to the species’ restoration.



▲ Ecological pool construction process



▲ Ecological pool completed



▲ Environmental education course



The environmental education element of the e-WATCHER project has connected 14 communities/schools/enterprises, and held 9 environmental education sessions with a total of 351 participants.



e-WATCHER Project

The hazards of air pollutants such as PM2.5 are of great concern to the public. In 2018, the three monitoring stations with the highest annual average of PM2.5 in the Environmental Protection Administration's statistics were in Kaohsiung, with two of them located in Qiaotou and Nanzi, which are the planned fields of this project. Therefore, the e-WATCHER project started seeking improvement and regeneration of air and waste problem in addition to the original river protection work.

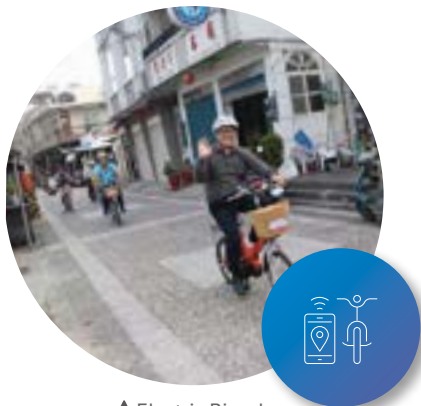
The faculty members and students of the Department of Safety, Health and Environmental Engineering worked with domestic air detection, clean technology companies and the Department of

Communications Design, Shih Chien University, to design and develop a smart indoor air and energy-saving monitoring and control system suitable for domestic campuses. The system combines air freshening, anti-epidemic and energy-saving features to reduce the hazard caused by air pollution and promote the health of school children. The river watch tasks combine service education courses and collaboration with community river watch teams to develop smart river watch through drones, expand the scope of river watch and water quality analysis. Moreover, it applies geographic information systems to integrate water quality and air data to build the database on pollution sources for river basins. In addition to pollution monitoring and improvement, promoting environmental

education is equally important. The faculty members and students of the Department of Safety, Health and Environmental Engineering developed teaching materials on topics that combine knowledge and current events such as water resources (Fun in the Water World) and air pollution (Invisible Killers) and promoted them at elementary and junior high schools in Kaohsiung. The former allows the students to understand water management and reflect on it in their daily lives to cherish water resources. The latter teaches students to understand the sources of air pollution, the harm to the human body, the air quality indicators and air pollution flags. The environmental education courses showcase the children's focus and concentration.



◀ Fun in the Water World course



▲ Electric Bicycle

Introduction of Smart Internet of Vehicles (IoV) to Lambai Island

As a popular tourist destination in Taiwan, the main means of transportation for tourists on Lambai Island is fuel locomotives, which generate a lot of exhaust and noise. In order to maintain the quality of ecological tourism on the island and reduce carbon emissions, achieving low-carbon tourism has become a trend. Therefore, this project introduces IoV technology to electric assisted bicycles is of immense help for low-carbon transportation.

Working with rental companies, the equipment of the smart IoV services was developed by the faculty members and students of the Department of Information Management, and the appearance of the solar panel is designed by the Department of Industrial Design. At present, the IoV technology has been introduced to 30 electric assisted bicycles. For users, electric assisted bicycles can provide a wealth of travel information. The emergency report system can alert the rental company in the event of an emergency to seek a timely solution. For the rental companies, the device positioning and emergency report system can be effective in tracking the vehicles. It can also provide data to the Liouciou Township Office for further analysis, enhancing the quality of local tourism. For example, a period of maintenance can be scheduled for popular tourist attractions during low season, which multiplies the benefits.

Chemical Disaster Rescue Training and Chemical Substance Management

To further people's understanding of evacuation and the disaster relief capabilities of dedicated

personnel in case of chemical disasters, the Southern Center for Emergency Response of Toxic Substance constantly organized (or assisted) in the organization of exercise. In 2020, the center assisted in the organization of the toxic substance disaster and evacuation exercise, which was a compound exercise for the leakage of silicon tetrahydride (controlled substance of the National Fire Agency) coming into contact with the storage of chlorine gas container (toxic substance controlled by the Environmental Protection Agency). The exercise simulated the impact in sensitive downwind areas for evacuation, enhancing disaster relief procedures and people's concept of evacuation and taking refuge. The Southern Center for Emergency Response of Toxic Substance also organized basic chemical disaster rescue training for firefighters.

The topics include basic knowledge of chemical disasters, chemical substance information inquiry, the timing for using personal protective equipment and the practical operations of emergency facilities. This ensures that firefighters can effectively protect themselves while performing rescue missions of hazardous chemicals in a professional and safe context. In addition to disaster training, the Southern Center for Emergency Response of Toxic Substance also takes charge of the source management of chemical substances. The tasks include taking inventory of companies engaged in the sale of chemical raw materials in Tainan based on the four official principles, assisting with the on-site inspections of vehicles that transport toxic or chemical substances of concern, and hoping to reduce the chance of chemical substance disasters through source management.



▲ Chemical Disaster Rescue Training

Building Sustainable Communities, Cities and Towns

NKUST is committed to community participation. The university has long worked hand-in-hand with the community on topics such as resource conservation, industry rebuild or cultural preservation. For example, NKUST has selected Kaohsiung and Pingtung to promote water conservation to urge the community to participate in water conservation, remind the society to pay attention to water resources, and develop more water conservation communities with local characteristics and the qualities of conservation. The project has now completed the promotion of nonpoint source pollution reduction workshops, site surveys and promotion, while engaging in the investigation of major sources of water pollution. A series of workshops on natural farming methods and water and humanities ecological surveys were organized in Xinfeng Community, Gaoshu Township, Pingtung. Training activities for seed guides have been organized together with local schools in Jiangong Community, Xinpi Township, Pingtung County, while carrying out ecological surveys on the fauna and flora in the lake area.

In addition, the “Blue Ocean Highway x Port Hopping” project and the “Qieding Culture and Slow Travel” project gathered local residents, researchers and experts to focus on the seawall art, old streets and regional industrial characteristics of Ziguan District and the tourism resources such as century-old culture, temples, old streets and old shops, craftsmen, ecology and so on of Qieding District. NKUST formed a cross-disciplinary team with faculty and students who had expertise in tourism, industrial design, marketing and logistics, and

invited people to brainstorm through open discussions about the future development direction of the region.

Collaborate with Enterprises to Expand the Influence of Sustainable Cities and Towns

Since 2019, NKUST collaborated with the “Education in Sustainable Cities and Towns” project of the ASE Cultural & Educational Foundation to introduce the topic of “urban and rural development” into the school curriculum in schools in Kaohsiung. The tasks include a project planning, lesson plan design, talent cultivation, etc. For sustainable development education with the hope that all partner schools would be transformed into development and promotion for “community placemaking” that nurtured the seeds of a sustainable future for citizens and towns. The project is expected to be implemented at 54 elementary and junior high schools in Kaohsiung City by 2020, spanning across its 24 administrative districts.

In 2020, NKUST engaged in industry-government-academia collaboration with the Department of Education in Kaohsiung City and the ASE Cultural & Educational Foundation to jointly organize the “2020 Sustainable Urban and Rural Green Energy Campus Expo” with 15 development projects of 2020 on display. The projects included the “plastic reduction” ones from Yancheng Junior High School and Wenfu Elementary School, the “food waste reduction” ones from Bagua Elementary School and Gangpu Elementary School, as well as the “education optimization” one from Xingren Junior High School. The goal was facilitating the linking of relevant resources through this expo to form a cross-school, cross-disciplinary,

cross-departmental and cross-generational collaboration model that is sustainable, thereby helping the citizens of Kaohsiung to realize the importance of urban and rural development and environmental education.

Pingtung County Transportation Planning General Consultant Project

The land in Pingtung is long and narrow with an extremely uneven population distribution. The traditional demand-oriented transportation means the infrastructure is concentrated in the west and north of Pingtung, leaving the south with a lack of transportation services. This affects the basic lives of the local people and is not beneficial for development. To achieve balanced spatial planning, a complete transportation network that allows the residents access to public services such as education, employment, medical care and shopping was needed. Therefore, the Department of Logistics Management undertook the Pingtung County Transportation Planning General Consultant Project with the following themes for research, including finding feasible fast bus routes for joint transportation corridors and transfer nodes, combining existing transfer station planning and engineering to formulate transfer services for cross-vehicle outbound transportation, integrating existing routes and making suggestions for route adjustment, as well as research for large-scale public transportation infrastructure projects. The research and analysis were expected to assist Pingtung County in improving the transportation infrastructure, public transportation, and formulating the best proposal for the Pingtung to implement transportation and regional development plans.



▲ Education Bureau of Kaohsiung City Council, ASE and Hi-Tech University together held 2019 Sustainable Urban and Rural & Green Energy Campus Plan exhibition



3.6.3 Teaching and Student Affairs

Environmental Resources and Conservation Course

With the impact of climate change increasing in severity, the course starts with topics such as earthquakes, typhoons and torrential rains that are closely related to daily life before looking into environmental pollution (water resources, waste, circular economy), global climate change (typhoons, floods and droughts, energy, impact and adaptation to climate change) and so on to enhance the students' knowledge of protecting the earth's environment and resources. The discussion of aforementioned topics help the students develop innovative and cross-disciplinary thinking, as well as thinking about how to apply what they have learnt to contribute to sustainable development by combining their academic expertise and the issues in environmental protection.

Community Long-term Care Course

Taiwan is an aged society, and long-term care is an issue that most people will face. This course explains the system, model, laws and policies of the long-term care system with real-life experience activities. The elderly simulation suit allows the students to experience the physical and mental changes of the elderly, and visiting community long-term care institutions (Right figures) allows the students to understand the importance and value of long-term care so that they can develop the ability to care, communicate and respect life.



▲ Physical training game with elders



▲ Visit to day care center



Southern District
Professional Training
Field and Material
Dispatch Center



3.6.4 Campus Operations

Green Buildings

NKUST actively constructs a sustainable campus environment by planning all new buildings in line with the philosophy of green buildings. Till now there are 15 green buildings (including the ones with candidate certificates), 11 of which have obtained the green building label, and 4 have obtained green building certificates. The green building label application for the new construction of the Southern Professional Training Field and Material Dispatch Center was assessed and approved in August 2021, and the silver-level green building label certificate has been obtained in the meantime. The main features of the building included covering the steel frame with wires outside so that the vines could climb up for heat insulation. In addition, the surface was covered with green or water-permeable materials, and it is equipped with the rainwater recovery system.

Sustainable Transportation on Campus

Being spacious, NKUST's Yanchao Campus and First Campus have provided courtesy bicycles (Figure above) that are free to use to facilitate transport on campus. For the moment, there are 160 bicycles on the Yanchao Campus and 350 on the First Campus. The students can be seen riding bicycles beneath the trees on the First Campus, showing their youthful vitality while contributing to a sustainable environment. After the merger, the faculty and students of the five campuses faced transport problems.



► Courtesy bicycle



To reduce the pollution caused by self-owned vehicles (including cars and scooters) while making transportation accessible for everyone, a request was submitted to the Kaohsiung City Government for city buses to enter the campuses in 2018. The bus passes through the Nanzi Campus and enters the First Campus and Yanchao Campus, as well as stopping at MRT stations to facilitate further transfer. It is hoped that this route can reduce the proportion of students going to class on motorcycles, lower the

probability of accidents and contribute to carbon emission reduction in the meantime. In addition, the university has actively introduced the "Smart Parking Guiding System" to indicate the number of vacant spaces in each parking lot on campus with artificial intelligence. This effectively reduces unnecessary idle movement and energy consumption caused by vehicles while searching for parking spaces on campus, thereby contributing to a campus that conserves energy and reduces carbon.



SDG 14 Life Below Water

Conserve aquatic ecosystems and sustainably use marine resources

3.7.1 Academic Research

Ocean Sustainability Research

In response to the trend of sustainable marine resources, the College of Hydrosphere Science discusses the “impact of plastic particles on the sustainability of the marine environment” and “development and application of marine biodegradable plastic” based on the ecology and environment as well as resource development to promote the sustainability of the marine and water environment.

In addition to the abnormal increase in sea temperature caused by global warming, the damage caused by tourism activities, domestic sewage discharge and waste pollution may all have a negative impact on the growth and communities of coral reefs. Bleaching was observed in certain areas of Kenting and Lambi Island when researching the “impact of plastic particles on the sustainability of the marine environment.” The growth of corals will be followed up to clarify the exact impact and recovery of coral bleaching. The “development and application of marine biodegradable plastic” study explored the influence of temperature, pH and metal ions to establish the best conditions for bacterial strains to produce marine biodegradable plastic.

In addition, sustainable fishery research includes “Investigation of Indian Ocean Shark Fishery Resources and Non-detriment Findings (NDFs),” “Feasibility Assessment of Setting up Stationary Fishing Nets or Cage Culture in the Sea of Xuhai, Mudan Township, Pingtung County” and so on to target specific species for research that is beneficial for the coexistence and co-prosperity of fishery resources and the environment.

Polaris

Polaris, the oceanographic research ship, became stationed in the NKUST’s Innovation and Incubation Center in 2009. The ship is equipped with high-tech underwater detection equipment, such as underwater positioning systems, underwater unmanned vehicles, multi-beam detection systems and magnetic detection systems. This professional maritime equipment can be used for underwater shipwreck exploration, high-resolution seabed and surface surveys, hydrological surveys, emergency rescue and other purposes to assist in the advancement of marine affairs research.





▲ Net removal personnel training



▲ Removed nets



▲ "Ghost Net Mission" environmental drama performance



▲ Guided reading of the picture book "The Drifting Plastic Bottle"



As of 2020, the total amount of nets removed were **239,967** meters in length and **70,180** kilograms in weight.

3.7.2 Social Participation

Penghu Underwater Net Removal, Campaign and Training Program

Abandoned fishing gear on the seabed poses a serious threat to marine life. According to the Red List of Threatened Species of the International Union for Conservation of Nature (IUCN), 46% of species have been affected by this type of pollution. As the plastic particles produced by the shredding of discarded fishing gear enter the food chain, they also pose potential threat to human health. The 2020 UN Food and Agriculture Organization report reiterated the importance of this topic and listed it as the top issue of the marine environment.

As one of the few universities in Taiwan that has the capacity to handle the disposal of discarded underwater nets (ropes), NKUST's Marine Affairs Research Center formed

a professional diving "ghost net removal team" with the Chinese Taipei Water Sports Association and the local divers in Penghu in 2018 to clear up underwater nets in the Penghu waters. As of 2020, the total amount of nets removed were 239,967 meters in length and 70,180 kilograms in weight. The team also introduced a geographic information system in the process of removal to collect information on the location, type and quantity of underwater net as policy reference. In addition, to expand the capacity of the Penghu net removal manpower, the "Penghu Sea Area Net Removal Instruction Manual" was compiled in 2020 to systematically record the experience and knowledge of net removal, and recruit volunteers for training. In addition to removing underwater nets, the

concept of marine environmental protection should also be publicized and taught to children. The CoralWatch coral reef monitoring training was organized from 2018 to 2019, calling on people in Penghu who enjoyed diving to participate in coral reef health monitoring. The "public welfare trip" was also promoted so that tourists who go diving in Penghu can also experience and join. In 2020, NKUST went to kindergartens and elementary schools to promote marine environmental education with the environmental drama "Ghost Net Mission." Guided reading sessions of the "Drifting Plastic Bottle" picture book provided preliminary knowledge of the marine environment before the performances. The quiz contest at the end was a call for action that asked school children to help protect the ocean.



The Coastal Placemaking Diamond Fishing Village - Kaohsiung Yong'an Fishing Village Project which is jointly run by the Institute of Marine Affairs and Business Management, Department of Seafood Science, Department of Industrial Design and the Office of Academic Affairs helps local fishermen create processed aquatic products. Since 2017, it has developed a total of 8 products with NT\$1.44 million in revenue.



▲ Marine collagen peptide mask



Good Fish Next Door Project

Aquaculture is an important industry along the southwest coast, mostly with small local fishermen. They face information asymmetry in the process of production and sales, which lead to an imbalance between production and sales and unstable profits in the long run. In addition, improper use of natural resources and the food safety problems caused by chemical use have caused the industry to wither. The NKUST team¹ introduced environmentally-friendly aquaculture expertise and the establishment of a production and marketing platform in Linbian and Jiadong, Pingtung to assist with the industry development of local fishing villages, supported by fish education promotion to ensure the public understands the importance of sustainable fisheries. Responsible production and consumption behaviors are promoted from both the supply and demand ends to facilitate sustainable development of fisheries and fishing villages.

The team assisted 225 local businesses in optimizing aquaculture techniques through education, training and technical counseling seminars to reduce the use of water, chemicals and electricity. The frequency of chemicals used for the Fourfinger Threadfin Fish was reduced by over 80%. The average daily water change in the model pool was reduced by more than 5 centimeters, which means 1,000 metric tons per hectare. The electricity consumption during the same period was also reduced by an average of 300 kWh compared with last year. In addition, the team collaborated with Taiwanese



▲ Discuss with local fishermen



▲ Maritime Affairs Forum

largest agricultural and fishery e-commerce platform to assist small fishermen in selling their catch on the platform by creating a farm-to-table operating model. The processing by-products (fish waste) of the grouper that is in season are coupled with the concept of circular economy to incorporate the fish scale collagen solution extracted by the university's professional technology. NKUST helped local residents develop new products such as marine collagen peptide masks, fish scale collagen dumplings and collagen duck egg tofu based on local specialties (Left figure).

The team engaged in the promotion and research of Linbian and Jiadong fishing village culture and food and fish education to design a Linbian-Lambi Island eco tourism package with

elements such as fishing village culture, local fishery products, small local fishing grounds, food and fish education, water activities, swimming with sea turtles, rafting in Dapeng Bay and Fourfinger Threadfin Fish pond experience. It is among the few fishing village cultural sightseeing tours in the south where the university team executed planning, trials, pilots and final commercial operation. The team also collaborated with the Department of Education in Pingtung County and elementary schools in the fishing villages to build course materials for the food and fish education so that elementary schools in the neighborhood could integrate the course in the future curriculum. Figure above shows the discussion between the NKUST team and local fishermen.

