

ECONOMIC IMPACT OF OIST ON OKINAWA AND JAPAN

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August 2026

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I. Background and Objectives

1. Background

The Okinawa Institute of Science and Technology Graduate University (hereinafter referred to as OIST) was established with the objective of creating a world-class center of excellence in education and research. Since its inauguration in 2011, OIST has worked to attract internationally diverse researchers and students while producing outstanding research outputs and fostering highly skilled talent. In addition to its research activities, OIST has generated a wide range of economic and societal impacts on Okinawa Prefecture and Japan through the recruitment of researchers and students from Japan and abroad, the hosting of conferences and events, facility development, technology transfer, startup support, and collaboration among academia, industry, and government.

An economic impact analysis of OIST was previously conducted in FY2018, demonstrating the significance of the university's contribution to the regional and national economy. Since then, however, the environment surrounding OIST has changed considerably because of increases in faculty and student numbers, the continued development of research and residential facilities, and the expansion of collaboration with local communities. In recent years, expectations have also grown regarding OIST's role in fostering an innovation ecosystem through the real-world application of its research outputs, technology transfer, and startup creation.

Against this backdrop, there is a need to reassess and quantitatively evaluate the economic impact of OIST's education and research activities, of spending by faculty, staff, and students, of conferences and other events, and of facility development activities. At the same time, it is important to examine OIST's contributions to addressing regional challenges and creating new industries through its research outputs and collaboration among industry, academia, and government. Such an assessment provides a comprehensive understanding of the value that OIST generates for Okinawa Prefecture and Japan.

2. Objectives

The objective of this study was to assess the economic and societal impacts of OIST's activities on Okinawa Prefecture, Onna Village, and Japan, and to clarify the achievements of these activities and their future potential.

Specifically, using input-output analysis, the study estimated induced production value, induced gross value added, employment effects, and tax revenue effects arising from OIST's education and research activities, spending by faculty, staff, and students, conferences and seminars, and facility development. Scenario analyses were also conducted based on assumed increases in the number of faculty members to estimate the economic impact expected in the future.

The study also conducted case study analyses of initiatives to foster innovation through technology transfer, intellectual property management, startup support, and collaboration among industry, academia, and government, as well as research activities contributing to the resolution of regional challenges. Through these analyses, the study identified the role played by OIST in promoting the development of local communities and industries through the real-world application of its research outputs. The study thereby clarified the significance of OIST not only as an academic research institution but also as a core institution in an Okinawa-based innovation ecosystem.

II. Study Design and Methodology

1. Scope of Analysis

The economic impact of the following OIST activities was estimated. In addition, the economic impact was estimated for each stage at which the number of Principal Investigators, or faculty members, increases from 94 in FY2025 to 120, 150, 200, and 300, in line with OIST's anticipated targets. The activities covered by the analysis were as follows:

1. Education and research activities
2. Spending by executives, faculty, staff, and students
3. Other activities, including conferences, seminars, and related events
4. Facility development
5. Innovation ecosystem activities

2. Analytical Methodology

(1) Input-Output Tables Used in the Analysis

1) Geographic Coverage

To estimate the economic impact on Japan, Okinawa Prefecture, and Onna Village, this study used the following input-output tables corresponding to each geographic area.¹

- Japan: Input-Output Tables for Japan, published by the Ministry of Internal Affairs and Communications
- Okinawa Prefecture: Okinawa Prefectural Input-Output Table
- Onna Village: Onna Village Input-Output Table developed by the Ministry of the Environment (provided by Value Management Institute, Inc.)

2) Reference Years of Input-Output Tables

i) Economic Impact of Operational Activities

Because the analysis of operational activities covered FY2025, input-output tables compiled for 2020 were used.²

¹ In *Economic Impact Analysis of Regional Universities*, published by the Ministry of Education, Culture, Sports, Science and Technology in March 2007 and prepared by the Japan Economic Research Institute, economic impacts for municipalities for which input-output tables have not been compiled are estimated by allocating the impacts according to the relative size of the municipal economy. However, this approach does not capture the final demand generated within Onna Village or the resulting ripple effects. It may therefore produce estimates that differ from the economic impact actually generated within Onna Village. Accordingly, this study used an input-output table specifically developed for Onna Village.

² The latest input-output tables available for both Japan, as published by the Ministry of Internal Affairs and Communications, and Okinawa Prefecture were the 2020 tables. Consequently, the 2020 input-output tables were used to analyze the economic impact of operational activities. Although a 2022 input-output table has been compiled for Onna Village, the 2020 table was used to ensure consistency in the reference year across Japan, Okinawa Prefecture, and Onna Village.

ii) Economic Impact of Facility Development

Site preparation works for OIST began in 2007, and expenditures associated with facility development have been recorded in each fiscal year. To estimate the economic impact of activities undertaken at different points in time, it was necessary to use input-output tables reflecting the interindustry structure prevailing in each respective period.

Because input-output tables are generally compiled at approximately five-year intervals, the following input-output tables were applied to the economic impact estimated for each year, including the years preceding and following the reference year of each table.

Table II-1 Correspondence Between Analysis Periods and Input-Output Tables

Year of Economic Impact Measurement	2005–2012	2013–2017	2018 onward
Reference Year of Input-Output Tables	Japan and Okinawa: 2011 / Onna Village: 2010	2015	2020

(2) Construction of the Leontief Inverse

To estimate economic impact, this study applied the competitive import-adjusted regional Leontief inverse.

$$\Delta X_a = [I - (I - \hat{M})A]^{-1}(I - \hat{M})\Delta F^d$$

I : identity matrix
 A : input coefficient matrix
 $\hat{M}$: diagonal matrix of import coefficients
 ΔF^d : change in intraregional final demand
 ΔX_a : change in production value

Figure II-1 Formula for Estimating Economic Impact from Changes in Final Demand

(3) Estimation of Economic Impact

1) Overview

This study estimated the economic impact generated by OIST in Japan, Okinawa Prefecture, and Onna Village, generally following the methodology presented in *Economic Impact Analysis of Regional Universities*, published by the Ministry of Education, Culture, Sports, Science and Technology and prepared by the Japan Economic Research Institute in March 2007.³

³ The economic impact estimated in this study includes the effects generated through interindustry transactions resulting from the activities analyzed, referred to as indirect effects, as well as the effects generated when the resulting compensation of employees is spent on consumption, referred to as induced effects. Although additional rounds of ripple effects theoretically continue beyond the induced effects included here, their magnitude diminishes over successive rounds. In practice, it is common to include household-consumption effects as induced effects and to limit the analysis at this stage. *Economic Impact Analysis of Regional Universities*, published by the Ministry of Education, Culture, Sports, Science and Technology, also includes effects up to this stage.