Note 1 Including 7 departments and centers such as the Department of Seafood Science, Department of Aquaculture, Department of Business Computing, Department of Industrial Design, Institute of Marine Affairs and Business Management, Department of Tourism Management and Center of General Studies.



▲ Online version of the marine oil spill diffusion simulation system.



Simulated Monitoring Plan for Marine Pollution Incident Contingency

When an incident of marine oil spill occurs, it is of the utmost importance to block the impact of the oil spill and remove oil pollution from the coast in the shortest time possible. However, the weather forecast may be severe when the accident occurs, making it impossible to immediately carry out pollution prevention and response operations. To overcome this limitation, the oil spill radar monitoring system can stay updated with the development of the incident on the sea surface even under poor weather conditions. This enhances the effectiveness of oil pollution monitoring and response.

NKUST's Coastal Water and Environment Center has designed a simplified online version of the marine oil spill diffusion simulation system for the Ocean Conservation Administration of the Executive Yuan. Logging into this system allows for immediate oil pollution diffusion simulation, and personnel on duty can also produce a contingency report, including information such as the scope of oil spill and recommendations of response. Besides the simulation system, NKUST is on standby 24 hours a day throughout the project period. After receiving an emergency oil or chemical pollution notification from the Ocean Conservation Administration or a designated exercise topic, a pollution diffusion simulation will be conducted. In 2020, a total of 19 pollution diffusion simulations were completed.

3.7.3 Teaching and Student Affairs

Located in the center of the Greater Kaohsiung area, the marine industry in the south is prominent for NKUST with many departments and institutes that are related to marine technology. With the mission of sustainable marine development and local connections, NKUST organizes marine education training and research, promotes diversified activities, integrates internal and external resources, and furthers marine education to become a base for promotion for the ocean, environment and culture.

Marine Biodiversity, Marine Civilization Development, Marine Rumor Buster General Course

The "Marine Biodiversity" course introduces marine life in the ecosystems around Taiwan, including deep oceans, subtidal benthic environments, coral reefs, sandy and mud banks, estuaries and mangroves, exploring the ways of resource utilization to establish the concept of environmental conservation and sustainable use of resources. The "Marine Civilization Development" course guides students to understand the process of how civilization is shaped from the interactions between mankind and the ocean, allowing the students to understand the relationship between the development of marine science, the evolution of human civilization, marine geography and ecology, as well as inspiring them to think about the marine ecological crisis caused by over-exploitation. The "Ocean Rumor Buster" course discusses rumors about ocean-related issues and helps the students build correct knowledge of the ocean through the "World Café" discussion, inspiring them to pay attention to ocean sustainability issues.



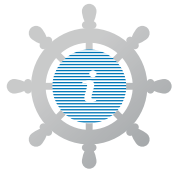
▲ Ocean Sightseeing Tour



▲ Oceanography - Science and Technology Museum



▲ Teaching assistants explain the course objectives and the design concept of the works at the on-campus achievement exhibition



The Marine Information Network has now collected **206,105** pieces of knowledge for cultivating marine professionals.



▲ Beach Cleanup



▲ Local Tour

Narrative Program - Sustainable Marine Development Program

One of the goals of this project is for faculty to explore with students the real situation in the place, integrate local issues into various courses, and allow students to explore issues, define problems and think about solutions. The narrative program of "Sustainable Marine Development Program" includes field trips at Yongan Fishing Port in Yong'an District and Qijin District, Kaohsiung. Among them, "Oceanology" leads students on field trips to further their understanding of the professional knowledge of coastal terrain and so on, sets up popular marine science teaching plans based on group discussion. "Introduction to World Fishery" allows the students to design interactive games for food and fish education through an app based on the topics of selected fishery resources. "Marine Ecology" leads the students on beach cleanup missions (Left figure) and after cleaning they turn the trash they find into art. They can explain the concept behind their creations to illustrate the ecological catastrophe caused by trash in the ocean, inspiring them to think about effective actions to protect the ocean. Students are expected to perceive local problems from the perspective of sustainable development during field visits, and to internalize relevant knowledge by transforming it into various forms of output.



3.7.4 Campus Operations

Prohibiting Single-use Plastic Straws

In order to maintain the sustainable development of the marine ecology and reduce the plastic particles in the ocean, NKUST follows government policies to completely prohibit providing single-use plastic straws when dining in on campus. Related penalties have been set up to reduce the amount of plastic on campus.

4.1	<u>Sustainability Teaching</u>	56
4.2	<u>Sustainability Research</u>	59

In response to the increasing importance of sustainability issues such as university governance, environmental protection and social participation, NKUST actively offers sustainability courses and activities to help students understand sustainability issues, and develop sustainability skills through experience and practice. In the meantime, NKUST lays focus on sustainability research and projects while collaborating with relevant stakeholders to expand social influence. It is hoped that the university can tackle the challenges faced by society today through teaching and research and move towards a sustainable future.



Sustainability Teaching and Research

4.1 Sustainability Teaching

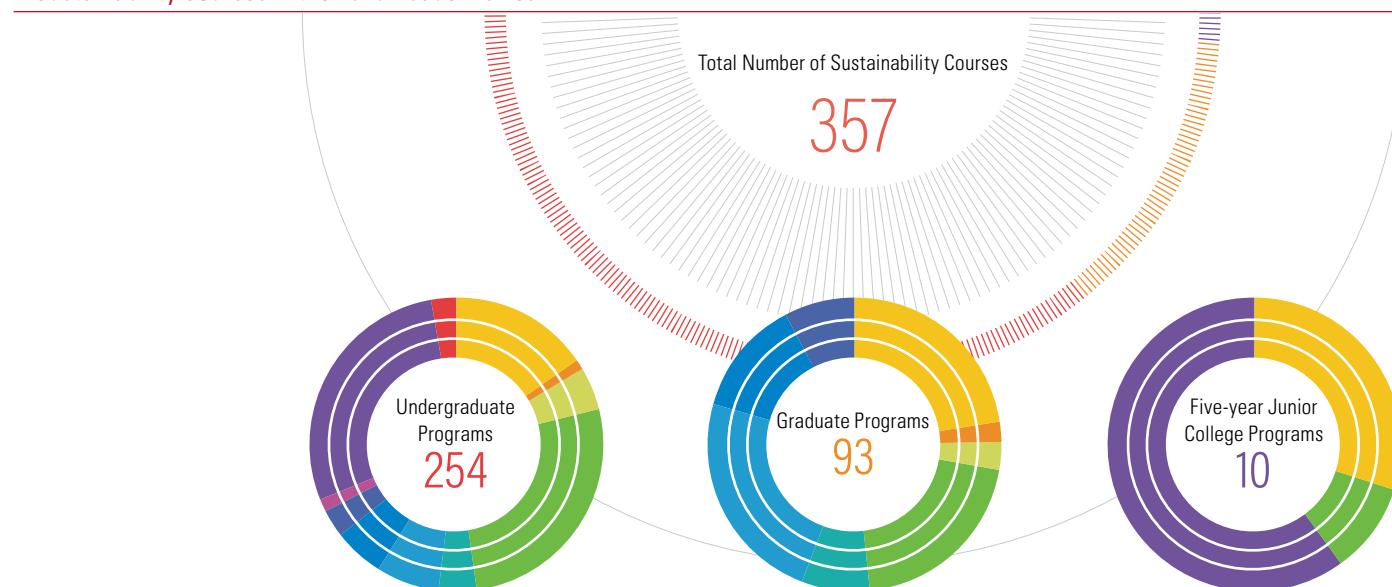
4.1.1 Sustainability Courses

Educating students is one of the main missions of the university. The university has the unique advantage and characteristics of helping students understand and respond to the sustainable challenges of the future, as well as providing courses that cover sustainability issues to help them acquire the knowledge and skills. By cultivating future leaders, scholars, workers, and professionals and so on the society can move towards a sustainable future. NKUST offered a total of 357 sustainability courses in the 2020 academic year (254 courses in undergraduate programs, 93 courses in graduate programs and 10 in five-year junior college programs), as shown in Table accounting for 9% of all courses. Among them, there are 39 departments offering at least one sustainability course, accounting for 78% of all departments. Furthermore, there are 21 departments making sustainability courses mandatory, accounting for 42% of all departments.

NKUST provides faculty with incentive to offer sustainability courses to encourage colleges to offer these courses. For example, the “Topic Oriented Narrative Innovative Teaching Development Program” provides funding for courses. This program introduces SDG topics and combines professional narrative skills of the students to organize field visits, workshops and lectures to cultivate talents in sustainability with diverse skills. The program subsidizes courses such as Smart Urban/Rural Placemaking, Regional Revitalization and Social Innovation, Technological Development and Sustainable Fisheries, Marine Material Application and Marine Rumor Buster.

Please refer to the chapter of “Key Actions on SDGs” for further information on sustainability courses.

▼ Sustainability Courses in the 2020 Academic Year¹



College	Number of Sustainability Courses in Undergraduate Programs	Number of Sustainability Courses in Graduate Programs	Number of Sustainability Courses in Five-year Junior College Programs
College of Engineering	39	21	3
College of Electrical Engineering and Computer Science	3	2	-
College of Maritime	12	3	-
College of Hydrosphere Science	68	19	1
Business Intelligence School	10	7	-
College of Management	18	22	-
College of Marine Commerce	14	12	-
College of Finance and Banking	-	-	-
College of Humanities and Social Sciences	8	7	-
College of Foreign Languages	3	-	-
College of General Education	72	-	6
Center for Innovation and Entrepreneurship Education	7	-	-

Note 1 The number of sustainability courses in the 2020 academic year was counted based on sustainability keywords defined by NKUST, including human rights, land, citizen participation, public health, sustainable development, ecological conservation, pollution, disaster, gender, social responsibility, air quality, risk, food and agriculture education, climate, weather, energy, health, industry, innovation, resources, green economy, environmental protection, environment and occupational safety. The number of Sustainability courses is counted by the number of courses, so if there are 3 courses with the same name, the number will be calculated as 3.

In addition to the regular courses, NKUST held sustainability workshops that complement the regular courses to continuously enhance the students' awareness, knowledge and capacity for sustainability. Examples of sustainability workshops held in 2020 are shown as below:

Daylight Discovery:
Life Aesthetics Workshop



Arts Center

"Sunlight Xiaolin" develops the Tevorangh Ethnic Botanical Garden, bamboo and rattan weaving, traditional mesh bags and embroidery activities based on the wisdom of tribal elders, ancient folk songs and plant restoration experience. The students are given the opportunity to witness the tribal culture and aesthetics through this workshop.

Combine Interest and
Work by Becoming an
International Volunteer



Office of Marine Science
and Technology

The speaker leveraged his experience as a sea turtle volunteer in Japan and Taiwan to help the students think about how to combine their interests with work, as well as becoming an international volunteer to think about who they want to be. This encourages the students to pursue and realize their dreams.

Citizen Scientist:
Ocean Observer



Office of Marine Science
and Technology

This initiative focuses on conservation issues proposed by the Foundation of Pescadores Citizens. It is hoped that students who love the ocean and have a sense of responsibility for the environment will engage in public issues and care about the environment to become extraordinary modern citizens.

Why Is a Fish-based Diet
Indispensable



Office of Marine Science
and Technology

This workshop teaches the students about seafood guidelines and a fish-based diet based on Seafood Guide Taiwan. It takes the fishery resources of Penghu as an example to help them think collectively about what happened to the ocean.

The Journey of
Marine Waste



Office of Marine Science
and Technology

Due to the geographical location as well as the influence of monsoons and ocean currents, the Penghu Islands are like a natural net that traps all waste in the Taiwan Strait. All drifting garbage is gathered here like a melting pot of marine waste. The workshop gives the students a glimpse of this strange marine waste based on statistics.

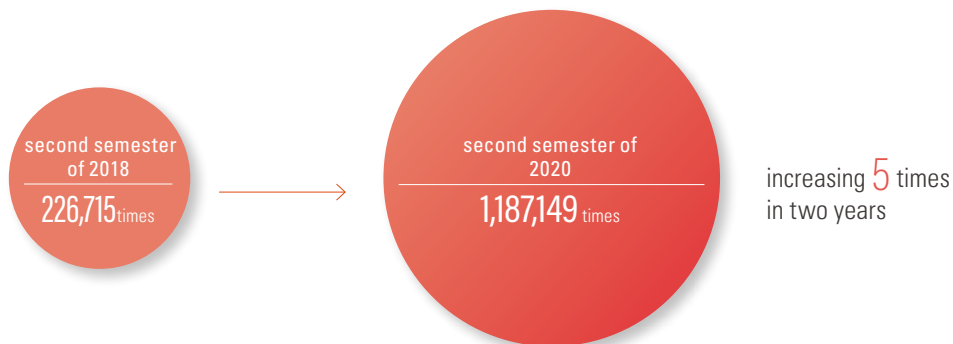


4.1.2 Digital and Open Courses

Online Distance Learning System

NKUST actively develops online teaching systems, including the “ZUVIO Real-time Cloud Interactive System” and the “Teaching Platform.” ZUVIO covers online quizzes, feedback and discussions, peer evaluation and student management (management functions include grouping, roll call and viewing learning statistics) with an usage rate that increases year by year. As of the second semester of the 2020 academic year, more than one fifth of the courses take advantage of ZUVIO to provide instant feedback on teaching, with the average number of interactions exceeding 70,000 times a week among students. The university has also established a “Teaching Platform” as a digital Learning Management System (LMS), providing features such as allowing the faculty to upload digital teaching materials, students to upload assignments, taking tests online, discussing and interacting on topics, as well as synchronizing remote learning. Since the official launch during the second semester of the 2018 academic year, the number of users per semester has increased year by year. The number of times the system was used in the second semester of the 2018 academic year was 226,715, and 1,187,149 times in the second semester of 2020, increasing five times in two years.

In addition to providing subsidies and rewards for faculty members to offer online courses, NKUST also holds online teaching workshops to help them develop relevant skills and organizes the “Online Teaching Tools Workshop” in combination with the Narrative Program with the main purpose of making synchronous online teaching more fun and gamified while encouraging faculty members to take advantage of multimedia tools. In view of the current epidemic, the faculty’s ability to use online teaching software now can be applied to synchronous distance learning when life goes back to normal in the future.



SOS: Summer Online School

NKUST’s Center for the Liberal Arts and National Yang Ming Chiao Tung University have partnered to launch the Summer Online School (SOS) to allow universities and colleges at home to share their courses, as well as allowing current and prospective students to study in their free time over summer. Synchronous and asynchronous distance learning of cross-university general education courses are also offered, for which the students can earn credits to be exempted from Liberal Arts credits.

MOOCs: Massive Open Online Course

MOOCs refers to “massive open online courses”, which open courses to a large number of online users through the Internet to participate in the learning process, creating a network that can be used anytime, anywhere and with any identity. A learning mode in which users can participate in and lead the speed and progress of self-learning. In 2020, the University opened a total of 11 online grinder-note courses, with more than 3,000 students taking the courses and 30,000 views of the digital teaching materials.

4.2 Sustainability Research

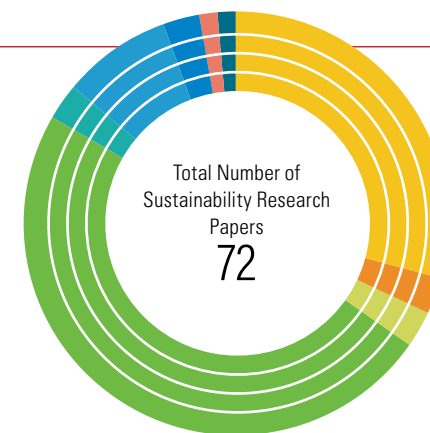
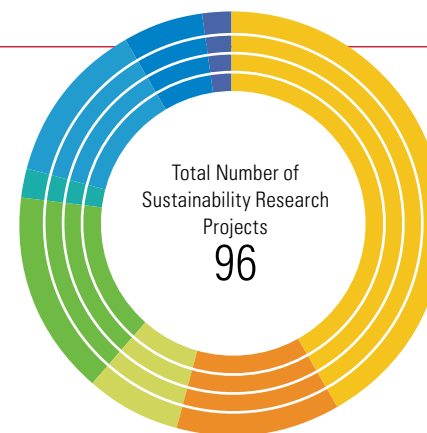
4.2.1 Sustainability Research Projects and Papers

Research is one of the important ways for universities to make a contribution to society. This can be done by helping the society understand the emerging sustainability problems through relevant research, as well as developing new technologies, strategies and methods to meet these challenges. A total of 72 sustainability research papers were produced by NKUST in the 2020 academic year, as well as a total of 96 sustainability research projects (as shown in the right Table). A total of 91 researchers were engaged in sustainability research projects/papers, accounting for 35% of all researchers. There were 35 departments with at least one researcher engaged in sustainability research, accounting for 70% of all departments.

To encourage faculty and students of all colleges to carry out sustainability research, NKUST has gradually provided targeted incentives. “Subsidy for USR Practice Pilot Program” was set up to encourage faculty and students to actively communicate with local communities and industries, take stock of key issues in regional development, integrate cross-unit capacity and resources as well as taking action to revitalize regional development. The goals include cultivating talents needed for regional development, promoting the innovation and development of local industries and technology upgrades, shortening the gap between urban and rural education development, creating co-prosperity for faculty, students and local residents to fulfill USR. Take 2020 for example, each approved application received NT\$500,000 in subsidy (each year).

Please refer to the chapter of “Key Actions on SDGs” for further information on sustainability research.

▼ Research Projects/Papers in 2020¹



College/Center	Number of Sustainability Research Projects	Number of Sustainability Research Papers
College of Engineering	40	21
College of Electrical Engineering and Computer Science	12	2
College of Maritime	7	2
College of Hydrosphere Science	15	35
Business Intelligence School	2	2
College of Management	12	6
College of Marine Commerce	6	2
College of Finance and Banking	-	1
College of Humanities and Social Sciences	2	-
College of Foreign Languages	-	-
College of General Education	-	-
Center for Innovation and Entrepreneurship Education	-	-
Office of Academic Affairs	-	-
Office of Physical Education Office	-	1

Note 1 The number of sustainability projects/papers in the first semester of the 2020 academic year was counted based on sustainability keywords defined by NKUST. Statistics are as of December 31, 2020.

Small Column

Cross-Campus Research Project with Marine Characteristics

The cross-campus research project on marine characteristics of the University of Science and Technology of China was launched in 2018 after the merger of three schools with their own characteristics. It was accumulated quite fruitful results, and was received external recognition and resource subsidies. In the third phase of 2020, two subsidy programs will be launched. One is that the “New Enlistment Program” program encourages cross-disciplinary teams to invest in potential innovative ideas. Research teams of quite academic standards can apply Excellent Highlights program. In 2018 and 2019, 35 programs were approved to be subsidized, and a total of 109 academic staff from the five campuses participated. In 2020, 21 new cases and 4 continued cases were subsidized, and 76 academic staff in the school were promoted.

The research plan connects the value-added energy and innovative vitality of academic staff and students in different campuses, so the overall research energy of the school is more robust, thereby deepening the research on marine issues and enhancing the school’s academic competitiveness. At the same time, linking the direction of industrial development, focusing on four major topics: marine green energy and the environment, innovation in the aquatic industry, marine management and humanities, marine engineering and electromechanical. There are specific performances in starting companies, providing technical services, industrial application of R&D results, counseling and diagnosing enterprises, and assisting enterprises to improve production capacity.

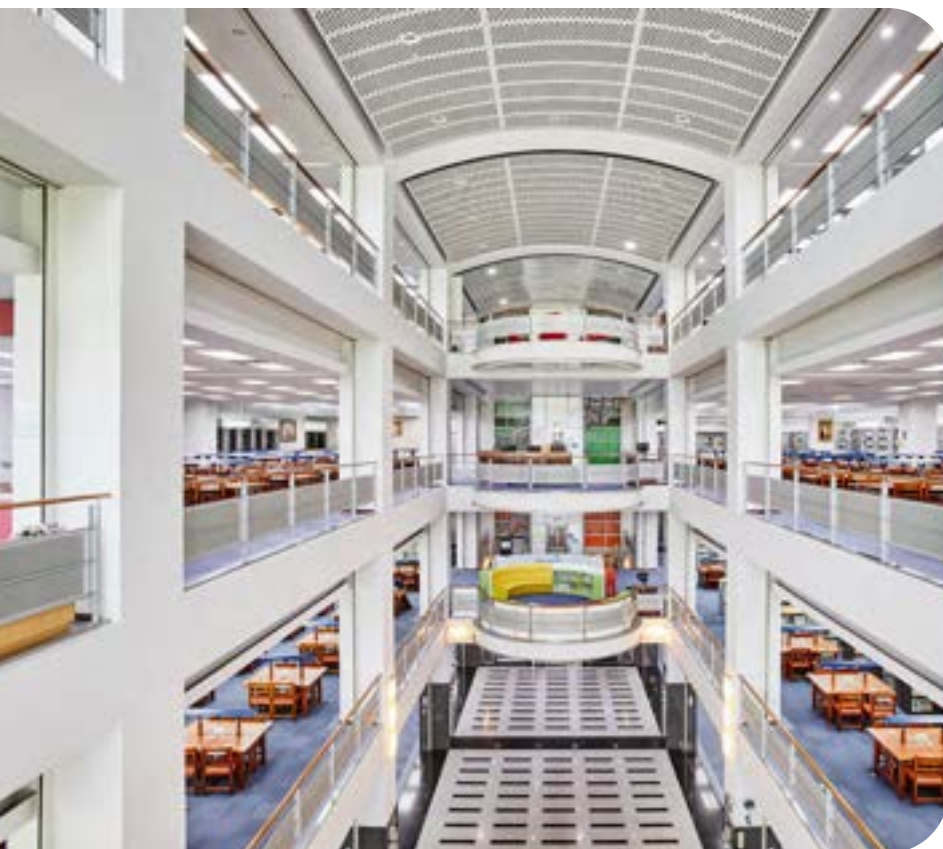
Case Highlights

In Taiwan’s aquaculture fisheries, due to the intensive aquaculture method, antibiotics are often used to suppress the occurrence of fish diseases, and antibiotics are easily left in the water body and sediment. If they are not properly treated, the aquatic and terrestrial environment will be seriously affected. Therefore, the cross-campus academic staff research team of Hi-Tech University is committed to developing new technologies for water purification. Based on the principle of advanced oxidation/catalysis/filtration, it can be applied to the treatment of antibiotics in aquaculture wastewater to replace the existing equipment in the aquaculture industry to treat pool water containing antibiotics and to develop water resources circular economy as the goal. This research team is subsidized by the Ministry of Science and Technology, and will publish 10 papers in SCI or TOP 20% journals based on this project in 2020.



4.2.2 Papers in Open Access Journals

The main purpose of Open Access is to create an academic environment with free and fair knowledge and information retrieval. NKUST actively promotes and encourages faculty and students to publish papers in Open Access journals to facilitate knowledge sharing and free circulation. In the 2020 academic year, 286 Open Access journal papers were published, as shown in the right Table.



▼ Papers in Open Access Journals in 2020¹



College/Center	Number of Journal Articles Published	Number of Papers in Open Access Journals
College of Engineering	256	93
College of Electrical Engineering and Computer Science	123	59
College of Maritime	35	17
College of Hydrosphere Science	140	69
Business Intelligence School	40	9
College of Management	52	18
College of Marine Commerce	14	5
College of Finance and Banking	4	1
College of Humanities and Social Sciences	-	-
College of Foreign Languages	2	-
College of General Education	14	10
Center for Innovation and Entrepreneurship Education	-	-
Office of Academic Affairs	2	2
Office of Physical Education Office	3	3

Note 1 The total number of journal papers published by NKUST in 2020 was retrieved from Web Of Science, with Open Access Designations in the filter. Statistics are as of December 31, 2020.

Smart Green Campus



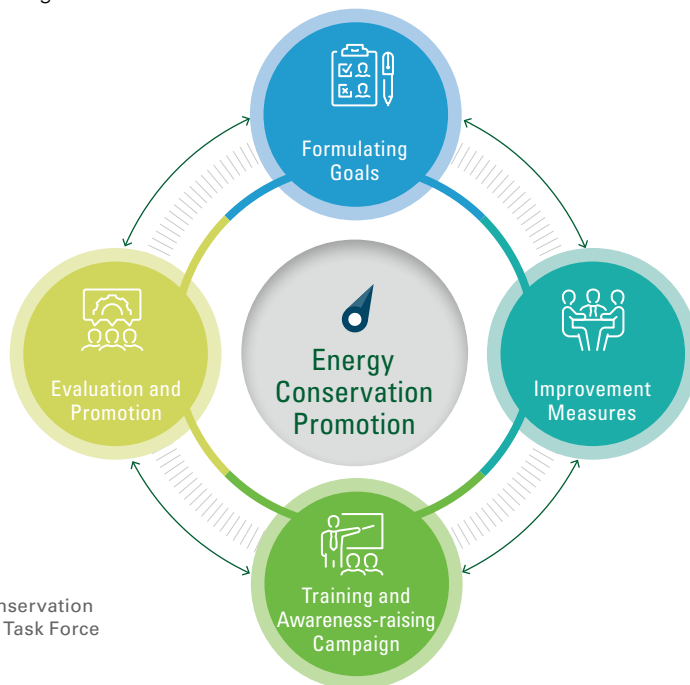
The concept of sustainability goes beyond cognition and knowledge. How to effectively take advantage of various resources in the face of human needs and the depletion of natural resources has become one of the key issues today. In view of this, we should reduce the impact and damage of the environment through daily practice, including the management of energy, air, water resources and waste, while actively managing the connections among people, animals, plants and the environment from the perspective of ecology and nature. This can help build a multi-layer outlook of life on campus. In addition, NKUST has further created a green, smart and safe campus environment by targeting food safety management and the introduction of smart technological systems.

5.1	<u>Greenhouse Gas and Energy</u>	63
5.2	<u>Air Quality and Environmental Monitoring</u>	65
5.3	<u>Waste</u>	66
5.4	<u>Water Resources</u>	67
5.5	<u>Campus Ecology</u>	68
5.6	<u>Green Procurement</u>	69
5.7	<u>Food Safety and Health</u>	70
5.8	<u>Smart Campus Technologies</u>	72

5.1 Greenhouse Gas and Energy

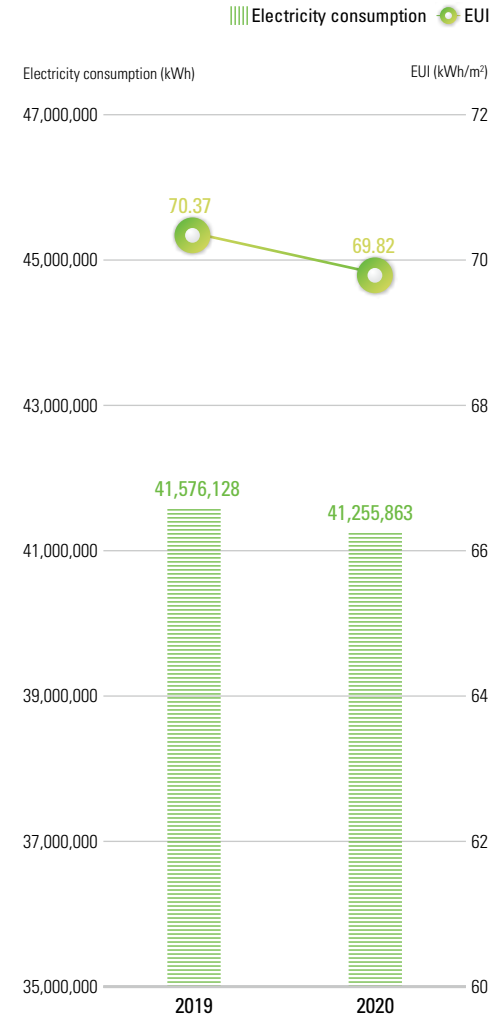
With the trends of global climate change and limited resources, countries around the world are developing awareness of environmental protection, leading to the rise of green economy such as energy saving, low carbon, and recycling. As a global citizen, NKUST must think about how to introduce the idea of green campus to each campus through effective actions so that faculty and students can lead a low-carbon lifestyle. In the meantime, we take advantage of the spacious campus to maximize ecology and natural landscape, actively encouraging the concept of environmental protection.

NKUST has continued to strive for energy conservation goals with implementation plans, lowering energy consumption through measures such as central air-conditioning, energy-saving lamps, transformers and renewable energy. Statistics on energy consumption over the past 2 years is the best proof for concrete actions the university took in 2020. Moreover, statistics show a 1.5% decrease in total energy consumption in 2020 compared with 2018, illustrating the effectiveness of energy saving. To promote effective use of energy on campus, NKUST set up an "Energy Conservation Promotion Task Force" in 2021 to improve the effectiveness of energy conservation and create a sustainable smart campus. The concrete actions of the task force is showed in the figure below.



► Energy Conservation
Promotion Task Force

▼ Energy consumption and consumption indicator (EUI)² over the past 2 years.



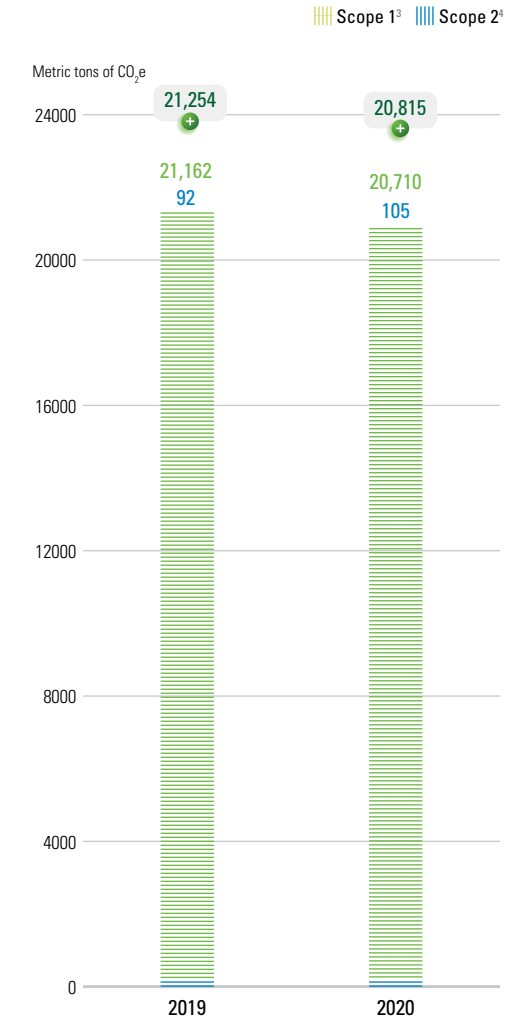
Note 1 Floor area of the building: 590,851 square meters

Note 2 EUI stands for Energy Unit Index.

Note 3 Scope 1 is direct greenhouse gas emissions. It is estimated based on total fuel consumption according to IPCC's 5th evaluation report of the global warming potential (GWP) defined by the "Version 6.0.4 of Greenhouse Gas Emission Coefficient Management Table" of the Environmental Protection Administration, Executive Yuan.

Note 4 Scope 2 is indirect greenhouse gas emissions.

▼ Greenhouse gas emissions over the past 2 years



▼ Concrete carbon reduction measures in 2020

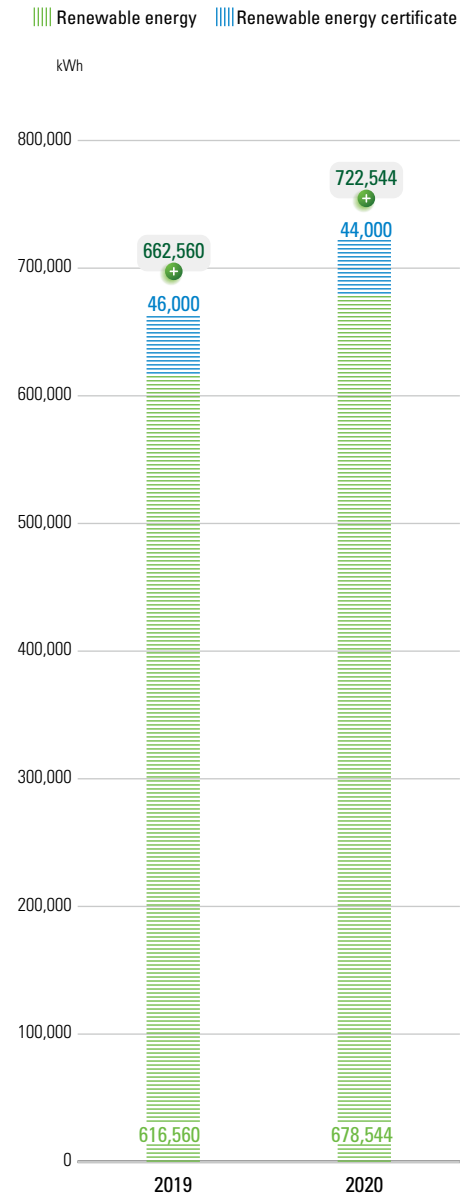


◀ Rooftop solar power system for male and female dormitories

Renewable Energy

- > The roofs of some buildings on Yanchao Campus are equipped with a solar energy system, including 158.4 kW for the Humanities and Social Sciences Building, 184.8 kW for the male and female dormitories, and 156 kW for the Library and Information Building with a total power generation capacity of 499.2 kW. A total of 678,544 kWh of electricity was generated in 2020.
- > In response to the government's promotion of renewable energy certification, a solar power system was installed at the gymnasium on the First Campus in November 2007 with the certificate publicly traded each year. A total of 44,000 kWh of electricity was generated in 2020.
- > The spare roof space on campus is leased to external operators to install renewable energy equipment for application. The roof of the College of Electrical Engineering and Computer Science building on the First Campus for example generated 617,868 kWh of electricity in 2020.
- > From 2021, it is planned to expand the capacity of renewable energy generation to increase the proportion of green energy consumption on campus year by year. At present, NKUST has signed contracts with companies to set up a total capacity of 3,312 kW that is expected to start generating electricity in 2022. In the future, it will become the largest photovoltaic rooftop power generation capacity in a single university in Taiwan, increasing the proportion of green energy on campus to over 10%.

▼ Renewable energy usage over the past 2 years



5.2 Air Quality and Environmental Monitoring

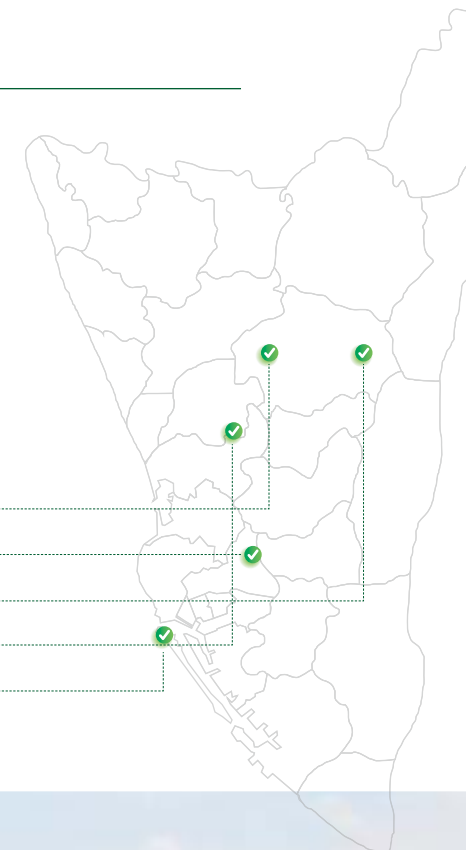
In line with the Indoor Air Quality Act, NKUST has formulated indoor air quality management plans for each campus, set up dedicated management personnel and regularly implement indoor air quality testing and measurement. For example, the libraries conduct air quality self testing every six months, as well as air quality testing every two years. Testing was carried out on the First Campus and Jiangong Campus in February 2020, and the remaining campuses were tested in August 2021 with test results in compliance with relevant regulations. The test reports can be found in the [Indoor Air Quality Testing Section of the Environmental, Occupational Safety and Health Center](#) on the university official website.