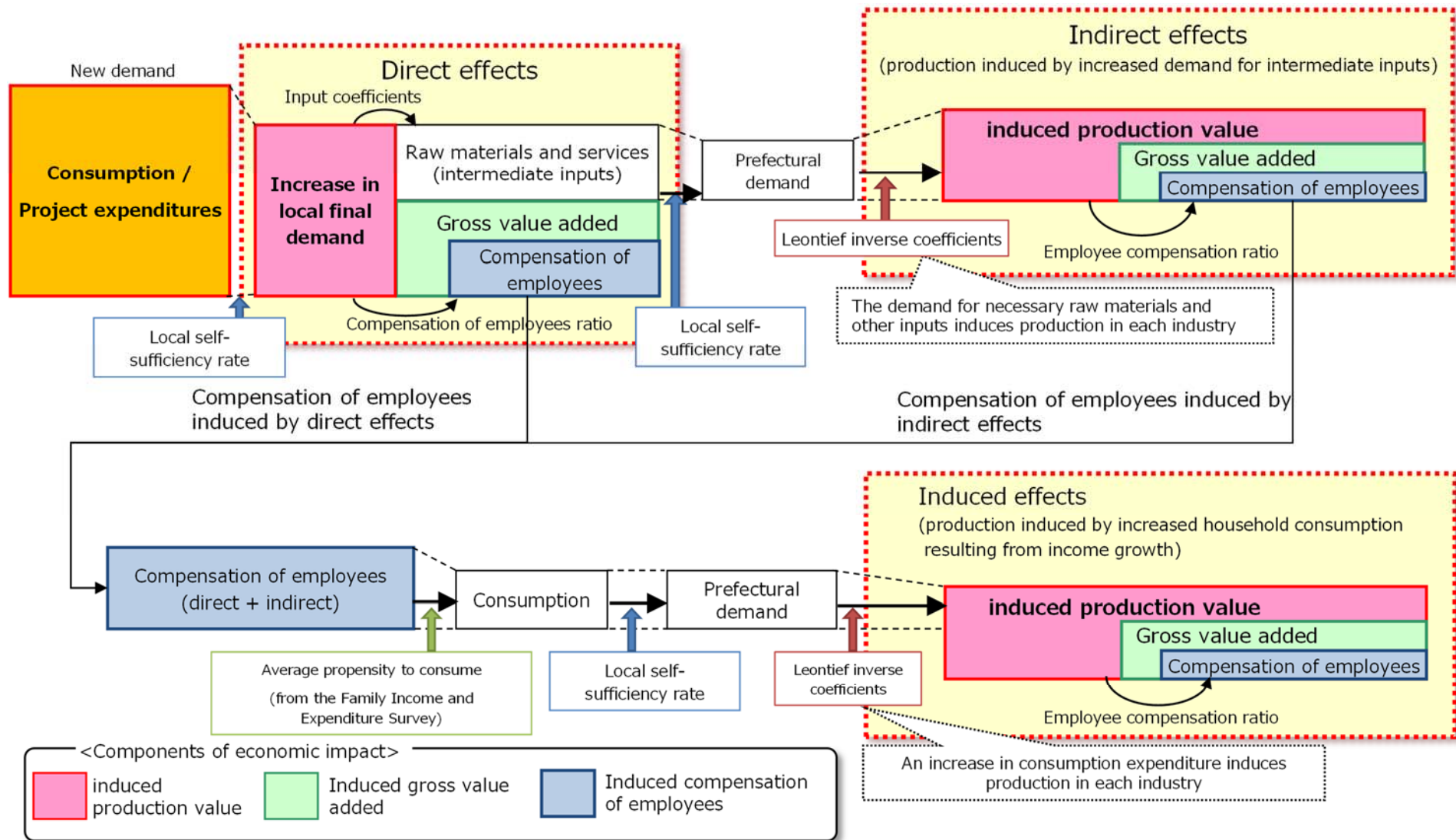


Figure II-2 Framework for Economic Impact Estimation

2) Estimation Methods for Each Impact Measure

i) Estimation of Induced Production Value and Induced Gross Value Added

Following the economic impact estimation framework, the study estimated and compiled the additional production induced by expenditures and consumption associated with each activity, together with the gross value added generated as a result. Induced gross value added by industry sector was calculated by multiplying induced production value in each industry sector by the corresponding gross value-added ratio. Total induced gross value added was then calculated by summing the resulting amounts across all industry sectors.

To indicate the extent of the impact of OIST's presence on the regional economy, the study also separately compiled the following components of gross value added corresponding to Gross Regional Product, together with their total.

Table II-2 Components of GRP-Equivalent Value Added

- | |
|---|
| <ul style="list-style-type: none">• Compensation of Employees• Operating Surplus• Consumption of Fixed Capital• Indirect Taxes• Current Subsidies |
|---|

ii) Estimation of Employment Effects

Employment effects were estimated by multiplying the additional output induced in each industry sector by the corresponding sector-specific employment coefficient. The employment coefficient was calculated as the ratio of the number of employed persons in each industry sector, obtained from the employment table accompanying the relevant input-output table, to the corresponding domestic production of that industry sector.

$\text{Employment Coefficient} = \frac{\text{Number of Employed Persons by Industry Sector}}{\text{Domestic Production by Industry Sector}}$
--

Figure II-3 Employment Coefficient

iii) Estimation of Tax Revenue Effects

An increase in production results in increases in the individual components of gross value added. Tax revenue effects were estimated by applying tax coefficients, defined as the ratio of actual tax revenue to the corresponding income or tax base, to the increases in compensation of employees, operating surplus, indirect taxes, and other relevant components.⁴ Tax coefficients for national, prefectural, and municipal taxes were calculated as shown below.

⁴ In the Onna Village Input-Output Table, gross value added is divided into three components: Consumption Expenditure Outside Households, Other Income, and Compensation of Employees. Accordingly, Other Income was used as the item corresponding to Operating Surplus.

Table II-3 Method for Estimating Tax Coefficients and Tax Revenue Effects

Tax Category	Tax Item	Calculation of Tax Coefficient	Calculation of Tax Revenue Effects
National Tax	Corporate Income Tax	Corporate Income Tax / Operating Surplus	Operating Surplus × Tax Coefficient
	Personal Income Tax	Personal Income Tax / Compensation of Employees	Compensation of Employees × Tax Coefficient
Prefectural Tax	Enterprise Tax	Enterprise Tax / Indirect Taxes	Indirect Taxes × Tax Coefficient
	Corporate Resident Tax	Corporate Resident Tax / Operating Surplus	Operating Surplus × Tax Coefficient
	Individual Resident Tax	Individual Resident Tax / Compensation of Employees	Compensation of Employees × Tax Coefficient
Municipal Tax	Corporate Resident Tax	Corporate Resident Tax / Other Income	Other Income × Tax Coefficient
	Individual Resident Tax	Individual Resident Tax / Compensation of Employees	Compensation of Employees × Tax Coefficient

Using these calculation methods, tax coefficients were calculated from the relevant input-output tables and actual tax revenue data for each geographic area, as shown below.

Table II-4 National Tax Coefficients**Corporate Income Tax**

Unit: JPY million

Reference Year	Operating Surplus	Corporate Income Tax Revenue	Tax Coefficient
2020	92,798,150	11,234,626	12.1%
2015	103,905,324	10,827,403	10.4%
2011	86,806,105	9,351,426	10.8%

Personal Income Tax

Unit: JPY million

Reference Year	Compensation of Employees	Personal Income Tax Revenue	Tax Coefficient
2020	283,879,404	19,189,790	6.8%
2015	265,799,218	17,807,137	6.7%
2011	248,421,023	13,476,192	5.4%

Table II-5 Okinawa Prefectural Tax Coefficients**Enterprise Tax**

Unit: JPY million

Reference Year	Indirect Taxes	Enterprise Tax Revenue	Tax Coefficient
2020	333,328	30,990	9.3%
2015	345,321	21,588	6.3%
2011	253,113	13,975	5.5%

Corporate Resident Tax

Unit: JPY million

Reference Year	Operating Surplus	Corporate Resident Tax Revenue	Tax Coefficient
2020	551,250	4,094	0.74%
2015	775,184	5,073	0.65%
2011	699,718	4,838	0.69%

Individual Resident Tax

Unit: JPY million

Reference Year	Compensation of Employees	Individual Resident Tax Revenue	Tax Coefficient
2020	2,382,898	44,523	1.9%
2015	2,152,141	36,004	1.7%
2011	2,014,108	30,872	1.5%

Table II-6 Onna Village Tax Coefficients

Corporate Resident Tax

Unit: JPY million

Reference Year	Other Income	Corporate Resident Tax Revenue	Tax Coefficient
2020	15,158	81	0.53%
2015	19,127	109	0.57%
2011	17,483	106	0.60%

Individual Resident Tax

Unit: JPY million

Reference Year	Compensation of Employees	Individual Resident Tax Revenue	Tax Coefficient
2020	25,325	460	1.8%
2015	26,771	332	1.2%
2011	24,637	294	1.2%

(4) Treatment of Cumulative Economic Impacts

The economic impact of facility development estimated for the year in which each activity occurred was expressed in nominal terms. To calculate cumulative economic impact over multiple years, it was therefore necessary to convert the estimates into real terms using a common price basis.

In this study, sector-specific deflators were applied to the nominal economic impact estimated for each year. The resulting amounts were converted into economic impact at constant 2020 prices and then aggregated to calculate the cumulative economic impact.

$$\text{Real Economic Impact} = \text{Nominal Economic Impact} / \text{Deflator}$$

Figure II-4 Conversion of Nominal Economic Impact into Real Economic Impact Using Deflators

III. Final Demand Estimation

1. Data Collection and Analytical Framework

To estimate economic impact, data provided by OIST were combined with regional economic statistics and other relevant sources to compile and analyze final demand and output.

2. Estimation of Final Demand Components

By combining data provided by OIST with regional statistical data and other relevant information, final demand and output were estimated for each of the expenditure categories described below by geographic area (within Onna Village, within Okinawa Prefecture excluding Onna Village, and within Japan excluding Okinawa Prefecture).

(1) Expenditures Associated with Education and Research Activities

To estimate the economic impact generated by education and research activities, expenditures associated with education and research activities in FY2025 were compiled and analyzed.

Personnel expenses (including compensation for executives, faculty members, and staff) and personnel-equivalent expenditures (including honoraria and payments to part-time personnel) were treated as the source of consumption expenditures by faculty, staff, and students and were therefore excluded from education and research expenditures and analyzed separately under "Spending by Faculty, Staff, and Students." Among depreciation expenses, those associated with intangible fixed assets, leased assets, and other assets not related to facility development were included in expenditures associated with education and research activities. Taxes and public dues, overseas travel expenses, and similar items were excluded from the economic impact analysis. Based on the above classification, expenditures associated with education and research activities were estimated at JPY 11,771 million.

Table III-1 Education and Research Expenditures

Unit: JPY million

FY2025 Ordinary Expenses		Amount	Personnel Expenses	Expenses Excluding Personnel	Excluded Items	Eligible Expenditures
		A	B	C=A-B	D	C-D
Operating Expenses	Faculty Compensation	8,637	8,637			0
	Depreciation	3,557		3,557	700	2,857
	Taxes and Public Dues	3		3	3	0
	Overseas Travel	475		475	475	0
	Other Expenses	7,544		7,544		7,544
	Subtotal	20,216	8,637	11,579	1,178	10,401
General and Administrative Expenses	Executive Compensation	105	105			0
	Staff Compensation	1,413	1,413			0
	Depreciation	43		43	5	38
	Taxes and Public Dues	261		261	261	0
	Overseas Travel	66		66	66	0
	Other Expenses	1,560		1,560		1,560
	Subtotal	3,121	1,518	1,602	332	1,270
Financial Expenses	Interest Expenses	100		100		100
Total		23,437	10,155	13,282	1,511	11,771

Source: Prepared from "9. Breakdown of Operating and General Administrative Expenses" in the FY2025 Financial Statements of the Okinawa Institute of Science and Technology School Corporation.