In addition, NKUST implements environmental monitoring in accordance with the commitment to the environmental impact assessment every quarter, with items covering air quality, noise, vibration, traffic flow and surface water to ensure the development plan's degree of negative impact in the surrounding areas. The consistent monitoring system helps judge long-term trends in environmental changes and evaluates the possibility of mitigating adverse effects to lower environmental impact (please refer to the [Campus Environmental Monitoring section](#) for a detailed report on the university website).

▼ Air quality testing methods and recent test results

Item	Testing Method	Standard Value
Carbon dioxide	NIEA A448.11C	1000 ppm (8 hours)
Aerosol	NIEA A206.11C	75 µg/m ³ (24 hours)
Formaldehyde	NIEA A705.12C	0.08 ppm
Germ	NIEA E031.15C	1500 CFU/m ³

Campus	Time	Result
First Campus	February 20-21, 2020	Passed
Jiangong Campus	February 24-25, 2020	Passed
Yanchao Campus	August 23-24, 2021	Passed
Nanzih Campus	August 2-3, 2021	Passed
Cijin Campus	August 30-31, 2021	Passed



Indoor Air Quality Testing Section of the Environmental, Occupational Safety and Health Center



Campus Environmental Monitoring section



5.3 Waste

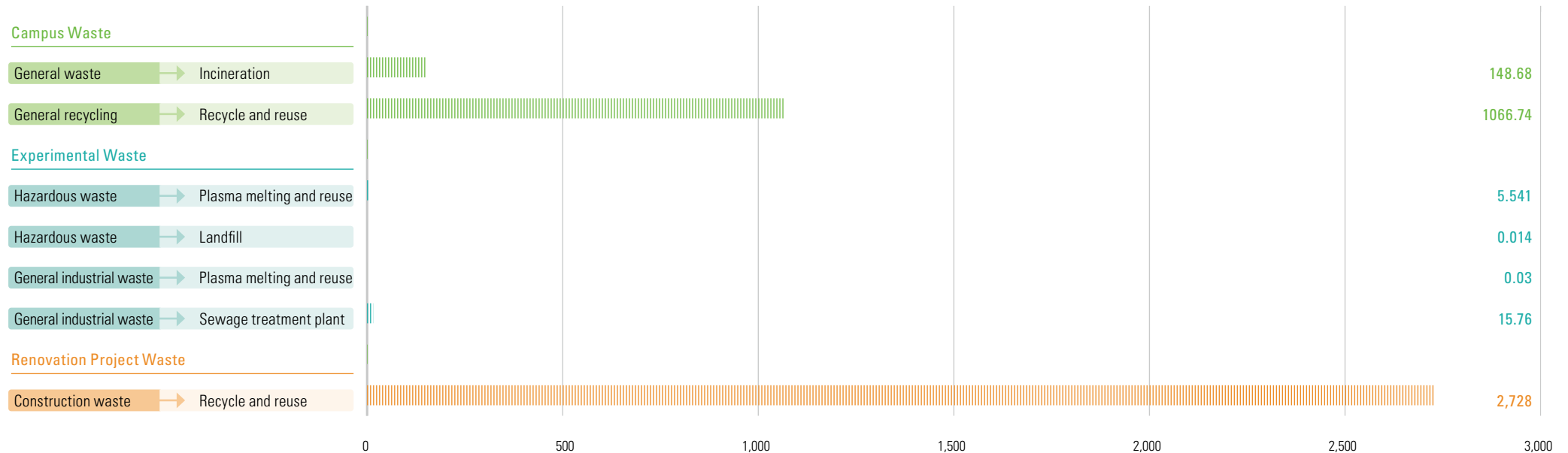
Maintaining the cleanliness and hygiene of the campus can provide a good environment for learning and research for faculty and students. NKUST follows the “Waste Disposal Act” and “Resource Recycling Act” of the Environmental Protection Administration, Executive Yuan to promote waste reduction, recycling and the correct concepts and habits for reuse to effectively remove and dispose of waste and lower the burden on the environment. Legal contractors are hired every year to collect, load, remove, transport and process campus waste. In response to the increasing waste disposal costs in recent years, NKUST plans to add recycling bins and campaigns on campus to move towards further waste reduction.

In terms of experimental waste, NKUST formulated the “Key Points for the Storage and Disposal of Waste from University Laboratories” to enable faculty, staff and students to understand the classification standards as well as removal and disposal specifications of the experimental waste. Experimental waste is classified into waste liquid, chemical waste and containers, and infectious waste. The weight of the waste is carefully collected and kept in check, with qualified contractors engaged for removal and competent authority for declaration.



▼ Waste Statistics in 2020

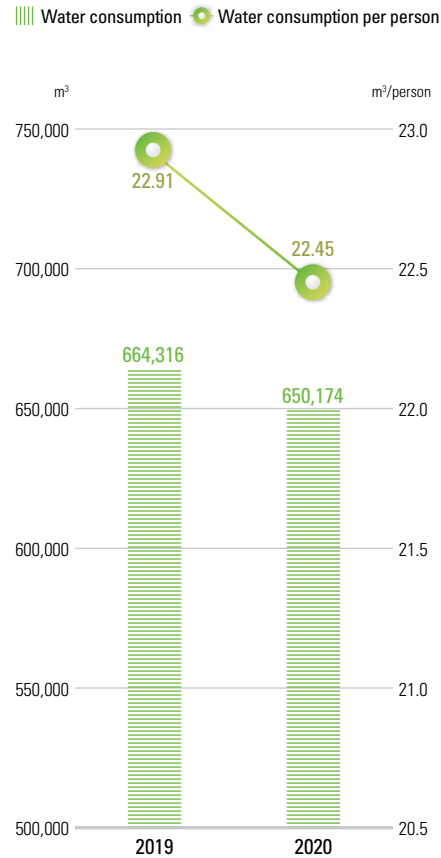
Unit: Metric Ton



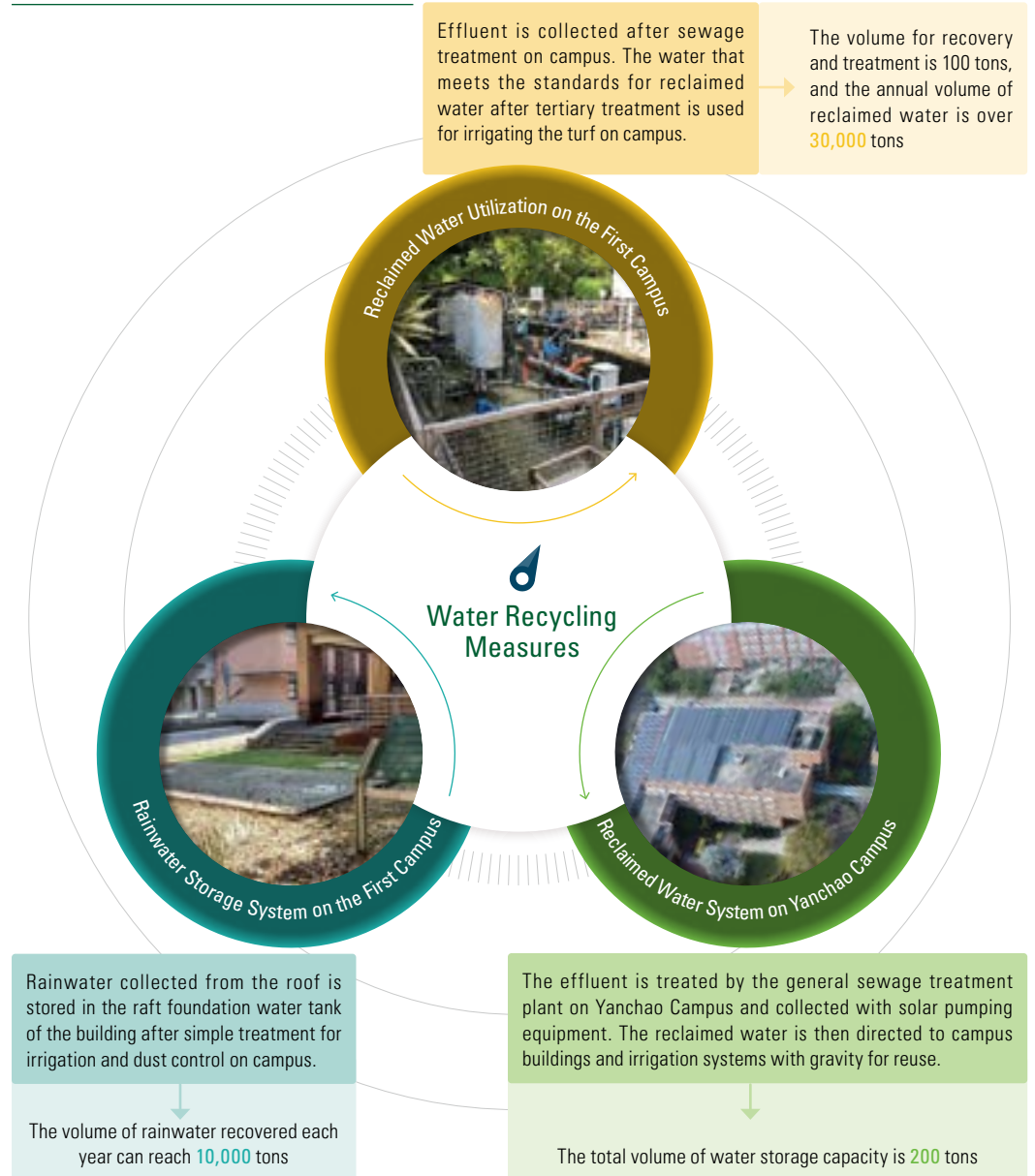
5.4 Water Resources

Water is essential for sustaining the ecosystem. Although Taiwan has abundant rainfall, the uneven distribution in terms of time and space coupled with changes in rainfall patterns caused by climate change have led to a water shortage crisis in recent years, highlighting the importance of water resources. To avoid wasting water resources, NKUST keeps monthly records of water consumption per meter and per campus. Water consumption is kept track of for management based on the number of people on campus. In addition, to reduce the overall demand for water, NKUST set up reclaimed water and rainwater recovery systems on the First Campus and Yanchao Campus to support the government's green building initiative. Recycled water is used for irrigation and dust control. The amount of recycled water reaches more than 40,000 tons, with the concrete results shown in far right figure. Coupled with the current overall water resources management, the number from 2020 was 2.1% lower than that of the previous year.

▼ Water consumption and intensity over the past 2 years



▼ Water Recycling Measures



Recycled water is used for irrigation and dust control. The amount of recycled water reaches more than **40,000** tons. Coupled with the current overall water resources management, the number from 2020 was **2.1%** lower than that of the previous year.



▲ Ecological pond (Plover Pond)



Campus
Walking Map
Download



Nearly **200** plant species, **45** insect species and **50** bird species of birds were spotted during more than half a year of field study, serving as the best witnesses for a green campus.

5.5 Campus Ecology

As you stroll on the lush campus, you will witness vitality in every corner. NKUST has always respected ecology since its founding, and the environment has been carefully created by ecological construction methods and green plants. The campus today attracts countless insects and birds. Nearly 200 plant species, 45 insect species and 50 bird species of birds were spotted during more than half a year of field study, serving as the best witnesses for a green campus.

The most representative feature of campus ecology is the Plover Pond (Ecological Pond) located on the First Campus. As you enter the campus from the west gate, you will see a vast and clean pond. The Plover Pond covers an area of about 14,000 square meters. It was originally constructed as a flood control measure. In addition to flood storage, it also helps with water resource utilization and ecological protection. Today, the ecological pond has formed a complete ecological chain with many wild bird visitors. Species such as little grebes, black-winged stilts, common sandpipers, wood sandpipers, little ringed plovers and little egrets have been spotted. In addition to the Plover Pond, the five NKUST campuses each have their own ecological features. Please find the [Campus Walking Map](#) on the official website to experience a relaxing experience in nature.

5.6 Green Procurement

Green procurement aims to reduce the impact on the environment by choosing “recyclable, low pollution and energy saving” green products, as well as encouraging green consumption through rewarding the production and use of green products. NKUST adopts the “Regulations for Priority Procurement of Eco-Products” of Executive Yuan and relevant procurement performance evaluation methods to prioritize eco-friendly products with green labels listed on the Greenliving Information Platform of the Environmental Protection Administration to actively promote green procurement practices within the university. The procurement ratio has reached 98% over the past 3 years, which is higher than the target approved by the government and shows outstanding results.

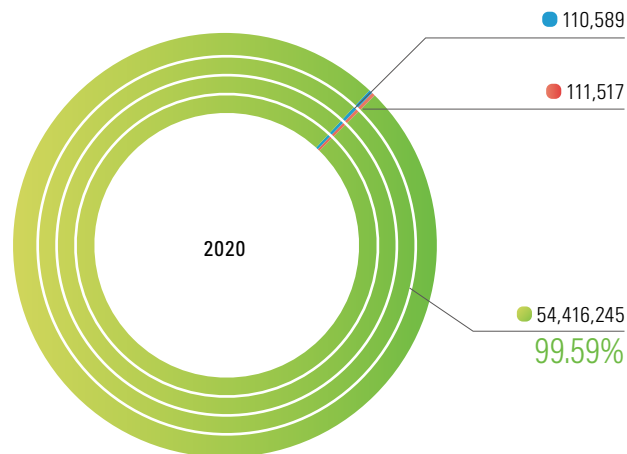
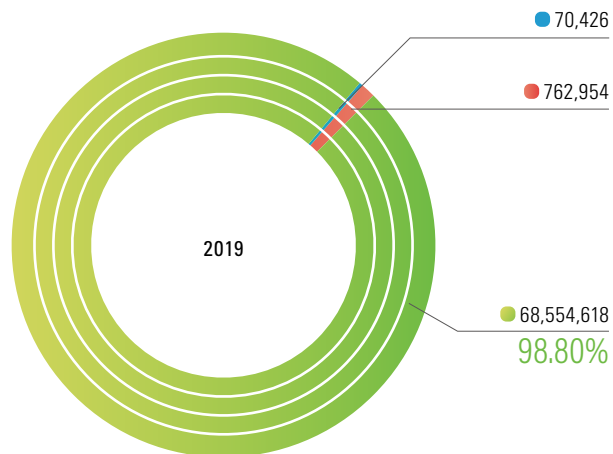


The procurement ratio has reached **98%** over the past 3 years, which is higher than the target approved by the government and shows outstanding results.

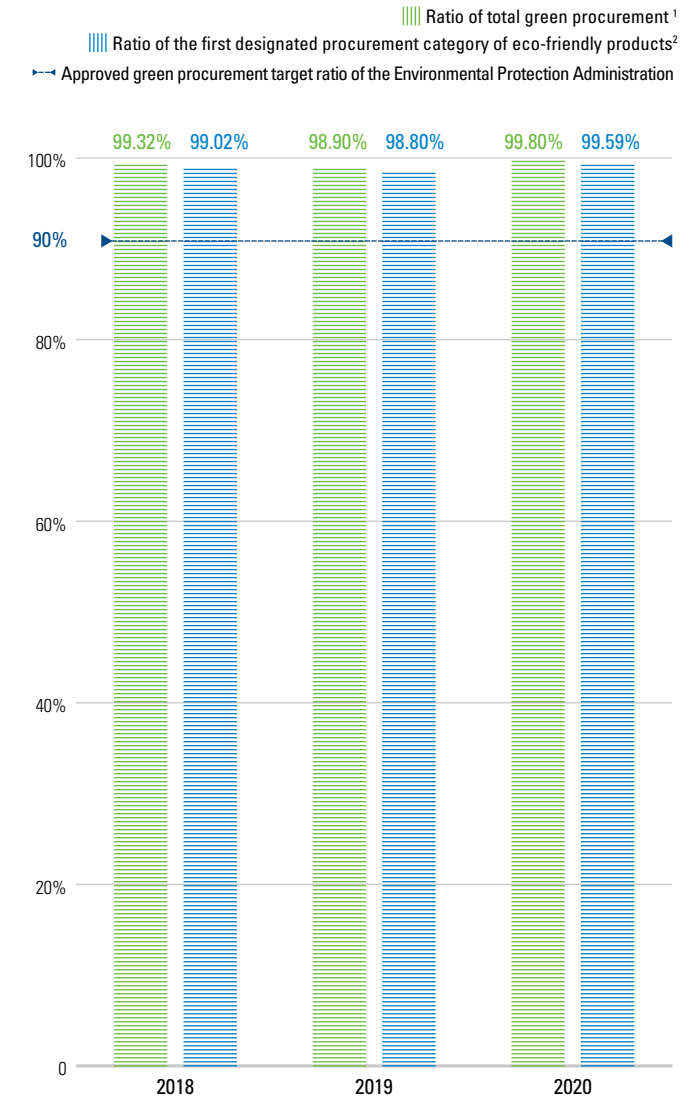
▼ Green Procurement over the past 2 years

Unit: NTD

- The first designated procurement category of eco-friendly products
- The second and third designated procurement category of eco-friendly products
- Not eco-friendly products



▼ Ratio of Green Procurement



Note 1 The total of first, second and third categories of products designated by the EPA/total procurement amount of designated items.

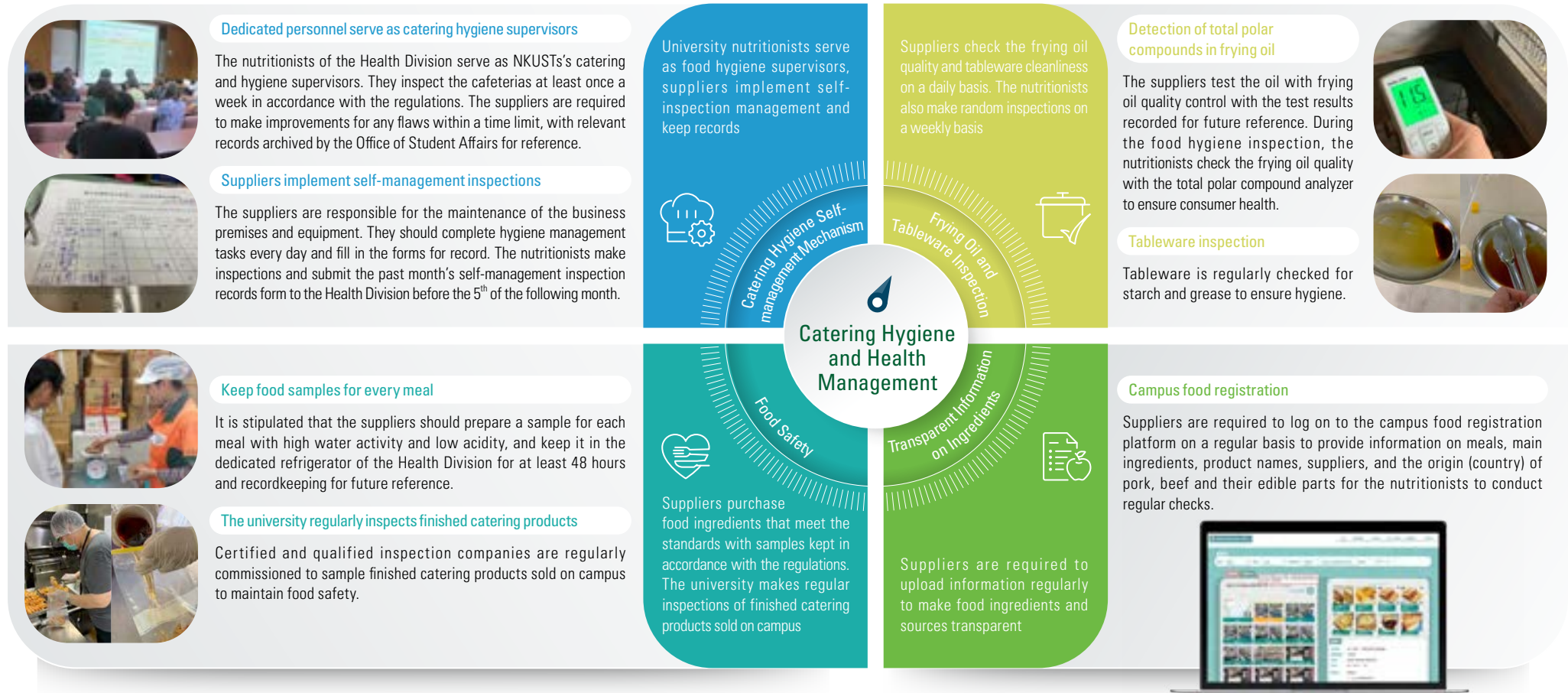
Note 2 The total of first category of products designated by the EPA/total procurement amount of designated items.

5.7 Food Safety and Health

To enhance the quality food provided at university cafeterias and maintain a safe food environment on campus, NKUST actively implements a food safety management system based on four main management policies through the division of responsibilities among the Office of Student Affairs, Office of General Administration and Office of General Affairs. Effective food safety management can be achieved with the self-management mechanism and food safety testing, providing food safety for faculty and students.

Drinking fountains are available on the NKUST campuses for the faculty, students and the general public. To prevent water-borne diseases, NKUST follows the regulation to commission external companies to check the drinking fountains and ensure drinking water safety. The water quality has consistently met the standard in recent years. Any drinking fountain with higher values needs improvement from the maintenance company. The detailed drinking water quality inspection report can be found on the [website announcement](#). In the meantime, budgets are set out every year to gradually replace old equipments to protect the rights to clean drinking water for the faculty, staff and the general public.

▼ Four Main Food Safety Management Measures



Healthy Diet

To instill the concept of a healthy diet, “My Plate” and “Fruit and Vegetable 579” activities have been held on different campuses. The activities introduce a balanced diet through fun games, with slogans helping people remember the amount of the 6 categories of food they should eat per meal. A free box of fruit was offered when the quiz is passed. NKUST hopes that faculty and students can incorporate simple healthy eating tips in their lives to facilitate the planning of daily intake of sufficient nutrients and calories.



▲ Fruit and Vegetable 579



▲ My Plate



Cafeteria provides different vegetable options

Plant-based Diet Once a Week

NKUST promotes the “Plant-based Diet Once a Week” program in line with the government to advocate a new lifestyle with a low-carbon diet. Seasonal ingredients, minimal packaging and unprocessed ingredients, food waste prevention, energy-saving cooking and minimizing garbage help mitigate greenhouse gas emissions with low-carbon actions. A list of businesses selling plant-based food has also been made available in an online campaign. The faculty and students can also achieve their goal of eating a plant-based diet with the many plant-based food options available on the campus.



▲ Low-carbon diet online campaign

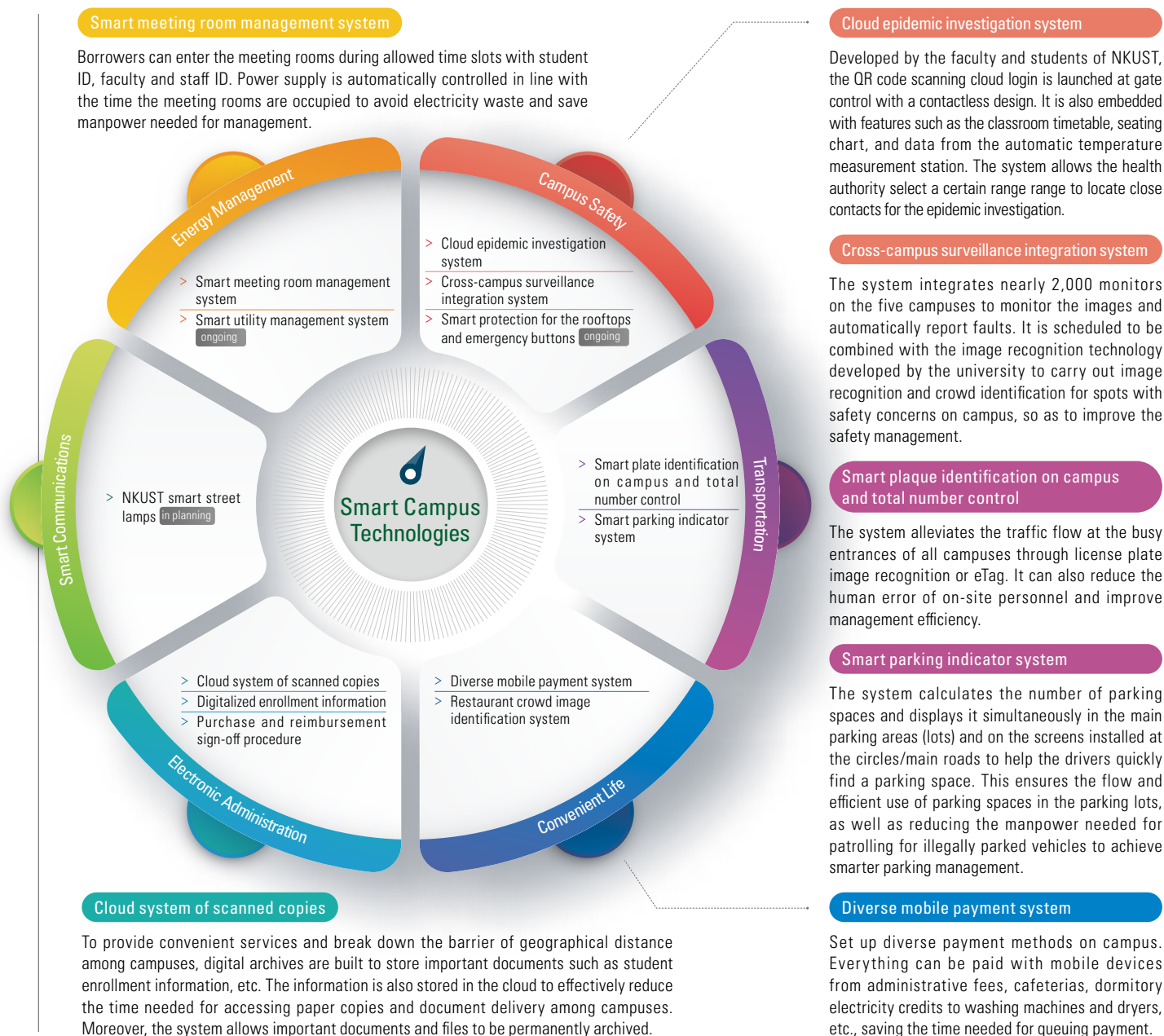
5.8 Smart Campus Technologies

Technology and digitalization have become inseparable parts of modern life in the information age. Coupled with the impact of COVID-19, digital transformation has also become one of the most critical issues in recent years. Under these circumstances, NKUST started thinking how to enhance the level of convenience, safety and energy consciousness through digital technology on campus.

In view of this, NKUST is aimed at the evaluation, research and development and introduction of six major projects to develop smart campuses, while providing all faculty members, students and administrative divisions faster services on campus through IoT devices, cloud-based and digital models. This solves the issue of the geographical distance between different campuses, as well as reducing unnecessary waste thanks to the improvement of efficiency in all aspects, indirectly achieving the benefits of energy saving and carbon reduction.

One of the most representative projects in 2020 is the Smart parking indicator system. After entering the campus, you don't have to worry about finding a parking space. Just look at the entrance notice board to understand the remaining and location of parking spaces, which can save time for drive around. It is estimated that 384 kilograms of CO₂e¹ were reduced by in 2020. In addition, NKUST has also introduced the power automatic switch for classrooms, digital attendance system, and online administrative procedures etc. NKUST believe that a smart campus is a manifestation of modern life that will continue to improve over time. NKUST will continue to introduce new digital tools to fulfill the ideal outlook of a future campus.

Note 1 Calculated based on the emission of 0.12 kg of CO₂e per kilometer by automobiles. Approximately 1,600 vehicles entered the First Campus and Jiangong Campus in 2020, and the assumption is each would drive 2 kilometers on campus.



In view of the diversity in student profiles and learning styles nowadays, learning is no longer restricted to the classrooms. The university upholds the spirit of people-oriented education with the goal of “no student left behind,” hoping all the students at NKUST can have equal opportunities. It is hoped that the students can bring more integrated value through diversified cross-disciplinary cooperation, learning to accept challenges concentrate on their studies, explore various issues in a variety of ways.



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Inclusive Campus and Society

6.1 Diversity and Well-being

6.1.1 Diversified Enrollment

NKUST has always been committed to improving access to higher education. Therefore, enrollment campaigns targeting financially or culturally disadvantaged students¹ have been organized to increase their willingness to study at NKUST. In addition to running campaigns at high schools or vocational high schools in rural areas, the students are also invited to the campus to experience it for themselves. These visits help financially or culturally disadvantaged students know more about the university's professional fields. Up to now 10 sessions have been organized with 300 participants.

To reduce the students' burden, the university subsidizes entrance examination fees (including registration fees, transportation and accommodation). In 2020, a total of 103 financially disadvantaged students² received the subsidy.



A total of 10 experience activities for high school students have been held so far, with 300 people participated.

Expenses related to entrance examinations are subsidized, and a total of 103 disadvantaged students were subsidized in 2020.

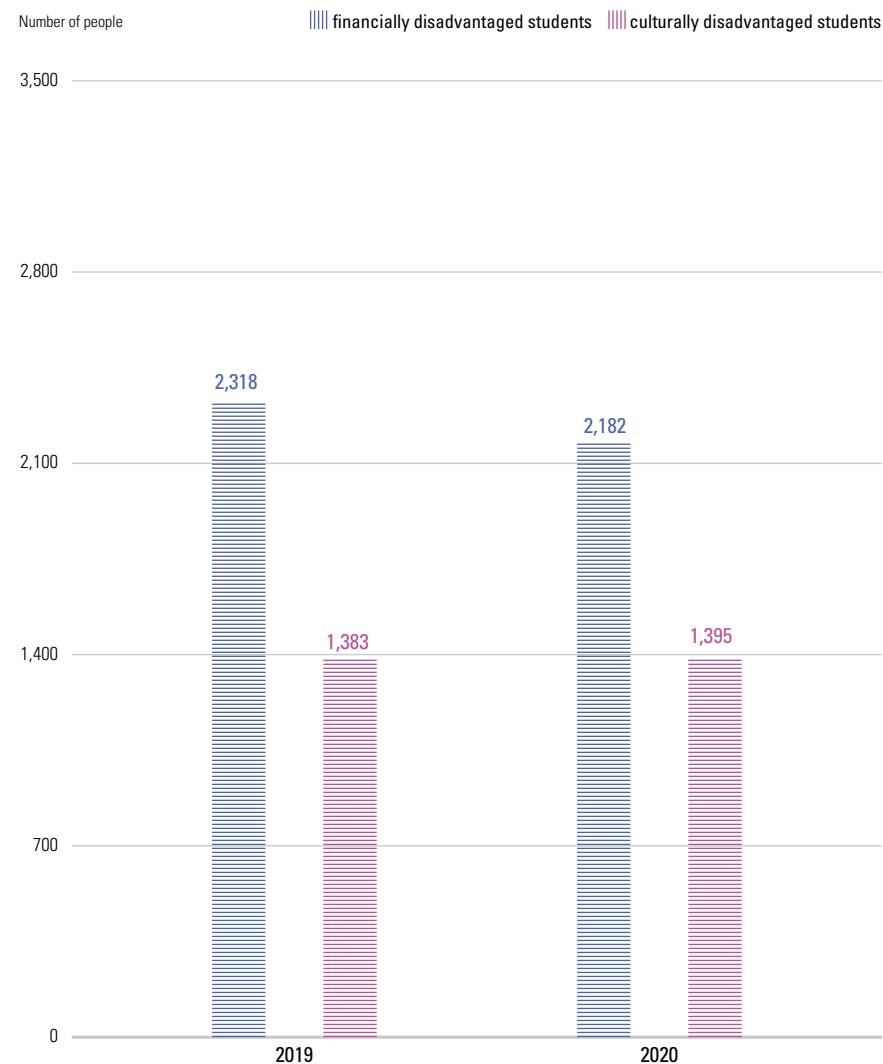


▲ Experience activities for high school students



▲ Admissions advocacy

▼ Number of financially or culturally disadvantaged students



Note 1 Financially disadvantaged (including low-income households, low-middle-income households, and those eligible for the disadvantaged student program of colleges and universities), culturally disadvantaged students and students from minority groups (including indigenous students, students with physical and mental disabilities, children of persons with disabilities, children of families in hardship).

Note 2 The statistical population of the percentage of financially or culturally disadvantaged students is the number of students at NKUST in 2020.

6.1.2 Measures for Disadvantaged Students

NKUST believes that higher education should provide all students with a willingness to learn with equal rights to education. Education has long played a key role in enhancing social mobility. Therefore, eliminating the urban-rural gap in education and achieving balance in teaching resources are the responsibilities and goals of higher education. To increase learning effectiveness and reduce the burden, NKUST aims to cultivate diverse abilities for financially or culturally disadvantaged students by formulating a total of 10 incentives to care for financially or culturally disadvantaged students throughout their university years. In addition, the university has set up a study buddy system to help overseas and international students adapt to life in a foreign country in a timely manner. Study buddies for international students are selected each semester to help international students solve problems in their daily lives and schoolwork. International students with outstanding performances will qualify for scholarship applications that are implemented in accordance with NKUST's Scholarship Guidelines for International Students.

There are non-profit friendship organizations founded by overseas students from all over the world, as well as the student club named as Overseas Chinese Students Association. Various resources and assistance are provided by the peers, and different events are organized during the festive season so that the overseas Chinese students from different countries can feel the kindness of the local ones, which encourages interactions and friendship. As the members come from different countries, they can also take this opportunity to discover other countries and develop an international perspective.



NKUST aims to cultivate diverse abilities for financially or culturally disadvantaged students by formulating a total of 10 incentives to care for financially or culturally disadvantaged students throughout their university years.

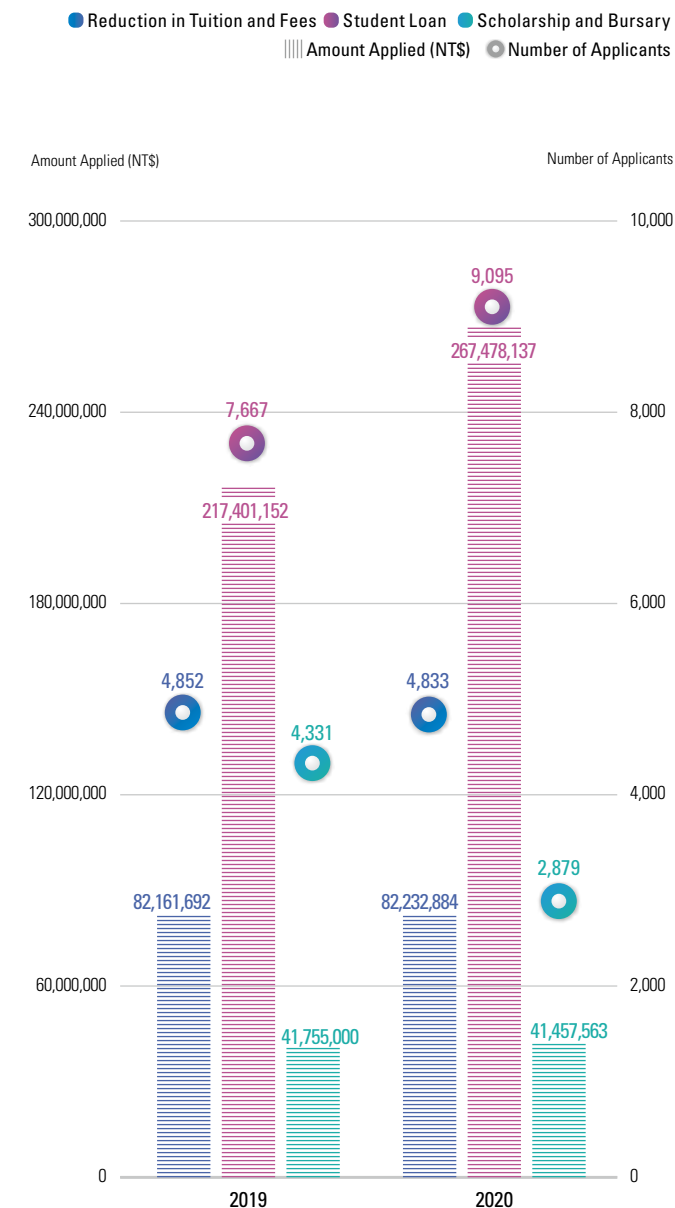
▼ Amount of incentive for financially or culturally disadvantaged students¹

Item	2019			2020		
	Number of Receivers ²	Amount Awarded (NT\$)	Percentage	Number of Receivers	Amount Awarded (NT\$)	Percentage
Class tutoring	478	1,821,000	1.7%	123	578,000	0.4%
Self-directed learning plan	--	--	--	550	7,787,000	2.0%
Study counseling	525	700,000	1.9%	263	263,000	1.0%
Career planning and assistance from counseling	934	868,000	3.4%	369	354,700	1.3%
Job matching	223	842,000	0.8%	134	189,472	0.5%
License counseling	459	1,506,405	1.7%	180	525,318	0.7%
Learning empowerment for outstanding students	85	3,090,000	0.3%	60	2,335,000	0.2%
Top-notch competitions	5	26,000	0.02%	29	84,197	0.1%
Social service empowerment	100	2,954,400	0.4%	55	1,160,200	0.2%
Leadership coaching and diverse empowerment	220	440,000	0.8%	370	1,110,000	1.4%
Total	3,029	12,247,805	11%	2,133	14,386,887	7.8%

Note 1 Financially disadvantaged (including low-income households, low-middle-income households, and those eligible for the disadvantaged student program of colleges and universities), culturally disadvantaged students and students from minority groups (including indigenous students, students with physical and mental disabilities, children of persons with disabilities, children of families in hardship).