Note: Due to rounding, calculations based on the figures shown may not exactly match the totals presented in this report.

(2) Consumption Expenditures of Executives, Faculty, Staff, and Students

1) Consumption Expenditures of Executives, Faculty, and Staff

As described in the previous section, personnel expenses (including compensation for executives, faculty members, and staff) and personnel-equivalent expenditures (including honoraria and payments to part-time personnel) were treated as the source of consumption expenditures generated from these incomes. The resulting economic impact was estimated as the economic impact generated by spending by executives, faculty members, and staff.

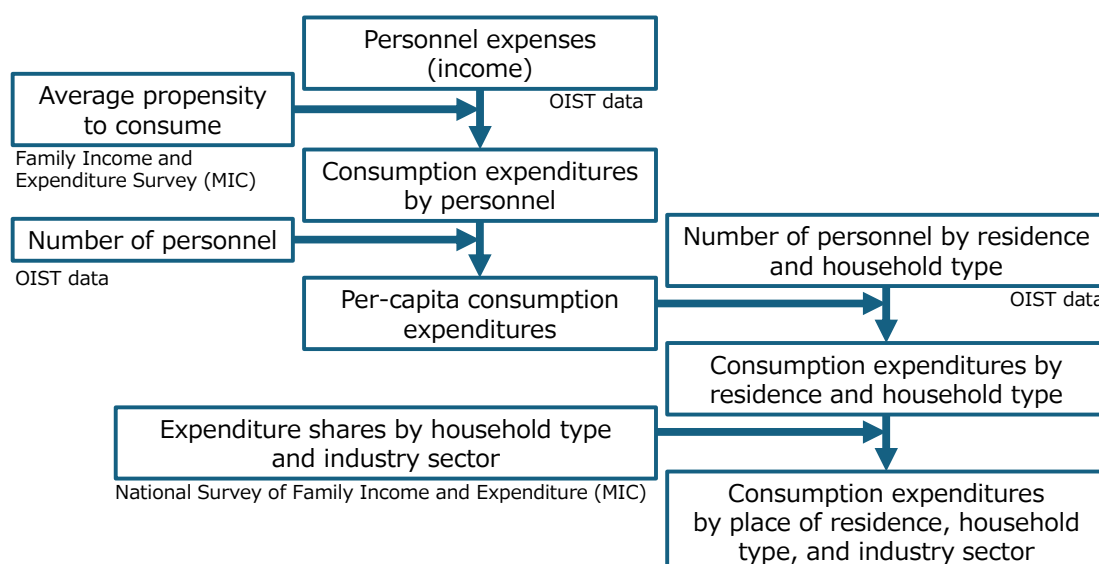


Figure III-1 Estimation Framework for Consumption Expenditures by Executives, Faculty, and Staff

i) Consumption Expenditures and Per-Capita Consumption Expenditures of Executives, Faculty, and Staff

Consumption expenditures by executives, faculty members, and staff were estimated by applying the average propensity to consume⁵ to personnel expenses reported in OIST's financial statements. In addition, per-capita consumption expenditures were calculated in order to estimate consumption expenditures by place of residence and household type.

Table III-2 Total and Per-Capita Consumption Expenditures of Executives, Faculty, and Staff

Item	Formula	Value	Unit
Personnel Expenses	A	10,155	JPY million
Average Propensity to Consume	B	67.0	%
Consumption Expenditures	$C=A \times B$	6,804	JPY million
Number of Persons	D	1,099	persons
Per-Capita Consumption Expenditures	$E=C \div D$	6,191	JPY thousand per person

Note: The average propensity to consume is based on the category "working households with two or more persons" in Okinawa Prefecture (2025).

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation and the *Family Income and Expenditure Survey* published by the Statistics Bureau of Japan.

⁵ The average propensity to consume refers to the share of disposable income that is spent on consumption expenditures.

ii) Estimation of the Number of Executives, Faculty, and Staff by Place of Residence and Household Type

To estimate economic impact for Onna Village, Okinawa Prefecture, and Japan, executives, faculty members, and staff were classified by place of residence. In addition, because expenditure patterns differ by household type⁶, the numbers of individuals by household type were estimated.

Table III-3 Number of Executives, Faculty, and Staff by Place of Residence and Household Type

Unit: persons

Place of Residence	Total	Household	
		Single-Person	Multi-Person
Onna Village	333	171	162
Okinawa Prefecture (excluding Onna Village)	758	389	369
Okinawa Prefecture Total	1,091	560	531
Outside Okinawa Prefecture	6	3	3
Japan Total	1,097	563	534
Overseas	2	1	1
Total	1,099	564	535

Notes:

1. The household composition ratio of the total population (51.3% for single-person households and 48.7% for multi-person households) was applied to each place of residence. Values were rounded to whole numbers.
2. Consumption expenditures by overseas residents were excluded from the economic impact analysis.

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation.

iii) Estimation of Consumption Expenditures by Place of Residence and Household Type

Consumption expenditures by place of residence and household type were estimated by multiplying the number of executives, faculty members, and staff in each category by the per-capita consumption expenditure estimated above.

Table III-4 Consumption Expenditures by Place of Residence and Household Type

Unit: JPY million

Place of Residence	Total	Household	
		Single-Person	Multi-Person
Onna Village	2,062	1,059	1,003
Okinawa Prefecture (excluding Onna Village)	4,693	2,408	2,285
Okinawa Prefecture Total	6,755	3,467	3,288
Outside Okinawa Prefecture	37	19	19
Japan Total	6,792	3,486	3,306
Overseas	12	6	6
Total	6,804	3,492	3,312

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation and the Family Income and Expenditure Survey published by the Statistics Bureau of Japan.

⁶ According to the 2024 National Survey of Family Income, Consumption and Wealth, spending patterns differ significantly between single-person households and multi-person households. Accordingly, this study applies separate consumption structures to each household type.

iv) Estimation of Consumption Expenditures by Place of Residence, Household Type, and Industry Sector

To estimate consumption expenditures by industry sector, it was necessary to establish industry-specific expenditure shares.

For this purpose, expenditure categories were divided into:

1. sectors not estimated using household expenditure data; and
2. sectors estimated using household expenditure data.

For sectors not estimated using household expenditure data, expenditure shares reported in the Input-Output Tables were adopted directly. For the remaining sectors, expenditure shares were reallocated based on household expenditure data.

a. Sectors Not Estimated Using Household Expenditure Data

The National Survey of Family Income and Expenditure captures expenditures actually paid by households. By contrast, private consumption expenditures recorded in the input-output tables include broader concepts such as the total supply of services and imputed transactions. As a result, directly linking expenditure amounts reported in the National Survey of Family Income and Expenditure to the finance, insurance, public administration, education, medical services, and social insurance and social welfare sectors is likely to result in substantial overestimation or underestimation. Accordingly, expenditure shares for these sectors were based on the shares of private consumption expenditures reported in the input-output tables and treated as fixed values in this study.

Table III-5 Sectors Not Estimated Using Household Expenditure Data

Industry Sector	Items Observed in the Household Expenditure Survey	Items Recorded in the Input-Output Table	Nature of the Conceptual Difference	Share of Private Consumption Expenditure	
				Okinawa	Japan
Finance	Certain service charges, such as bank transfer fees, ATM fees, and annual credit card fees	Total production and consumption of financial services	Many financial services, including deposit, lending, and payment services, are not directly observed as household expenditures. Household expenditures and consumption of financial services, therefore, do not coincide.	6.7%	5.5%
Insurance	Insurance premium payments, including fire and life insurance premiums	Value of insurance services	Insurance premiums include claim reserves and savings components, and therefore do not entirely represent insurance services.		
Public administration	No corresponding household expenditure item	Consumption of public administrative services	Public administrative services are financed primarily through tax revenues and, therefore, are not observed as household expenditures.	0.3%	0.4%
Education	Tuition, educational materials, childcare fees, and other out-of-pocket expenses	Total value of educational services	Educational services are supported by government subsidies and tuition support programs; therefore, household payments do not correspond to the total value of educational services provided.	3.0%	3.1%
Medical services	Patient out-of-pocket payments for outpatient and inpatient care	Total value of medical services (out-of-pocket payments, insurance reimbursements, and public expenditures)	Households bear only a portion of total medical expenditures; consequently, household expenditure data do not capture the full value of medical services consumed.	2.0%	2.6%
Social insurance and social welfare	Long-term care service fees, childcare fees, social insurance premiums, etc.	Total value of social welfare and long-term care services	Long-term care and welfare services are largely financed through public programs. In addition, social insurance premiums are transfer payments rather than consumption expenditures.	4.3%	2.2%

Note: Finance and insurance are combined into a single sector in the Input-Output Tables. For explanatory purposes, however, they are discussed separately in this table.