Note 2 The percentage of incentives is divided by the total number of students during the year. There were 27,329 students for the undergraduate, graduate and PhD programs in the 2019 academic year and 27,389 for the 2020 academic year. The number of students in the academic year is calculated based on the first semester.

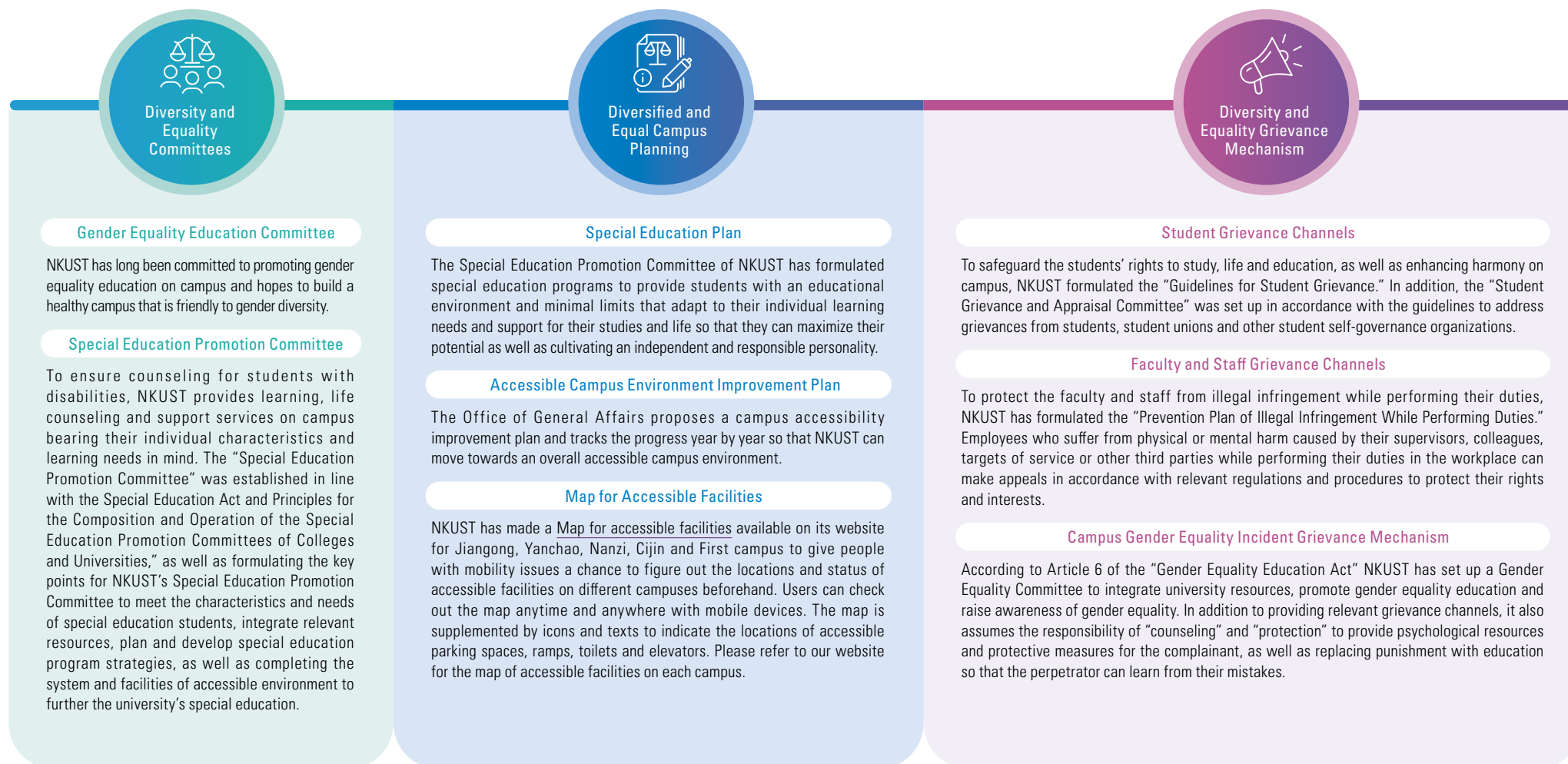
▼ Applications status for various student assistance measures





6.1.3 Diversity and Equality Committees, Campus Planning Program and Grievance Mechanism

To promote diversity and inclusiveness on campus, NKUST has set up relevant committees and specified a grievance mechanism for all administrative offices to draft and implement a number of friendly campus planning plans.



6.1.4 Diversified Staff Composition

The number of students enrolled at NKUST in 2020 was 28,128, with 64% males and 36% females. Compared with the statistics from the 2020 academic year as announced by the Department of Statistics, Ministry of Education, the gender ratio of college and university students in engineering, manufacturing and construction departments (institutes) where males take up 80.84% and females 19.16%, there is a smaller difference in the gender ratio of students at NKUST.

In terms of educational systems, statistics from the Department of Statistics, Ministry of Education pointed out that the percentage of males in the undergraduate, graduate and PhD programs in engineering, manufacturing and construction is higher. The gender ratio and distribution of NKUST is in line with the Department of Statistics' results from the rest of the country.

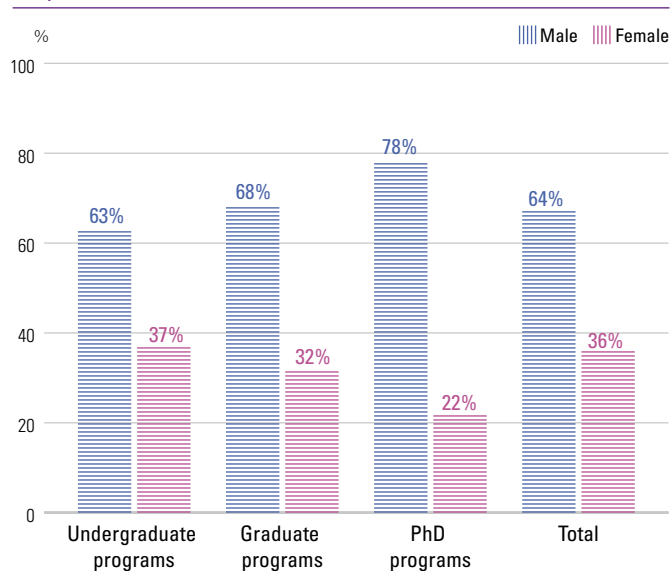
NKUST currently has a total of 864 full-time faculty members, including 657 males and 207 females, and a total of 750 part-time faculty members with 478 males and 272 females (as of October 15, 2020). There is a higher percentage of male full-time and part-time faculty members.

International exchange and traveling have boomed with different departments in recent years with increasingly diversified forms of communication. However, the main goal is enhancing the students' international mobility and cultivating international talents. NKUST has long been committed to building an international environment, enhancing the students' international mobility, cultivating international talents, and expanding international cooperation and exchanges in the hopes of becoming a model university of science and technology in the future.

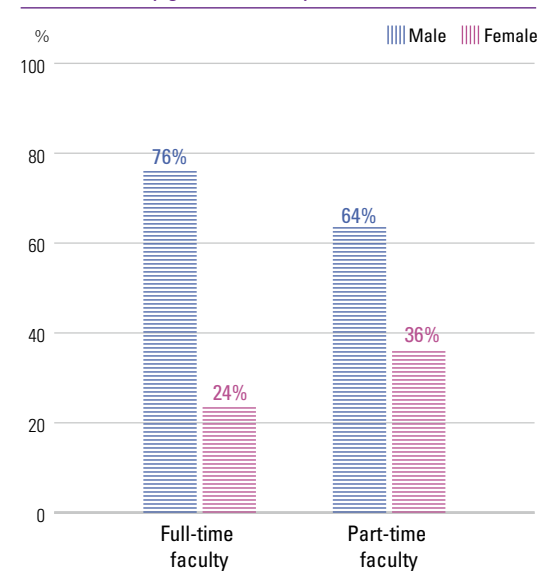


There are a total of **513** international students at NKUST, accounting for about **1.87%** of all students in the year of 2020.

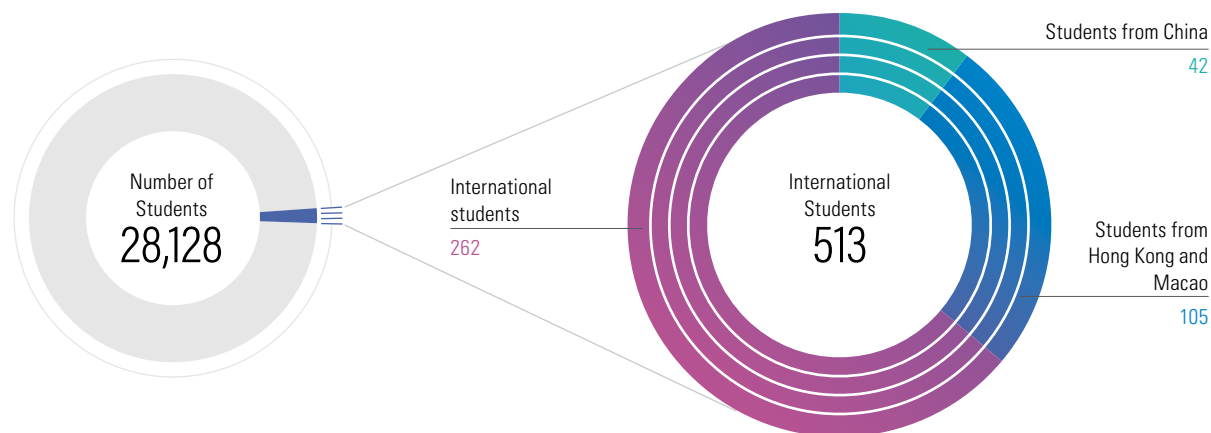
▼ Gender ratio of students in each educational system in 2020



▼ Number of full-time and part-time faculty members by gender in the year of 2020



▼ Number of international students in 2020



6.1.5 Staff Compensation and Benefits

The compensation of all NKUST personnel is in accordance with relevant regulations. The current compensation of all full-time faculty members is in line with the basic salary regulations stipulated by the Ministry of Labor. If the Ministry of Labor announces an adjustment of the minimum wage that year, the university will follow suit to protect the rights of part-time staff. To recruit and retain exceptional talents in order to enhance the NKUST's international vision and academic competitiveness, the Ministry of Education's "Revised Implementation of Flexible Salary Plan for Recruiting and Retaining Exceptional Talents at Colleges and Universities" was used as the reference for NKUST's "Guidelines for Recruiting and Retaining Exceptional Talents" to reward exceptional faculty members with the incentive of flexible salary.

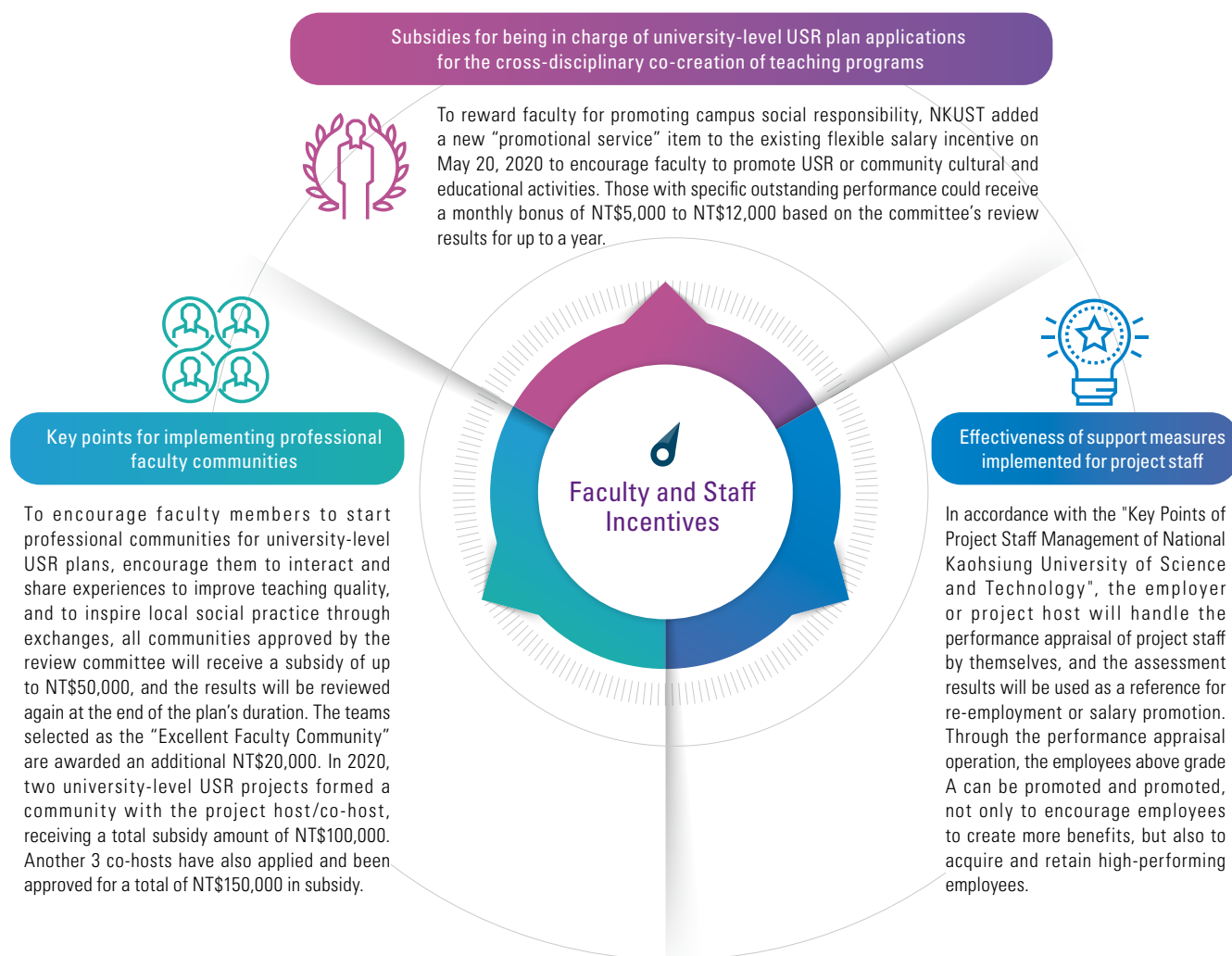
In addition, the following incentives for faculty members have

▼ Ratio of minimum wage to basic salary of full-time and part-time staff

Year		2019	2020
Full-time staff	General full-time staff (excluding faculty and researchers)	1.00	1.00
	Full-time project research assistant	1.00	1.00
	Post-doctorate (equivalent) researcher	2.52	2.45
Part-time staff	General part-time staff (excluding faculty and researchers)	1.00	1.00
	Part-time project assistant	1.00	1.00
Statutory minimum wage (NT\$)		\$23,100	\$23,800

been set up to encourage them to participate in the implementation of USR:

▼ Faculty and staff incentives



6.1.6 Physical and Mental Health of Students

On-campus Counseling

The Health Division and Student Counseling Division have been set up to ensure the physical and mental health of students. Besides treating emergency injuries and first aid, the Health Division also provides health consultations with a dedicated area for infectious disease prevention and catering health for campus promotion. The Student Counseling Division also provides a DIY mood check and monthly counseling magazine so that the students can access the resources anytime they need, as well as making counseling appointments on all campuses. All aforementioned measures help the students maximize their education and promote health and well-being on campus.



Life Education Promotion

Life education is an indispensable part of higher education. In addition to listing "Life and Ethics" as a core general course, the Center for the Liberal Arts also organizes faculty training workshops and actively expands and manages the community of life education faculty. In the meantime, teaching observations are promoted to innovate the teaching methods and materials together.

In order to effectively enhance the professional growth of NKUST's life education faculty members and fully support the educational practices in the engaging in academic research in life education, curriculum, promotion strategies, etc., the university's Center for Liberal Arts works with National Taiwan University's Life Education Center, Wenzao Ursuline University of Languages' Center for Research, Development and Promotion of Life Education and the Taiwan Life Education Association to organize the "Cross-university Life Education Alliance" to facilitate the practice of life education in the higher education system, thereby achieving the core goal and important mission of cultivating future talents.

Academic Staff Training Courses

Invite life education masters to the University to give speeches in order to let academic staffs grow together.



Graduation Workshop

Each group of participating academic staffs will design relevant lessons and share their learning experiences with each other.



Monthly Sharing Meeting

Four major themes: Ultimate Care, Value Speculation, Spiritual Cultivation, Humanity Exploration. Lecturers are invited to give lectures on theories and experience sharing of the month.



Results Presentation

Results presentation will be held in each of the Northern, Central and Southern Taiwan. Also, academic staffs from various colleges will be invited to participate in the grand event.

Compilation of Academic Staffs' Handbook

Complete the compilation and printing of the academic staffs' manual of life education course, which will provide reference for future life education courses.



Cultural and Art Activity on Campus: Young Artists

To enhance NKUST students' understanding of art and humanities, the faculty and students' aesthetic vision and the ability to appreciate art, as well as creating an artistic vibe on campus while shouldering the social mission of artistic and aesthetic education, the university has organized the "Call for Archived Works from Young Artists" since 2019 to encourage young artists to show their creative capacity through open selection. Participants are not limited to NKUST faculty and students. All young art creators with a ROC nationality are welcome to apply.

A total of 47 works were shortlisted in 2020, with the media covering videos, sculptures, prints, paintings, etc. The description and concept of each piece tells its unique story and soul. The influence of art and culture takes time to develop, and these works will gradually accumulate more meaning to balance the campus of a university of science and technology with a humanistic and artistic vibe, as well as shaping the perception required for future talents.



Call for
Archived
Works from
Young Artists
• • •

國立高雄科技大學

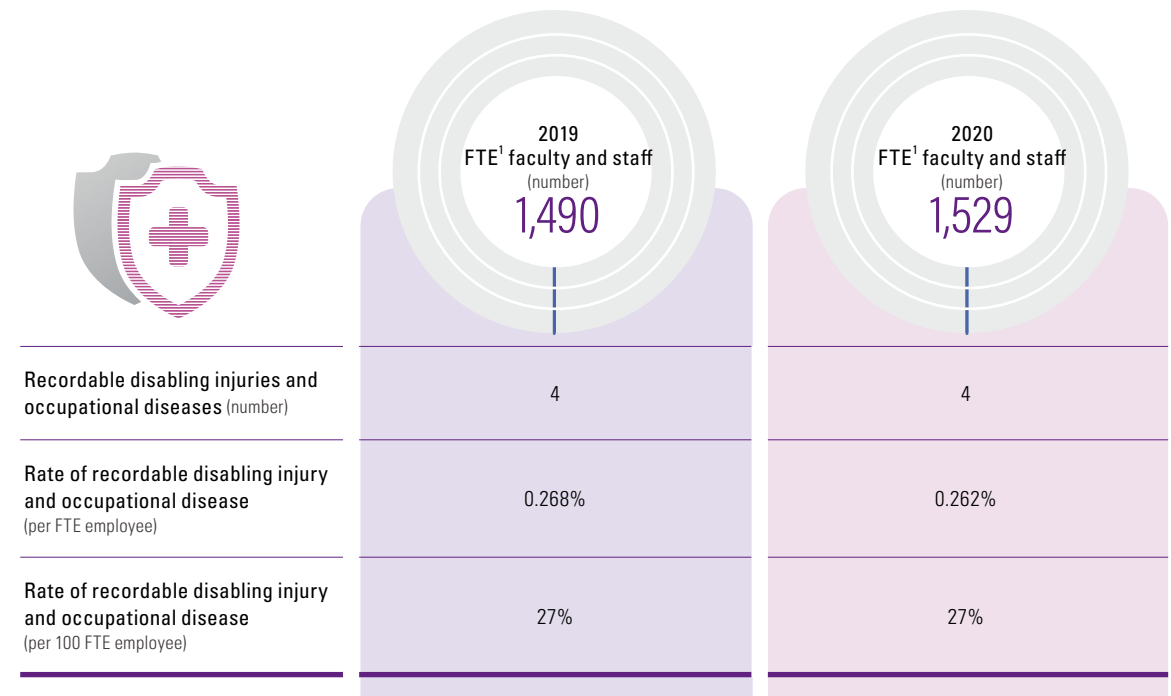
青年藝術家
典藏徵件

OPEN CALL

6.1.7 Occupational Safety and Health

The Environmental, Safety and Health Center provides education and training on environmental, safety and health in accordance with relevant laws and regulations. The training is meant to enhance expertise on safety and health on campus to effectively prevent all incidents, as well as raising occupational safety awareness to create a safer campus.

▼ Statistics of Disabling Injuries and Occupational Diseases of Faculty and Staff



Note 1 FTE: Full-time equivalent

6.2 Campus Sustainability and Social Participation

6.2.1 University Social Responsibility (USR) Project

The Ministry of Education encourages universities to play a more critical role as a local think tank in the process of regional innovation and development so that they can perform and fulfill their social responsibilities. The “University Social Responsibility Project” has been promoted since 2018, devoting the academic expertise to local industries, community culture and urban/rural development issues. This maximizes the value of universities so that they can actively contribute to sustainable development.

NKUST has been awarded a total of NT\$399.34 million in subsidies for this project, ranking sixth in the country and the first among all universities of science and technology. Moreover, 8 projects were approved for the funding of NT\$77.78 million during the first phase of University Social Responsibility Project as defined by the Ministry of Education (2018-2019). Five more were approved for phase two with NT\$99.6 million. The number of approved projects and the total subsidy for the two consecutive phases rank first place among public and private colleges and universities in Taiwan.

▼ The number of USR projects and funding approved by the Ministry of Education in recent years

Phase	Year	Approved Projects	Approved Funding
First phase	2018	8 projects	38,890,341
	2019		38,890,341
Second phase ¹	2020	5 projects	33,200,000 ²
	2021		33,200,000 ²
	2022		33,200,000 ²

Note 1 The second phase only allowed a maximum of 5 projects per university. A total of 3 universities managed.

Note 2 The funding for the second phase of 2021-2022 is subject to the actual data approved by the Ministry of Education.

▼ List of the Ministry of Education's USR projects currently being executed

Coastal Placemaking Diamond Fishing Village - Kaohsiung Yong'an Fishing Village Project

- University Sprout project
- Yong'an, Kaohsiung

e-WATCHER

- University Germination project
- Qiaotou, Nanzi and Zuoying, Kaohsiung

Living in Utopia: Harbor City Mountain Line Urban and Rural Resilient Construction Project

University Germination project
Taoyuan, Liugui and Maolin, Kaohsiung



Yanchao-Placemaking from New Agriculture

University Sprout project
Yanchao, Kaohsiung



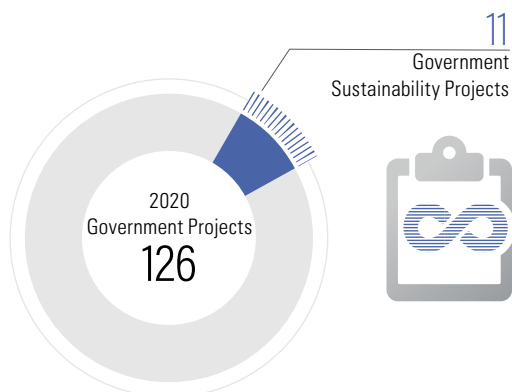
Good Fish Next Door

International Sprout project
Linbian and Jiagong, Pingtung



▼ List of current NKUST projects of the Ministry of Education's USR HUB

Project Name	Department	Field of Application	Funding (Annual)
The Youth Who Harnesses the Wind Putting down Roots in Rural Chiayi Action Study Plan	Department of Computer and Communication Engineering	Coastal and mountainous towns of Chiayi	NT\$500,000
Introduction of Smart Internet of Vehicles (IoV) to Lambai Island	Center for Innovation and Entrepreneurship Education	Lambai Island, Pingtung	NT\$500,000
For a Sustainable Kaohsiung: Fengshan District Revival	Center for the Liberal Arts	Fengshan District, Kaohsiung City	NT\$500,000
Promoting agricultural electronics and information education combined with food and agriculture education in disadvantaged elementary and junior high schools	Department of Electrical Engineering	Junior high and elementary schools in rural areas	NT\$500,000
Zuozhen District Local Creation and USR Project	Department of Information Management	Zuozhen District, Tainan City	NT\$500,000



6.2.2 Government Sustainability Projects Undertaken by Faculty and Staff

Based on the philosophy of “strong connections with industries,” “innovation and entrepreneurship” and “marine technology,” NKUST has developed many disadvantages and potentials with outstanding technical personnel and cultural diversity. By matching the needs of the national political, economic and cultural infrastructure, NKUST has undertaken many government projects at all levels to assist the government in formulating policies and solving social problems through its expertise.

In 2020, NKUST faculty and staff undertook a total of 126 government projects, of which 11 involved sustainability. In the future, NKUST will continue to further the integration of university resources, encourage faculty and staff to actively participate in sustainability research projects, and assist the government in promoting sustainable development policies.

6.2.3 Sustainability Activities

Sustainable development cannot be achieved single-handedly but requires more people to understand and become aware of the core and importance of sustainability. Society has to be changed gradually through cultivating talents, changing concepts and implementation. To this end, aside from encouraging faculty and staff to actively participate in the university’s social responsibility fulfillment program and undertake the government’s sustainability projects, various departments have also held a series of sustainability activities for the students. The goal is helping them master the philosophy of sustainable development through experience and learning.

▼ Other sustainability activities and contests



Green Product Marketing Contest

The Green Product Marketing Contest allowed faculty and students to better understand green products, strengthen the concept of environmental sustainability, and learn how to solve social and environmental problems with green product business models.

NKUST Fish-based Diet Education at the Science Fair

To join a series of science festivals in Taiwan, NKUST worked with 5 science centers and 10 popular science bases in Taiwan, as well as the Department of Seafood Science and the Department of Aquaculture to present what science in daily life looked like to the students.

The “Know Your Fish-based Diet” booth allowed the school children to discover and protect marine resources. Under the challenge of overfishing and the exhaustion of fishery resources, popular science education taught school children about seafood and how to cherish the resources. In addition, the booth provided craft activities, gyotaku art, AR fish farming and so on to further the public’s understanding of fishery products and the ocean, planting the seeds of sustainable fishery resources.



UNESCO program

This program asked the students to discuss gender and disadvantaged issues involved in disaster reconstruction. They explored and exchanged as well as engaged in the final presentation through cross-border team cooperation. They were able to discuss disaster reconstruction experiences in different regions with friends from all over the world, furthering international cooperation and building a more secure, sustainable and inclusive world based on it.

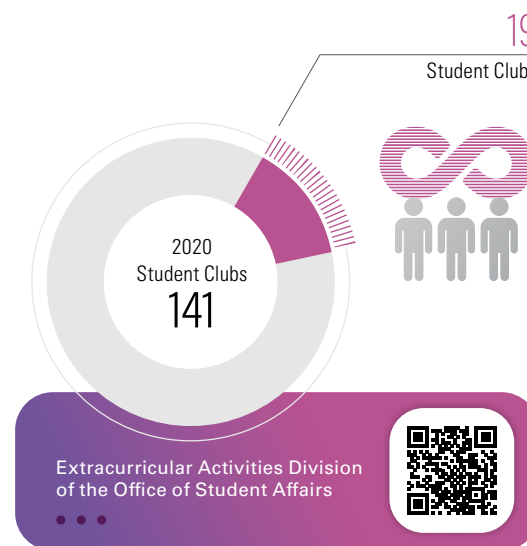
2020 NKUST UN SDGs Youth Initiative English Proposal Contest

In 2020, NKUST launched the Youth Initiative English Proposal Contest in response to the UN SDGs, encouraging aspiring young people to develop a deep understanding of how countries around the world are implementing SDGs, and strive to be young SDG advocates with ideas and beliefs that can contribute to global sustainability. A total of 19 teams signed up for this contest, with diverse profiles including students from different departments, classes, ages and nationalities. The topics of the proposals were also enlightening, including environmental protection, water conservation, educational resource allocation, marine animal conservation, air pollution, anti-terrorism, indigenous rights, water purification, food waste, water pollution, AI technology, etc., which fully demonstrated the burst of energy young people brought to sustainability topics and world issues through active participation.

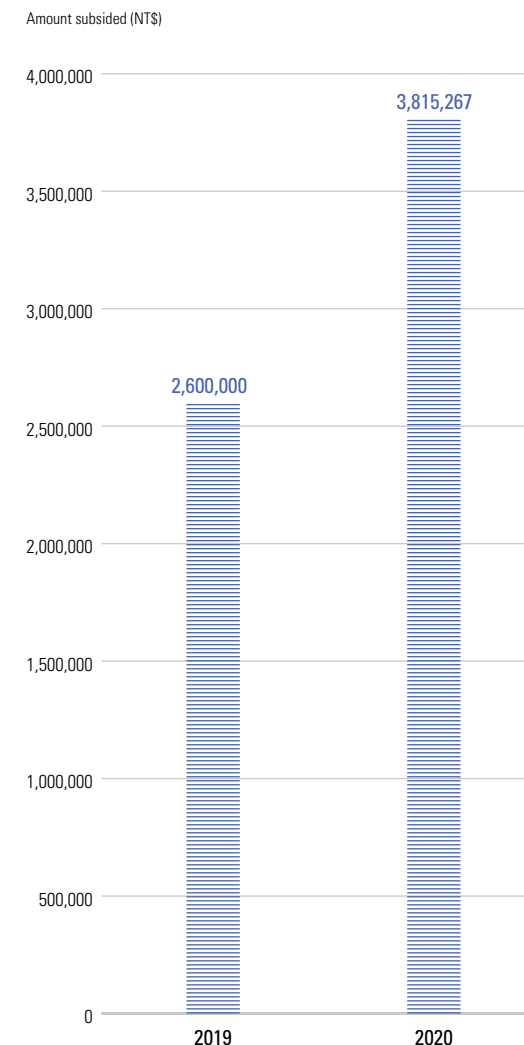


6.2.4 Sustainability Student Clubs

In the year of 2020, there are a total of 141 active student clubs on the campus, with great diversity such as academic, recreational, physical and service. In 2020, the amount of club subsidies also increased significantly compared with the previous period. Sustainability clubs have gradually taken a foothold. For example, there are 19 sustainable clubs including the Esin Club which is dedicated to serving disadvantaged groups, as well as the Animal Protection Society. For more information on student clubs, please refer to the website of the Extracurricular Activities Division of the Office of Student Affairs.



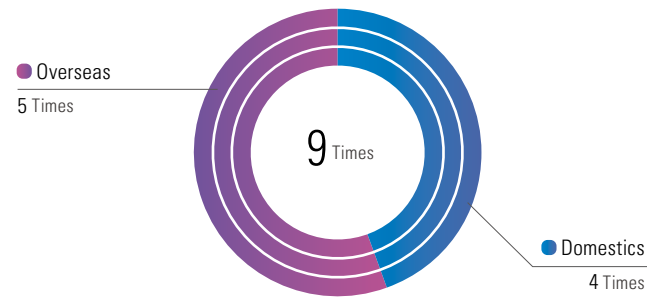
Amount of subsidy for student clubs



6.2.5 Student Service Learning and Rural Service Team

In 2020, NKUST helped students set up 20 rural service clubs with the hopes of allowing students to learn to manage interpersonal relationships with peers in the process of doing services with the guidance of the faculty. Another goal is learning a second expertise and crisis management ability to develop the value of serving the society.

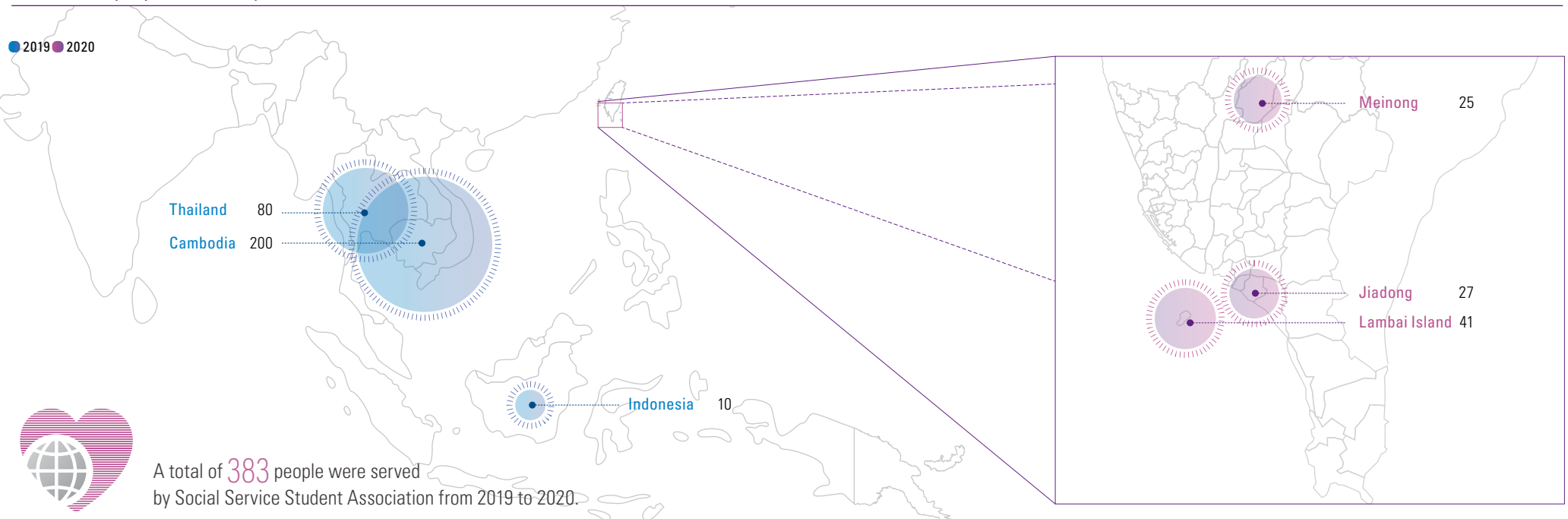
▼ Area and number of social service visits of social service student clubs



▼ Number of people assisted by social service student clubs



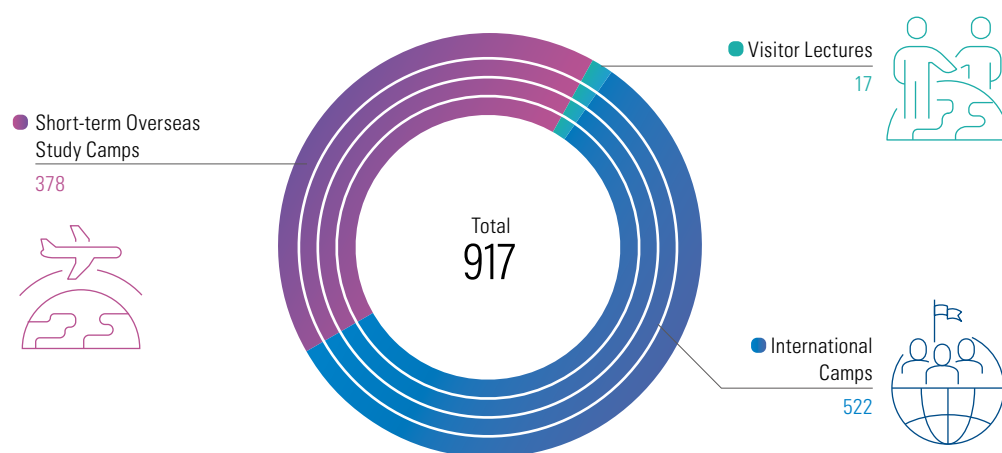
▼ Number of people assisted by social service student clubs



6.2.6 International Exchange

In 2020, NKUST was awarded the “Urban and Rural Sustainability in Asia” Overseas Experiences Program for College Students of the Youth Development Administration of the Ministry of Education. The subsidy amounted to NT\$800,000 with continued assistance for exchanges among local and foreign students to expand the university’s international vision, realizing our positioning and philosophy of “Model for International University of Science and Technology.” In recent years, NKUST has continued to invite foreign scholars to Taiwan to give lectures, international students to participate in camps, as well as sponsoring our students to participate in short-term study camps and overseas volunteer services to strengthen international academic exchanges and collaboration. As of 2020, a total of 917 people have participated in international exchanges.