Source: Prepared based on the 2020 Okinawa Prefectural Input-Output Table and the 2020 Input-Output Tables for Japan published by the Statistics Bureau of Japan.

b. Sectors Estimated Using Household Expenditure Data

The 2024 National Survey of Family Income, Consumption and Wealth published by the Statistics Bureau of Japan provides monthly expenditure data per household by expenditure category for working households, separately for multi-person households and single-person households. Accordingly, for all sectors other than those receiving the special treatment described above, industry-sector expenditure shares were estimated for each household type using these statistical data and the industry classifications of the Input-Output Tables. These expenditure shares were then applied to consumption expenditures by place of residence and household type to estimate consumption expenditures by place of residence, household type, and industry sector. Because these expenditures correspond to purchasers' prices, they were subsequently converted into producers' prices using trade margin rates and transportation cost rates.

c. Compilation of Consumption Expenditures by Place of Residence, Household Type, and Industry Sector

According to the Okinawa Prefectural Input-Output Table, the combined expenditure share of sectors not estimated using household expenditure data amounts to 16.3% in Okinawa Prefecture and 13.9% nationwide. The remaining shares (83.7% in Okinawa Prefecture and 86.1% nationwide) were reallocated based on industry-sector consumption expenditures measured at producers' prices.

The resulting expenditure shares by place of residence, household type, and industry sector were then applied to the consumption expenditures by place of residence and household type described in Section (iii) above in order to estimate consumption expenditures by place of residence, household type, and industry sector.

**Table III-6 Consumption Expenditures of Executives, Faculty, and Staff
by Place of Residence, Household Type, and Industry Sector**

Unit: JPY million

Code	Sector Name	Onna Village		Okinawa Prefecture		Japan	
		Single-Person	Multi-Person	Single-Person	Multi-Person	Single-Person	Multi-Person
011	Crop cultivation	12	19	38	62	38	62
012	Livestock	0	0	0	0	0	0
013	Agricultural services	0	0	0	0	0	0
015	Forestry	0	0	0	0	0	0
017	Fishery	6	8	20	27	20	27
061	Coal mining, crude petroleum and natural gas	0	0	0	0	0	0
062	Miscellaneous mining industry	0	0	0	0	0	0
111	Foods	53	77	173	253	174	254
112	Beverage	14	16	46	53	46	53
113	Feeds and organic fertilizer, n.e.c.	2	1	6	5	6	5
114	Tobacco	8	2	27	8	27	8
151	Textile products	1	2	4	7	4	7
152	Wearing apparel and miscellaneous ready-made textile products	9	9	30	31	30	31
161	Lumber and wood products	0	0	0	0	0	0
162	Furniture and fixtures	1	1	2	3	2	3
163	Pulp, paper, paperboard, coated and glazed paper	0	0	0	0	0	0

Code	Sector Name	Onna Village		Okinawa Prefecture		Japan	
		Single-Person	Multi-Person	Single-Person	Multi-Person	Single-Person	Multi-Person
164	Paper products	2	4	6	15	6	15
191	Printing, plate making and book binding	1	2	4	6	4	7
201	Chemical fertilizer	0	0	0	0	0	0
202	Industrial inorganic chemicals	0	0	0	0	0	0
203	Petrochemical basic products	0	0	0	0	0	0
204	Organic chemical products (except petrochemical basic products or synthetic resins)	0	0	0	0	0	0
205	Synthetic resins	0	0	0	0	0	0
206	Synthetic fibers	0	0	0	0	0	0
207	Medicines	8	7	25	24	25	24
208	Final chemical products (except medicaments)	9	12	29	38	29	38
211	Petroleum refinery products	18	19	59	62	59	62
212	Coal products	0	0	0	0	0	0
221	Plastic products	0	1	2	3	2	3
222	Rubber products	0	0	0	0	0	0
231	Tanned leather, leather products and fur skins	4	2	12	8	12	8
251	Glass and glass products	0	0	0	0	0	0
252	Cement and cement products	0	0	0	0	0	0
253	Pottery, china and earthenware	0	0	0	1	0	1
259	Miscellaneous ceramic, stone and clay products	0	0	0	0	0	0
261	Pig iron and crude steel	0	0	0	0	0	0
262	Steel products	0	0	0	0	0	0
263	Cast and forged steel products (iron)	0	0	0	0	0	0
269	Miscellaneous iron or steel products	0	0	0	0	0	0
271	Non-ferrous metals	0	0	0	0	0	0
272	Non-ferrous metal products	0	0	0	0	0	0
281	Fabricated constructional and architectural metal products	4	3	14	9	14	9
289	Miscellaneous metal products	0	1	1	2	1	2
291	General-purpose machinery	0	0	0	1	0	1
301	Production machinery	0	0	0	0	0	0
311	Business oriented machinery	0	0	0	0	0	0
321	Electronic devices	0	0	0	0	0	0
329	Miscellaneous electronic components	0	0	0	0	0	0
331	Electrical devices and parts	0	0	0	0	0	0
332	Household electric appliances	0	6	1	20	1	20
333	Applied electronic equipment and electric measuring instruments	0	0	0	0	0	0
339	Miscellaneous electrical machinery	2	1	6	2	6	2
341	Communication, image and audio equipment	3	1	9	2	9	2
342	Electronic computing equipment and accessory equipment of electronic computing equipment	0	0	0	2	0	2
351	Passenger motor cars	29	6	96	18	96	19
352	Miscellaneous cars	0	0	0	0	0	0
353	Motor vehicle parts and accessories	14	4	46	14	46	15
354	Ships and repair of ships	0	0	0	0	0	0
359	Miscellaneous transportation equipment and repair of transportation equipment	0	0	0	0	0	0
391	Miscellaneous manufacturing products	21	15	68	49	68	50
392	Reuse and recycling	0	0	0	0	0	0
411	Building construction	0	0	0	0	0	0
412	Repair of construction	0	6	1	21	1	22
413	Public construction	0	0	0	0	0	0
419	Miscellaneous civil engineering and construction	0	0	0	0	0	0
461	Electricity	29	46	96	150	97	151
462	Gas and heat supply	13	12	42	39	42	39
471	Water supply	8	13	26	42	26	42
481	Waste management service	0	0	0	1	0	1
511	Commerce	97	108	319	352	320	354

Code	Sector Name	Onna Village		Okinawa Prefecture		Japan	
		Single-Person	Multi-Person	Single-Person	Multi-Person	Single-Person	Multi-Person
531	Finance and insurance	71	68	234	222	235	223
551	Real estate agencies and rental services	7	5	24	18	24	18
552	House rent	176	82	575	270	577	271
553	House rent (imputed house rent)	26	113	85	372	87	375
571	Railway transport	3	1	9	2	9	2
572	Road transport (except self-transport)	13	12	42	38	42	38
573	Self-transport	0	0	0	0	0	0
574	Water transport	0	0	2	1	2	1
575	Air transport	7	6	21	21	22	21
576	Freight forwarding	1	1	2	3	2	3
577	Storage facility service	2	2	6	7	6	7
578	Services relating to transport	3	7	9	23	10	23
579	Postal services and mail delivery	0	1	1	2	1	2
591	Communications	32	36	104	118	104	118
592	Broadcasting	2	3	7	9	7	9
593	Information services	0	0	0	0	0	0
594	Internet based services	9	8	30	27	30	27
595	Image information, sound information and character information production	6	3	19	9	19	9
611	Public administration	3	3	11	11	11	11
631	Education	32	30	103	98	104	98
632A	Research (except Research institutes for natural sciences (NPI))	0	0	0	0	0	0
632B	Research institutes for natural sciences (NPI)	0	0	0	0	0	0
641	Medical service	22	20	70	67	71	67
642	Health and hygiene	1	3	4	9	4	9
643	Social insurance and social welfare	45	43	148	140	148	140
644	Nursing care	0	0	0	0	0	0
659	Membership-based associations, n.e.c.	0	0	0	1	0	1
661	Goods rental and leasing services	1	3	2	11	2	11
662	Advertising services	0	0	0	0	0	0
663	Motor vehicle maintenance and machine repair services	7	7	22	24	22	24
669	Miscellaneous business services	0	0	0	0	0	0
671	Accommodations	8	9	27	30	27	30
672	Eating and drinking services	124	85	406	280	409	281
673	Laundry, beauty and bath service	11	7	35	22	35	22
674	Amusement and recreational services	74	32	243	105	244	106
675	Veterinary service	1	2	2	7	2	7
679	Miscellaneous personal services	5	4	16	14	16	14
681	Office supplies	0	0	0	0	0	0
691	Activities not elsewhere classified	0	0	0	0	0	0
700	Total of intermediate sectors	1,059	1,003	3,467	3,288	3,486	3,306

v) Estimation of Consumption Expenditures by Place of Purchase for Executives, Faculty, and Staff Residing in Onna Village

Compared with neighboring and nearby municipalities⁷, Onna Village has a relatively small concentration of industries related to consumer goods and services. As a result, it is assumed that executives, faculty members, and staff residing in Onna Village purchase a relatively limited share of goods and services from businesses located within the village. Accordingly, the local purchasing rate for executives, faculty members, and staff residing in Onna Village was estimated using the following formulas.