▼ Statistics of the number of people participating in international exchanges from 2018 to 2020



Achievements in International Volunteering

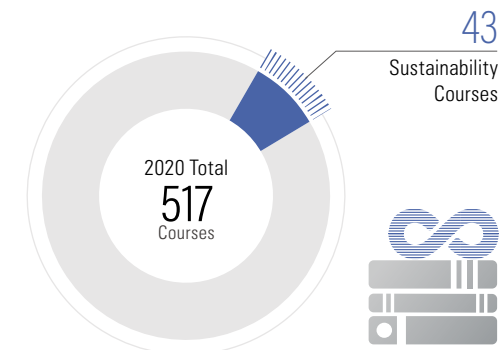
With the growth of a civilized society, social evolution has brought great progress to human life in terms of technology, economy and society. However, we must also face international crises, such as environmental pollution, lack of educational resources, climate change and other issues. To this end, NKUST hopes to bring the students’ attention to international issues through various volunteer services.

In the past, the International Volunteer Club of the university organized teams to participate in volunteer service activities abroad. However, the plan to go to Vietnam, Cambodia and Sri Lanka in 2020 had to be canceled due to the COVID-19 pandemic. After taking everything into consideration, the destination

was changed to Taiwan for rethinking and adjusting the direction of services by hosting a two-day international cultural experience camp in elementary schools. It was hoped that the activity would serve the elementary school students, provide the volunteers with extracurricular knowledge and design thinking skills, as well as expanding their international vision. Volunteers accumulated experience through actual interactions with the students and learnt how to prepare for activities, thereby developing the capacity for offering services abroad for the International Volunteer Club and planting the seeds of sustainable development.

Revisit Taiwan’s Divination Culture

NKUST is an inclusive university with diversified development of culture and technology. The university finds that Taiwan’s local temples and divination culture are not as far-reaching as churches in Europe and America. As Taiwanese people have a long history in worshipping Mazu, the goddess for seafarers, the College of Foreign Languages selected 100 divinations from the Penghu Tianhou Temple as the focus of the 2020 Sprout Project to develop the university’s unique feature. With the trend of international tourism in recent years, NKUST translated the divinations into English, Japanese and German to attract the interest of foreign tourists, hoping to enrich the resources for people who would like to learn more about culture and history from both at home and abroad.



6.2.7 Affiliated Institute of Continuing Education (AICE) and Continuing Education Center

To comply with national education policies, adapt to the needs of social development, improve the quality of educators, and provide teaching and research resources to serve the society, NKUST offers relevant continuing education and vocational training courses to provide learning opportunities and various channels for people on and off campus. The AICE and Continuing Education Center offer the opportunity to audit undergraduate, graduate, credit and lifelong learning courses. A total of 517 courses were offered, of which 43 sustainability courses. The courses cover topics such as air quality, green energy, toxic chemical disasters, environmental changes, disaster prevention, circular economy, food and agriculture education and occupational safety.

Table of Sustainability Performance

Sustainability Courses



Item	Unit	2020	Corresponding Chapter
Sustainability Courses ¹	Number	357	4.1 Sustainability Teaching
Departments/institutes with at least one sustainability course	Number	39	4.1 Sustainability Teaching
Percentage of departments/institutes with at least one sustainability course in all departments/institutes	Percentage	78%	4.1 Sustainability Teaching
Departments/institutes with mandatory sustainability courses	Number	21	4.1 Sustainability Teaching
Percentage of departments/institutes with mandatory sustainability courses in all departments/institutes	Percentage	42%	4.1 Sustainability Teaching

Note 1 The number of sustainability courses is counted based on sustainability keywords defined by NKUST.

Sustainability Research



Item	Unit	2020	Corresponding Chapter
Sustainability research papers ²	Number	72	4.2 Sustainability Research
Sustainability research projects ²	Number	96	4.2 Sustainability Research
Researchers engaged in sustainability research projects/papers	Number of people	91	4.2 Sustainability Research
Departments/institutes with at least one researcher in sustainability	Number	35	4.2 Sustainability Research
Percentage of departments/institutes with at least one researcher in sustainability in all departments/institutes	Percentage	70%	4.2 Sustainability Research
Papers in Open Access Journals	Number	286	4.2 Sustainability Research
Percentage of papers in Open Access journals in all journal papers	Percentage	42%	4.2 Sustainability Research

Note 2 Numbers of research projects/papers counted based on sustainability keywords defined by NKUST.

Smart Green Campus



Item	Unit	2019	2020	Corresponding Chapter
Energy consumption	kWh	41,576,128	41,255,863	5.1 Greenhouse Gas and Energy
Energy intensity	kWh/square meter	70.37	69.82	5.1 Greenhouse Gas and Energy
Greenhouse gas emissions (Scope 1)	Metric tons of CO ₂ e	92	105	5.1 Greenhouse Gas and Energy
Greenhouse gas emissions (Scope 2)	Metric tons of CO ₂ e	21,162	20,710	5.1 Greenhouse Gas and Energy
Renewable energy production (including feed-in tariff and green energy certificate)	kWh	662,560	722,544	5.1 Greenhouse Gas and Energy
Amount of waste (including general waste, resource, recycling, business waste and construction waste)	Metric tons	N/A	3,965	5.3 Waste
Water consumption	Unit	664,316	650,174	5.4 Water Resources
Water consumption per person	Unit/person	22.91	22.45	5.4 Water Resources
Ratio of first category designated procurement of eco-friendly products	%	98.80%	99.59%	5.6 Green Procurement
Valid green building label certificate (including candidates certificates)	Number	3	3	3.6 SDG 11 Sustainable Cities and Communities
Number of people taking the shuttle bus	Number of people	N/A	163,555	3.6 SDG 11 Sustainable Cities and Communities
Number of bicycle applications	Number of applications	N/A	495	3.6 SDG 11 Sustainable Cities and Communities

Diversity and Well-being



Item	Unit	2019	2020	Corresponding Chapter
Ratio of University Affairs Meeting participants				
Academic representatives	Percentage	83%	83%	2.1 University Governance
Non-academic representatives		6%	7%	
Student representatives		11%	11%	
Gender ratio of University Affairs Meeting participants (male:female)	Ratio	4.19	4.31	6.1 Diversity and Well-being
Gender ratio of students (male:female)	Ratio	N/A	1.78	6.1 Diversity and Well-being
Gender ratio of full-time and part-time faculty (male:female)	Ratio	N/A	2.37	6.1 Diversity and Well-being

(Continued)

Item	Unit	2019	2020	Corresponding Chapter
Financially or culturally disadvantaged students				
Amount of scholarship granted ³	Amount	12,247,805	14,386,887	6.1 Diversity and Well-being
Number of people receiving the scholarship	Number of people	3,029	2,133	
Tuition and fees reduction				
Amount	Amount	82,161,692	82,232,884	6.1 Diversity and Well-being
Number of applicants	Number of applicants	4,852	4,833	
Student loan				
Amount	Amount	217,401,152	267,478,137	6.1 Diversity and Well-being
Number of applicants	Number of applicants	7,667	9,095	
Scholarship and bursary				
Amount	Amount	41,755,000	41,457,563	6.1 Diversity and Well-being
Number of applicants	Number of applicants	4,331	2,879	
Recordable number of disabling	Number of cases	4	4	6.1 Diversity and Well-being

Note 3 Financially disadvantaged as defined by the Ministry of Education (including low-income households, low-middle-income households, and those eligible for the disadvantaged student program of colleges and universities), culturally disadvantaged students and students from minority groups (including indigenous students, students with physical and mental disabilities, children of persons with disabilities, children of families in hardship).

Campus Sustainability and Social Participation



Item	Unit	2019	2020	Corresponding Chapter
Number of USR projects	Number	8	5	6.2 Campus Sustainability and Social Participation
Number of governmental sustainability projects commissioned to faculty and staff	Number	N/A	11	6.2 Campus Sustainability and Social Participation
Number of sustainability clubs ⁴	Number	N/A	19	6.2 Campus Sustainability and Social Participation
Number of people served by student service learning and rural service team	People	290	93	6.2 Campus Sustainability and Social Participation
Number of students in service-based clubs	People	32	58	6.2 Campus Sustainability and Social Participation
Number of sustainability courses in continuing education ⁵	Number of courses offered	N/A	43	6.2 Campus Sustainability and Social Participation

Note 4 Including service-based and environmental protection clubs.

Note 5 The number of sustainability courses is counted based on sustainability keywords defined by NKUST.

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Summary of Subject Matters Assured

No.	Subject Matters Assured	Reporting Criteria	Page																																
1	2020 journal publications																																		
	<table><tr><th>College/Center</th><th>Number of Journal Articles Published</th></tr><tr><td>College of Engineering</td><td>256</td></tr><tr><td>College of Electrical Engineering and Computer Science</td><td>123</td></tr><tr><td>College of Maritime</td><td>35</td></tr><tr><td>College of Hydrosphere Science</td><td>140</td></tr><tr><td>Business Intelligence School</td><td>40</td></tr><tr><td>College of Management</td><td>52</td></tr><tr><td>College of Marine Commerce</td><td>14</td></tr><tr><td>College of Finance and Banking</td><td>4</td></tr><tr><td>College of Humanities and Social Sciences</td><td>-</td></tr><tr><td>College of Foreign Languages</td><td>2</td></tr><tr><td>College of General Education</td><td>14</td></tr><tr><td>Center for Innovation and Entrepreneurship Education</td><td>-</td></tr><tr><td>Office of Academic Affairs</td><td>2</td></tr><tr><td>Office of Physical Education Office</td><td>3</td></tr><tr><td>Total Number of Journal Papers</td><td>685</td></tr></table>			College/Center	Number of Journal Articles Published	College of Engineering	256	College of Electrical Engineering and Computer Science	123	College of Maritime	35	College of Hydrosphere Science	140	Business Intelligence School	40	College of Management	52	College of Marine Commerce	14	College of Finance and Banking	4	College of Humanities and Social Sciences	-	College of Foreign Languages	2	College of General Education	14	Center for Innovation and Entrepreneurship Education	-	Office of Academic Affairs	2	Office of Physical Education Office	3	Total Number of Journal Papers	685
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The number of 2020 SCI and SSCI papers (Article and Review) published by NKUST which can be searched from Web of Science Literature Repository as of December 1, 2021.																																			
Note Web of Science Literature Repository Information may be revised at different points in time library and search algorithms, which in turn lead to different search results.																																			
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Note Download the 2020 NKUST Published Journal from Web Of Science number. Statistics are as of 2020.12.31.																																			
2	Ratio of Type 1 Designated Procurement of Environmentally Friendly Products in 2020																																		
	<table><tr><th>item</th><th>2020</th></tr><tr><td>Ratio of the first designated procurement category of eco-friendly products</td><td>99.59%</td></tr></table>			item	2020	Ratio of the first designated procurement category of eco-friendly products	99.59%																												
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Note The total of first category of products designated by the EPA/total procurement amount of designated items.																																			
Pursuant to the “Government Procurement Law” and “Regulations for Priority Procurement of Eco-Products”, the ratio of the first category of designated procurement of environmentally friendly products must comply with the regulations of the Executive Yuan Environmental Protection Agency “Organization Green Procurement Performance Evaluation Method”.																																			
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No.	Subject Matters Assured		Reporting Criteria	Page	
	Renewable energy usage in 2020				
3	item	2020	Acquired “Purchase notices of Renewable Energy to generate electric Power” and “certificates of national renewable energy center” in the year of 2021.	P. 64	
	Renewable energy (kWh)	678,544			
	Renewable energy certificate (kWh)	44,000			
	Total	722,544			
4	University-level Contracts ^{Note} : 570		Effective school-level academic cooperation contracts as of December 31, 2021. According to the statistics of the Office of International Affairs.		
			Note 1 University-level contracts refer to the contracts of the NKUST and overseas educational institutions for the promotion mobilize academic, cultural exchange and enhance friendly relations with each other, agreed to sign. Academic Cooperation Agreement (referred to as the agreement), the content of which records the contracting parties with regard to academic and/or research Consensus, commitment or agreement are all, regardless of its name and manner as what. Note 2 Some contracts involve extension, change and the attached contract, such as the contract does not stated that the former contract is rescinded, then are deemed to be valid during the valid period. According to the number of contracts signedcount.	P. 7	
	Amount of incentive for financially or culturally disadvantaged students				
5	Item	2020		The school’s Higher Education Deep Cultivation Program Office compiles the “Appendix Award List” and submits it to the Ministry of Education in accordance with the economic or culturally disadvantaged student incentive mechanism of the Ministry of Education’s “Higher Education Deep Cultivation Program”. The amount issued is counted.	P. 75
		Number of Receivers	Amount Awarded (NT\$)		
	Total	2,133	14,386,887		
Note Financially disadvantaged (including low-income households, low-middle-income households, and those eligible for the disadvantaged student program of colleges and universities), culturally disadvantaged students and students from minority groups (including indigenous students, students with physical and mental disabilities, children of persons with disabilities, children of families in hardship).					

Independent Limited Assurance Report

Independent Limited Assurance Report

To National Kaohsiung University of Science and Technology

We have been engaged by **National Kaohsiung University of Science and Technology** ("NKUST") to perform assurance procedures on the sustainability performance information identified by the NKUST and reported in the 2020 University Sustainability Report (hereinafter referred to as the "USR Report"), and have issued a limited assurance report based on the result of our work performed.

Subject Matter Information and Applicable Criteria

The sustainability performance information identified by the NKUST (hereinafter referred to as the "Subject Matter Information") and the respective applicable criteria are stated in the "Summary of Subject Matters Assured" on page 92 of the USR Report. The scope of the aforementioned Subject Matter Information is set out in the "About This Report" on page 2 of the USR Report.

Management's Responsibilities

The Management of the NKUST is responsible for the preparation of the sustainability performance information disclosed in the USR Report in accordance with the respective applicable criteria, and for such internal control as management determines is necessary to enable the preparation of the sustainability performance information that is free from material misstatement, whether due to fraud or error.

Our Responsibilities

We conducted our assurance work on the Subject Matter Information disclosed in the USR Report in accordance with International Standard on Assurance Engagements 3000, issued by the International Auditing and Assurance Standards Board, to identify whether any amendment is required of the Subject Matter Information to be prepared, in all material aspects, in accordance with the respective applicable criteria, and issue a limited assurance report.

We conducted our assurance work in accordance with the aforementioned standards including identifying the areas where there may be risks of material misstatement of the Subject Matter Information, and designing and performing procedures to address the identified areas. The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had we performed a reasonable assurance engagement.

The extent of the assurance work we performed were based on the identified risk areas and determined materiality, and given the circumstances of the engagement, we designed and performed the following procedures:

- Made inquiries of the persons responsible for the Subject Matter Information to understand the processes, information systems, and the relevant internal controls relating to the preparation of the aforementioned information to identify the areas where there may be risks of material misstatement; and

- Based on the above understanding and the areas identified, performed selective testing including inquiry, observation, inspection, and reperformance to obtain evidence for limited assurance.

We do not provide any assurance on the USR Report as a whole or on the design or operating effectiveness of the relevant internal controls. Our assurance does not extend to information in respect of earlier periods or to any other information disclosed in the USR Report for 2019.

Compliance of Independence and Quality Control Requirement

We have complied with the independence and other ethical requirements of the International Code of Ethics for Professional Accountants (including International Independence Standards) issued by the International Ethics Standards Board for Accountants (IESBA Code), which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

Our firm applies International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Inherent Limitations

Certain Subject Matter Information involves non-financial data which is subject to more inherent limitations than financial data. Qualitative interpretations of the relevance, materiality and the accuracy of data are subject to individual assumptions and judgments.

Limited Assurance Conclusion

Based on the procedures we have performed and the evidence we have obtained, we are not aware of any amendments that is required of Subject Matter Information to be prepared, in all material aspects, to be in accordance with the respective applicable criteria."

Other Matter

The Management of the NKUST is responsible for maintaining the NKUST's website. If the Subject Matter Information or related applicable criteria are modified after this limited assurance report is issued, we are not obliged to re-perform the assurance work.

PricewaterhouseCoopers, Taiwan

Lin, Tzu-Shu

Partner

February 8th, 2022

For the convenience of readers and for information purpose only, this document has been translated into English from the original Chinese version. In the event of any discrepancy between the English version and the original Chinese version or any differences in the interpretation of the two versions, the Chinese-language version shall prevail.



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