⁷ For the purpose of estimating local purchasing behavior, neighboring municipalities were defined as municipalities located within approximately 30 minutes by car from OIST and having significant concentrations of commercial and service activities. These include Yomitan Village, Chatan Town, Uruma City, and Okinawa City.

Goods (Retail Purchases)
<i>Local Purchasing Rate in Onna Village</i>
<i>= $\frac{\text{Number of Retail Employees in Onna Village}}{\text{Number of Retail Employees in Onna Village, Yomitan Village, Chatan Town, Uruma City, and Okinawa City}}$</i>
Services
<i>Local Purchasing Rate in Onna Village</i>
<i>= $\frac{\text{Number of Employees in Personal Service Industries in Onna Village}}{\text{Number of Employees in the Corresponding Service Industries in Onna Village, Yomitan Village, Chatan Town, Uruma City, and Okinawa City}}$</i>

Figure III-2 Local Purchasing Rates within Onna Village

However, for the industry sectors listed below, all consumption was assumed to occur exclusively within Onna Village.

Table III-7 Industry Sectors Assumed to be Consumed Exclusively within Onna Village

Industry Sector
Electricity, gas and heat supply
Water supply
Waste management service
Public administration
Social insurance and social welfare

2) Consumption Expenditures of Students

Student consumption expenditures were estimated based on the number of students and per-capita living expenses derived from the results of the Student Life Survey conducted by the Japan Student Services Organization (JASSO).

i) Number of Students by Place of Residence

The distribution of OIST students by place of residence is shown below.

Table III-8 Number of Students by Place of Residence (FY2025)

	Onna Village	Okinawa Prefecture (excluding Onna Village)	Total
Number of Students	267	23	290

Unit: persons

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation.

ii) Student Living Expenses by Industry Sector

Student living expenses were estimated using expenditure data for the category “Student Housing / National University / Doctoral Program (General Students)” from the 2024 Student Life Survey Results: Graduate Programs (Pilot Survey) published by the Japan Student Services Organization. Multiplying the annual living expenses per student (JPY 1,392,300) by the number of students residing in Okinawa Prefecture (290 students) yields total student living expenditures of approximately JPY 404 million.

Table III-9 Breakdown of Student Living Expenses
(Student Housing / National University / Doctoral Program / General Students)

Unit: JPY per person

Category	Living Expenses	Share
Housing and Utilities (including mortgage-related expenses)	323,500	23.2%
Food	457,000	32.8%
Health and Hygiene	92,800	6.7%
Recreation and Leisure	228,100	16.4%
Other Living Expenses	290,900	20.9%
Total	1,392,300	100.0%

Note: The figures are based on general doctoral students residing in student housing at national universities and exclude working professionals enrolled as students.

Source: Japan Student Services Organization, *2024 Student Life Survey Results: Graduate Programs (Pilot Survey)*.

The living expense categories shown in Table III-9 were mapped to the corresponding industry sectors as shown below.

For each expenditure category, industry-sector expenditure shares were derived from the expenditure structure of single-person households in Okinawa Prefecture. These shares were adjusted so that the subtotal for each category corresponded to the expenditure shares reported in the Student Life Survey.

Table III-10 Allocation of Student Living Expenses
by Category and Industry Sector

Category	Corresponding Industry Sector	Share
Housing and Utilities (including mortgage-related expenses)	Electricity	3.0%
	Gas and heat supply	1.3%
	Water supply	0.8%
	House rent	18.1%
	Subtotal	23.2%
Food	Foods	9.1%
	Beverage	2.4%
	Eating and drinking services	21.3%
	Subtotal	32.8%
Health and Hygiene	Medical service	6.3%
	Health and hygiene	0.4%
	Subtotal	6.7%
Recreation and Leisure	Accommodations	1.6%
	Amusement and recreational services	14.8%
	Subtotal	16.4%
Other Living Expenses	other industry sectors	20.9%
Total		100.0%

Source: Prepared using the Japan Student Services Organization, *2024 Student Life Survey Results: Graduate Programs (Pilot Survey)*, the *2020 Okinawa Prefectural Input-Output Table*, and the *2024 National Survey of Family Income, Consumption and Wealth*.

iii) Student Consumption Expenditures by Place of Residence and Industry Sector

Consumption expenditures by industry sector were estimated by applying the industry-sector expenditure shares to living expenses by place of residence, which were obtained by multiplying the number of students in each place of residence by living expenses per student. The resulting student consumption expenditures by place of residence and industry sector are summarized below.

**Table III-11 Student Consumption Expenditures
by Place of Residence and Industry Sector**

Unit: JPY million

Code	Sector Name	Onna Village	Okinawa Prefecture
011	Crop cultivation	2	2
012	Livestock	0	0
013	Agricultural services	0	0
015	Forestry	0	0
017	Fishery	1	1
061	Coal mining, crude petroleum and natural gas	0	0
062	Miscellaneous mining industry	0	0
111	Foods	34	37
112	Beverage	9	10
113	Feeds and organic fertilizer, n.e.c.	0	0
114	Tobacco	1	1
151	Textile products	0	0
152	Wearing apparel and miscellaneous ready-made textile products	1	2
161	Lumber and wood products	0	0
162	Furniture and fixtures	0	0
163	Pulp, paper, paperboard, coated and glazed paper	0	0
164	Paper products	0	0
191	Printing, plate making and book binding	0	0
201	Chemical fertilizer	0	0
202	Industrial inorganic chemicals	0	0
203	Petrochemical basic products	0	0
204	Organic chemical products (except petrochemical basic products or synthetic resins)	0	0
205	Synthetic resins	0	0
206	Synthetic fibers	0	0
207	Medicines	1	1
208	Final chemical products (except medicaments)	1	1
211	Petroleum refinery products	3	3
212	Coal products	0	0
221	Plastic products	0	0
222	Rubber products	0	0
231	Tanned leather, leather products and fur skins	1	1
251	Glass and glass products	0	0
252	Cement and cement products	0	0
253	Pottery, china and earthenware	0	0
259	Miscellaneous ceramic, stone and clay products	0	0
261	Pig iron and crude steel	0	0
262	Steel products	0	0
263	Cast and forged steel products (iron)	0	0
269	Miscellaneous iron or steel products	0	0
271	Non-ferrous metals	0	0
272	Non-ferrous metal products	0	0
281	Fabricated constructional and architectural metal products	1	1
289	Miscellaneous metal products	0	0
291	General-purpose machinery	0	0
301	Production machinery	0	0
311	Business oriented machinery	0	0
321	Electronic devices	0	0
329	Miscellaneous electronic components	0	0
331	Electrical devices and parts	0	0
332	Household electric appliances	0	0
333	Applied electronic equipment and electric measuring instruments	0	0
339	Miscellaneous electrical machinery	0	0
341	Communication, image and audio equipment	0	0
342	Electronic computing equipment and accessory equipment of electronic computing equipment	0	0
351	Passenger motor cars	5	5
352	Miscellaneous cars	0	0
353	Motor vehicle parts and accessories	2	2
354	Ships and repair of ships	0	0

Code	Sector Name	Onna Village	Okinawa Prefecture
359	Miscellaneous transportation equipment and repair of transportation equipment	0	0
391	Miscellaneous manufacturing products	3	3
392	Reuse and recycling	0	0
411	Building construction	0	0
412	Repair of construction	0	0
413	Public construction	0	0
419	Miscellaneous civil engineering and construction	0	0
461	Electricity	11	12
462	Gas and heat supply	5	5
471	Water supply	3	3
481	Waste management service	0	0
511	Commerce	15	16
531	Finance and insurance	11	12
551	Real estate agencies and rental services	1	1
552	House rent	67	73
553	House rent (imputed house rent)	4	4
571	Railway transport	0	0
572	Road transport (except self-transport)	2	2
573	Self-transport	0	0
574	Water transport	0	0
575	Air transport	1	1
576	Freight forwarding	0	0
577	Storage facility service	0	0
578	Services relating to transport	0	0
579	Postal services and mail delivery	0	0
591	Communications	5	5
592	Broadcasting	0	0
593	Information services	0	0
594	Internet based services	1	2
595	Image information, sound information and character information production	1	1
611	Public administration	1	1
631	Education	0	0
632A	Research (except Research institutes for natural sciences (NPI))	0	0
632B	Research institutes for natural sciences (NPI)	0	0
641	Medical service	23	25
642	Health and hygiene	1	1
643	Social insurance and social welfare	7	8
644	Nursing care	0	0
659	Membership-based associations, n.e.c.	0	0
661	Goods rental and leasing services	0	0
662	Advertising services	0	0
663	Motor vehicle maintenance and machine repair services	1	1
669	Miscellaneous business services	0	0
671	Accommodations	6	7
672	Eating and drinking services	79	86
673	Laundry, beauty and bath service	2	2
674	Amusement and recreational services	55	60
675	Veterinary service	0	0
679	Miscellaneous personal services	1	1
681	Office supplies	0	0
691	Activities not elsewhere classified	0	0
700	Total of intermediate sectors	372	404

iv) Estimation of Local Purchasing Rates for Students Residing in Onna Village

As in the case of executives, faculty members, and staff, students residing in Onna Village are expected to purchase only a limited share of goods and services from businesses located within the village. However, students are generally assumed to have lower rates of car ownership and driver's license possession than executives, faculty members, and staff, resulting in greater physical constraints on their daily activities. Accordingly, the share of consumption occurring within Onna Village was assumed to be 20 percent higher than that of executives, faculty members, and staff, implying a correspondingly lower level of spending outside the village.

(3) Expenditures Associated with Conferences, Seminars, and Other Activities

To estimate the economic impact generated by other activities, visitor expenditures associated with events held at OIST were estimated based on the number of visitors participating in various activities.

1) OIST Visitors by Origin and Visitor Type

The number of OIST visitors by place of origin and visitor type is shown below.⁸

Table III-12 Number of OIST Visitors by Origin and Visitor Type (FY2025)

Unit: persons

Origin	Elementary School Students	Junior High School Students	High School Students	General Visitors	Other Visitors	Total
Okinawa Prefecture	1,268	488	963	49,309	6,718	58,746
Outside Okinawa Prefecture	297	596	1,751	467	37	3,148
Overseas	70	0	116	9	0	195
Total	1,635	1,084	2,830	49,785	6,755	62,089

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation.

2) Estimation of Visitor Expenditures

i) Expenditures Associated with Visits by Elementary, Junior High, and High School Students

a. Visitors from Okinawa Prefecture

Because most visits by elementary, junior high, and high school students within Okinawa Prefecture are assumed to use chartered buses and because the range of goods and services available within Onna Village is relatively limited, per-capita expenditures by expenditure item were assumed as shown below for Onna Village and Okinawa Prefecture as a whole.

⁸ Visitors to the OIST Science Studio located in Yomitan Village were excluded from the analysis.

Table III-13 Per-Capita Expenditures by Spending Location and Industry Sector Associated with Visits by Elementary, Junior High, and High School Students from Okinawa Prefecture

Unit: JPY per visitor

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Transportation, including chartered buses	Road transport	0	3,000	3,000
Food and beverage services	Eating and drinking services	200	800	1,000
Souvenirs and shopping: food products	Foods	100	400	500
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	100	400	500
Other expenditures, including insurance	Finance and insurance	0	500	500
Total	-	400	5,100	5,500

Using the assumed per-capita expenditures and the number of elementary, junior high, and high school students visiting OIST from within Okinawa Prefecture (2,719 students), total visitor expenditures were estimated as follows.

Table III-14 Expenditures by Spending Location and Industry Sector Associated with Visits by Elementary, Junior High, and High School Students from Okinawa Prefecture

Unit: JPY million

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Transportation, including chartered buses	Road transport	0.0	8.2	8.2
Food and beverage services	Eating and drinking services	0.5	2.2	2.7
Souvenirs and shopping: food products	Foods	0.3	1.1	1.4
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	0.3	1.1	1.4
Other expenditures, including insurance	Finance and insurance	0.0	1.4	1.4
Total	-	1.1	13.9	15.0

b. Visitors from Outside Okinawa Prefecture and Overseas

Visits to OIST by elementary, junior high, and high school students from outside Okinawa Prefecture and from overseas are assumed to involve air travel and overnight stays. Accordingly, per-capita expenditures were assumed as shown below.

Table III-15 Per-Capita Expenditures by Spending Location and Industry Sector Associated with Visits by Elementary, Junior High, and High School Students from Outside Okinawa Prefecture and Overseas

Unit: JPY per visitor

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Air and long-distance transportation	Air transport	0	200	200
Accommodation	Accommodations	0	12,000	12,000
Transportation, including chartered buses	Road transport	0	5,000	5,000
Food and beverage services	Eating and drinking services	1,000	4,000	5,000

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Souvenirs and shopping: food products	Foods	600	2,400	3,000
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	600	2,400	3,000
Other expenditures, including insurance	Finance and insurance	0	2,000	2,000
Total	-	2,200	28,000	30,200

Using the assumed per-capita expenditures and the number of elementary, junior high, and high school students visiting OIST from outside Okinawa Prefecture and overseas (2,830 students), total expenditures were estimated as follows.

Table III-16 Expenditures by Spending Location and Industry Sector Associated with Visits by Elementary, Junior High, and High School Students from Outside Okinawa Prefecture and Overseas

Unit: JPY million

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Air and long-distance transportation	Air transport	0.0	0.6	0.6
Accommodation	Accommodations	0.0	34.0	34.0
Transportation, including chartered buses	Road transport	0.0	14.2	14.2
Food and beverage services	Eating and drinking services	2.8	11.3	14.2
Souvenirs and shopping: food products	Foods	1.7	6.8	8.5
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	1.7	6.8	8.5
Other expenditures, including insurance	Finance and insurance	0.0	5.7	5.7
Total	-	6.2	79.2	85.5

c. Accompanying Teachers and Supervisors

Visits by schools are assumed to involve accompanying teachers and supervisors. Accordingly, it was assumed that one accompanying teacher or supervisor attends for every 20 students, and the number of accompanying personnel was estimated as shown below.⁹

Table III-17 Number of Accompanying Teachers and Supervisors by Place of Origin

Unit: persons

Origin	Elementary School	Junior High School	High School	Total
Okinawa Prefecture	63	24	48	135
Outside Okinawa Prefecture	15	30	88	133
Overseas	4	0	6	10
Total	82	54	142	278

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation.

⁹ The number of accompanying teachers and supervisors was estimated assuming one accompanying person for every 20 visiting students, based on information provided by the Outreach and Community Relations Team at OIST.

In estimating expenditures by accompanying teachers and supervisors, expenditure patterns were assumed to be the same as those applied to general and other visitors described in the following section.

ii) Expenditures Associated with General and Other Visitors

a. Number of General and Other Visitors

To estimate expenditures by accompanying teachers and supervisors using the same per-capita expenditure assumptions applied to general and other visitors, the number of accompanying teachers and supervisors was added to the number of general and other visitors. Expenditures generated by general and other visitors were then estimated by multiplying the resulting number of visitors by the corresponding per-capita expenditure.

Table III-18 Number of OIST Visitors by Origin and Visitor Type (FY2025)

Unit: persons

Origin	General Visitors	Other Visitors	Accompanying Teachers and Supervisors	Total
Okinawa Prefecture	49,309	6,718	135	56,162
Outside Okinawa Prefecture	467	37	133	637
Overseas	9	0	10	19
Total	49,785	6,755	278	56,818

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation.

b. Assumptions Regarding Per-Capita Expenditures

Expenditures by general and other visitors were estimated using tourism expenditure profiles corresponding to their place of origin. Visitors from within Okinawa Prefecture were assumed to be day-trippers, while visitors from outside Okinawa Prefecture were assumed to be overnight visitors. International visitors were assumed to generate expenditures consistent with inbound tourism spending patterns. For visitors from outside Okinawa Prefecture and overseas, expenditures were allocated on the basis of one night's stay, taking into account that their visits to OIST would likely be combined with visits to other destinations in Okinawa. Average lengths of stay were assumed to be 3.07 nights for domestic visitors from outside Okinawa Prefecture and 4.06 nights for international visitors.

**Table III-19 Tourism Expenditures per Visitor per Night
by Expenditure Category**

Unit: JPY per visitor-night

Expenditure Item	Industry Sector	Day-Trip Visitors	Domestic Visitors from Outside Okinawa	International Visitors
Air and long-distance transportation	Air transport	-	65	197
Accommodation	Accommodations	-	12,465	8,334
Local transportation	Road transport / Petroleum refinery products	6,699	4,081	3,379
Souvenirs and shopping: food products	Foods	2,019	3,246	3,267
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	2,019	3,246	3,267
Food and beverages	Eating and drinking services	2,931	7,106	6,349
Recreation and admission fees	Amusement and recreational services	2,541	3,423	1,290

Expenditure Item	Industry Sector	Day-Trip Visitors	Domestic Visitors from Outside Okinawa	International Visitors
Other expenditures	Finance and insurance	780	465	32
Total	-	16,988	34,097	26,114

Notes:

1. International visitors include only those arriving in Okinawa by air.
2. Expenditures associated with air transportation for domestic and international visitors were estimated using passenger facility charges at Naha Airport.
3. Expenditures on souvenirs and shopping were assumed to be evenly divided between Food Products and Other Manufactured Products.

Sources: Prepared using *Tourism Revenue in Okinawa Prefecture, FY2025*¹⁰; Japan Tourism Agency, *Travel and Tourism Consumption Trend Survey, 2025 (Final Report)*.

c. Visitors from Okinawa Prefecture

Total expenditures associated with visitors from within Okinawa Prefecture were estimated by multiplying the assumed per-capita expenditures by the number of general visitors, other visitors, and accompanying teachers and supervisors from Okinawa Prefecture (56,162 visitors).

Table III-20 Expenditures Associated with Visits from Okinawa Prefecture

Unit: JPY million

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Air and long-distance transportation	Air transport	0	0	0
Accommodation	Accommodations	0	0	0
Local transportation	Petroleum refinery products	0	376	376
Souvenirs and shopping: food products	Foods	45	68	113
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	45	68	113
Food and beverages	Eating and drinking services	66	99	165
Recreation and admission fees	Amusement and recreational services	0	143	143
Other expenditures	Finance and insurance	0	44	44
Total	-	157	798	954

d. Visitors from Outside Okinawa Prefecture

Total expenditures associated with visitors from outside Okinawa Prefecture were estimated by multiplying the assumed per-capita expenditures by the number of general visitors, other visitors, and accompanying teachers and supervisors from outside Okinawa Prefecture (637 visitors).

Table III-21 Expenditures Associated with Visits from Outside Okinawa Prefecture

Unit: JPY million

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Air and long-distance transportation	Air transport	0.0	0.0	0.0

¹⁰ https://www.pref.okinawa.jp/_res/projects/default_project/_page_/001/011/845/r7nenndo_2.pdf

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Accommodation	Accommodations	0.0	7.9	7.9
Local transportation	Road transport	0.0	2.6	2.6
Souvenirs and shopping: food products	Foods	0.8	1.2	2.1
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	0.8	1.2	2.1
Food and beverages	Eating and drinking services	1.8	2.7	4.5
Recreation and admission fees	Amusement and recreational services	0.0	2.2	2.2
Other expenditures	Finance and insurance	0.0	0.3	0.3
Total	-	3.5	18.3	21.7

e. International Visitors

Total expenditures associated with international visitors were estimated by multiplying the assumed per-capita expenditures by the number of general visitors, other visitors, and accompanying teachers and supervisors from overseas (19 visitors).

Table III-22 Expenditures Associated with International Visitors

Unit: JPY million

Expenditure Item	Industry Sector	Onna Village	Okinawa Prefecture, Excluding Onna Village	Total
Air and long-distance transportation	Air transport	0.0	0.0	0.0
Accommodation	Accommodations	0.0	0.2	0.2
Local transportation	Road transport	0.0	0.1	0.1
Souvenirs and shopping: food products	Foods	0.0	0.0	0.1
Souvenirs and shopping: other goods	Miscellaneous manufacturing products	0.0	0.0	0.1
Food and beverages	Eating and drinking services	0.0	0.1	0.1
Recreation and admission fees	Amusement and recreational services	0.0	0.0	0.0
Other expenditures	Finance and insurance	0.0	0.0	0.0
Total	-	0.1	0.4	0.5

(4) Facility Development Expenditures

Based on information provided by OIST, cumulative expenditures associated with facility development were treated as direct effects in the estimation of economic impact. Facility development expenditures incurred between FY2005 and FY2025 are shown below. The cumulative amount of facility development expenditures during this period was JPY 76,349 million. When converted into constant 2020 prices using the applicable deflators, the cumulative amount was estimated at JPY 81,804 million.

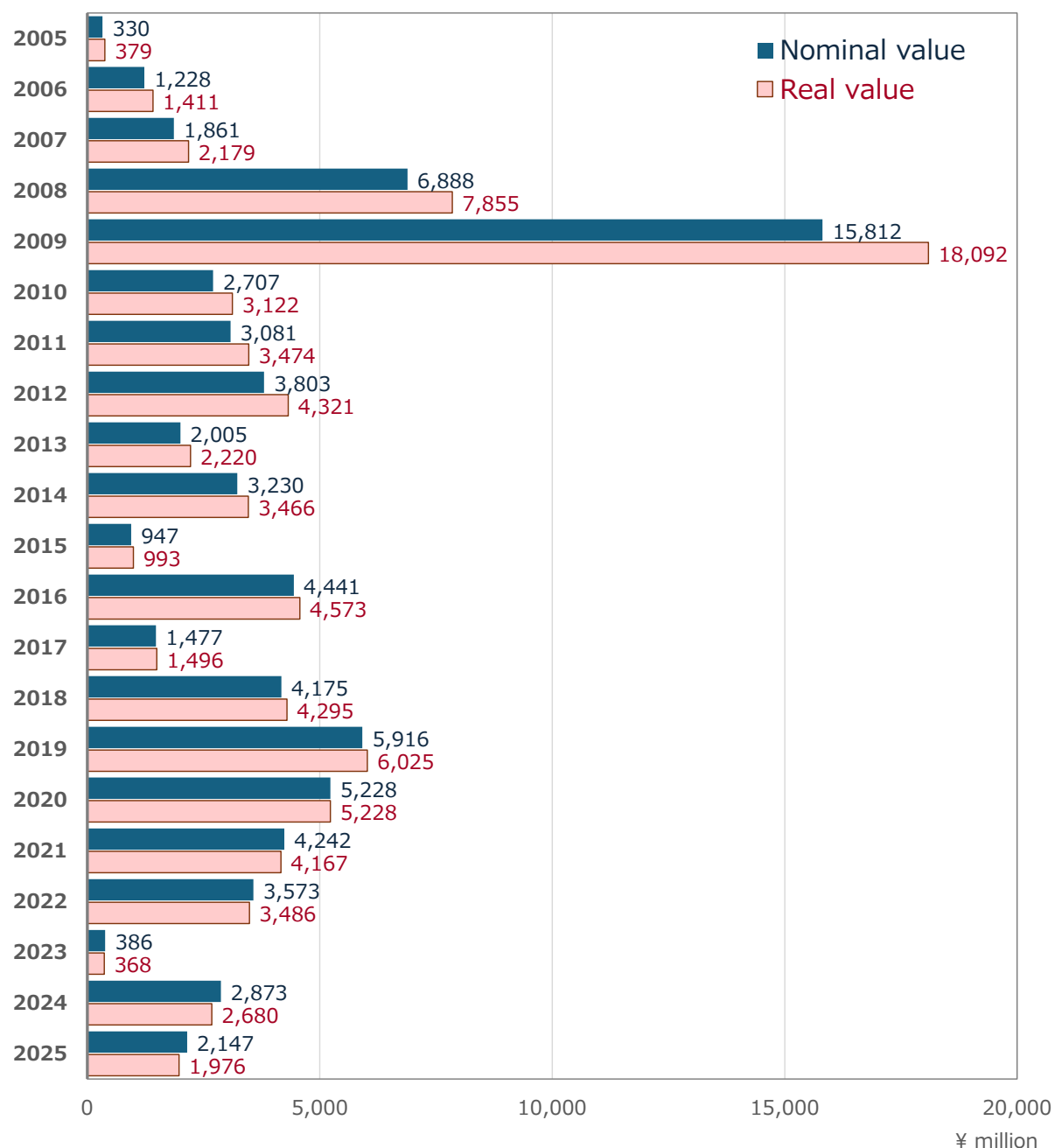


Figure III-3 Trends in Facility Development Expenditures at OIST

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation and industry-specific deflators from the *System of National Accounts (2020 benchmark, 2008 SNA)* published by the Economic and Social Research Institute, Cabinet Office.

(5) Assumptions for Future Faculty Expansion

Future scenarios were developed assuming that the number of faculty members increases from 94 as of 1 April 2026 to 120, 150, 200, and 300. The assumptions applied to each scenario are summarized below.

Table III-23 Assumptions for Faculty Expansion Scenarios

Item	Assumption
Executive Compensation	Assumed to remain unchanged from the level as of 1 April 2026.
Faculty Compensation	Compensation per faculty member was assumed to remain unchanged. Total faculty compensation was assumed to increase in proportion to the increase in the number of faculty members.
Staff Compensation	The total number of faculty and staff as of 1 April 2026 was 1,099, of which 94 were faculty members and 1,005 were staff members. Staff were divided into administrative/support staff and other staff. The number of administrative/support staff per faculty member was assumed to gradually decline from 4.9 as of 1 April 2026 to 4.15, the same level as ISTA ¹¹ , when the number of faculty members reaches 300. As a result, the number of administrative/support staff was assumed to increase gradually from 461 to 1,245, while the number of other staff was assumed to increase in proportion to the increase in faculty numbers, from 544 to 1,737. Compensation per staff member was assumed to remain unchanged from the level as of 1 April 2026.
Student Enrollment	Assumed to increase in proportion to the increase in the number of faculty members.
Other Activities	Activities associated with visitor numbers, such as conferences and seminars, were assumed to increase in proportion to the increase in the number of faculty members.
Facility Development Expenditures	Research Buildings: Based on one research building for every 20 faculty members and the cost of the recently completed Research Building No. 5 (JPY 13.62 billion), facility development expenditure was estimated at JPY 681 million per additional faculty member. Residential Buildings: Facility development expenditure per faculty member was derived for residential buildings occupied by faculty members and students and multiplied by the increase in the number of faculty members.

Table III-24 Additional Facility Development Expenditures by Faculty Scenario

Unit: JPY million			
Number of Faculty Members	Research Buildings	Residential Buildings	Total
120	17,706	2,360	20,066
150	38,136	5,084	43,220
200	72,186	9,624	81,810
300	140,286	18,702	158,988

Source: Prepared using data provided by the Okinawa Institute of Science and Technology School Corporation.

¹¹ The 4th Meeting of the Review Committee on the Future Direction of the Okinawa Institute of Science and Technology School Corporation, Material 2-1, p. 8.

3. Summary of Final Demand

Based on the assumptions described above, final demand was estimated for the situation as of 1 April 2026 and for each faculty expansion scenario. Facility development required to accommodate faculty expansion was assumed to require five years before becoming operational. Accordingly, facility development expenditures are presented as annual amounts obtained by allocating total facility development costs evenly over a five-year period.

Table III-25 Final Demand as of 1 April 2026 and Under Faculty Expansion Scenarios

As of 1 April 2026 (94 Faculty Members)

Unit: JPY million

Region	Operations + Facility Development					
		Operations Total				Facility Dev. (2021–25 Avg.)
			Education & Research	Faculty, Staff & Student Spending	Other Activities	
Japan	22,687	20,043	11,771	7,195	1,077	2,644
Okinawa	22,650	20,006	11,771	7,158	1,077	2,644
Onna	15,298	12,654	11,771	716	167	2,644

120 Faculty Members

Unit: JPY million

Region	Operations + Facility Development					
		Operations Total				Facility Dev. (2021–25 Avg.)
			Education & Research	Faculty, Staff & Student Spending	Other Activities	
Japan	29,512	25,498	15,027	9,097	1,375	4,013
Okinawa	29,465	25,451	15,027	9,050	1,375	4,013
Onna	20,159	16,146	15,027	905	214	4,013

150 Faculty Members

Unit: JPY million

Region	Operations + Facility Development					
		Operations Total				Facility Dev. (2021–25 Avg.)
			Education & Research	Faculty, Staff & Student Spending	Other Activities	
Japan	40,399	31,755	18,784	11,253	1,718	8,644
Okinawa	40,341	31,697	18,784	11,195	1,718	8,644
Onna	28,814	20,170	18,784	1,119	267	8,644

200 Faculty Members

Unit: JPY million

Region	Operations + Facility Development					
		Operations Total				Facility Dev. (2021–25 Avg.)
			Education & Research	Faculty, Staff & Student Spending	Other Activities	
Japan	58,456	42,094	25,045	14,758	2,291	16,362
Okinawa	58,380	42,018	25,045	14,682	2,291	16,362
Onna	43,231	26,869	25,045	1,468	356	16,362

300 Faculty Members

Unit: JPY million

Region	Operations + Facility Development					
		Operations Total				Facility Dev. (2021–25 Avg.)
			Education & Research	Faculty, Staff & Student Spending	Other Activities	
Japan	94,236	62,438	37,567	21,434	3,437	31,798
Okinawa	94,125	62,328	37,567	21,324	3,437	31,798
Onna	72,031	40,233	37,567	2,132	534	31,798

IV. Estimated Economic Impact

1. Overall Economic Impact of Operations

(1) Economic Impact of OIST Operations

The economic impact generated by education and research activities, spending by faculty, staff, and students, and other activities, including conferences and seminars, in FY2025 is shown in the table below.

For Japan as a whole, induced production value was estimated at JPY 39,527 million, induced gross value added at JPY 22,137 million, and employment effects at 4,811 jobs. For Okinawa Prefecture, induced production value was estimated at JPY 22,382 million, induced gross value added at JPY 13,060 million, and employment effects at 2,687 jobs.

Table IV-1 Economic Impact of OIST Operations (FY2025)

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
	A	Total	Direct Effects	Indirect Effects	Induced Effects		
		B	b0	b1	b2	C=B/A	G=B/b0
Japan	20,043	39,527	18,878	12,128	8,521	2.0	2.1
Okinawa	20,006	22,382	13,982	4,710	3,689	1.1	1.6
Onna	12,654	5,984	4,855	540	589	0.5	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	22,137	21,656	10,956	3,777	5,073	1,971	-120	4,811
Okinawa	13,060	12,712	6,861	2,465	1,846	1,629	-89	2,687
Onna	4,107	3,701	2,091	1,610				1,015

Note: Current subsidies are shown as negative values throughout this section.

(2) Economic Impact of Education and Research Activities

For expenditures associated with education and research activities, final demand was estimated at JPY 11,771 million. The resulting economic impact is shown in the table below.

For Japan, induced production value was estimated at JPY 23,685 million, induced gross value added at JPY 13,398 million, and employment effects at 2,849 jobs.

For Okinawa Prefecture, induced production value was estimated at JPY 12,723 million, induced gross value added at JPY 7,601 million, and employment effects at 1,582 jobs.

Table IV-2 Economic Impact of Education and Research Activities (FY2025)

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	11,771	23,685	11,096	7,076	5,512	2.0	2.1
Okinawa	11,771	12,723	8,095	2,409	2,219	1.1	1.6
Onna	11,771	5,468	4,395	497	575	0.5	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	13,398	13,113	7,088	2,027	2,900	1,161	-63	2,849
Okinawa	7,601	7,385	4,127	1,339	905	1,065	-50	1,582
Onna	3,727	3,576	2,045	1,531				976

(3) Economic Impact of Spending by Faculty, Staff, and Students

For spending by faculty, staff, and students, final demand was estimated at JPY 7,195 million. The resulting economic impact is shown in the table below.

For Japan, induced production value was estimated at JPY 13,941 million, induced gross value added at JPY 7,734 million, and employment effects at 1,697 jobs.

For Okinawa Prefecture, induced production value was estimated at JPY 8,746 million, induced gross value added at JPY 4,980 million, and employment effects at 962 jobs.

Table IV-3 Economic Impact Generated by Spending by Faculty, Staff, and Students (FY2025)

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	7,195	13,941	6,802	4,491	2,647	1.9	2.0
Okinawa	7,158	8,746	5,347	2,076	1,322	1.2	1.6
Onna	716	421	379	30	11	0.6	1.1

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	7,734	7,559	3,404	1,581	1,970	654	-51	1,697
Okinawa	4,980	4,865	2,459	1,058	884	501	-36	962
Onna	330	103	38	65				17

(4) Economic Impact of Conferences, Seminars, and Other Activities

For other activities, including conferences, seminars, and related events, final demand was estimated at JPY 1,077 million. The resulting economic impact is shown in the table below.

For Japan, induced production value was estimated at JPY 1,902 million, induced gross value added at JPY 1,005 million, and employment effects at 266 jobs.

For Okinawa Prefecture, induced production value was estimated at JPY 913 million, induced gross value added at JPY 479 million, and employment effects at 143 jobs.

**Table IV-4 Economic Impact of Conferences, Seminars, and Other Activities
(FY2025)**

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	1,077	1,902	980	561	361	1.8	1.9
Okinawa	1,077	913	540	225	148	0.8	1.7
Onna	167	96	80	13	2	0.6	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	1,005	985	464	168	203	157	-6	266
Okinawa	479	461	275	68	57	64	-3	143
Onna	50	23	8	14				22

2. Economic Impact of Facility Development

(1) Cumulative Impact Since the Beginning of Facility Development

The economic impact associated with facility development between FY2005 and FY2025, based on expenditures expressed in constant 2020 prices (JPY 81,804 million), is shown in the table below.

For Japan, induced production value was estimated at JPY 202,809 million, induced gross value added at JPY 97,957 million, and employment effects at 17,214 jobs.

For Okinawa Prefecture, induced production value was estimated at JPY 130,787 million, induced gross value added at JPY 60,590 million, and employment effects at 12,631 jobs.

The economic impact for facility development was estimated separately for each fiscal year and subsequently converted into constant 2020 prices using the applicable deflators before being accumulated over the entire period.¹²

**Table IV-5 Cumulative Economic Impact of Facility Development
(FY2005-FY2025)**

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	81,804	202,809	81,804	73,969	47,036	2.5	2.5
Okinawa	81,804	130,787	81,804	28,539	20,444	1.6	1.6
Onna	81,804	44,851	34,211	6,166	4,474	0.5	1.3

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	97,957	94,683	55,975	15,022	15,624	8,372	-310	17,214
Okinawa	60,590	61,804	36,298	10,802	7,663	7,200	-159	12,631
Onna	24,133	22,339	14,631	7,708				1,838

¹² Sector-specific deflators published in the *System of National Accounts* were used in converting nominal values into constant 2020 prices.

(2) Average Annual Impact Over the Most Recent Five Fiscal Years

To facilitate comparison with the economic impact generated by OIST's operational activities, the impacts of operations and facility development were both compiled on a nominal-value basis. For facility development, the average annual economic impact during FY2021–FY2025 was used.

For Japan, induced production value was estimated at JPY 6,263 million, induced gross value added at JPY 3,183 million, and employment effects at 662 jobs.

For Okinawa Prefecture, induced production value was estimated at JPY 4,229 million, induced gross value added at JPY 1,829 million, and employment effects at 365 jobs.

Table IV-6 Economic Impact of Facility Development (Average FY2021–FY2025)

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	2,644	6,263	2,644	2,211	1,408	2.4	2.4
Okinawa	2,644	4,229	2,644	1,030	554	1.6	1.6
Onna	2,644	930	749	87	94	0.4	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	3,183	3,108	1,751	532	542	291	-8	662
Okinawa	1,829	1,752	1,002	266	238	250	-4	365
Onna	526	493	336	157				48

3. Combined Impact of Operations and Facility Development

(1) Total Economic Impact

The combined economic impact of OIST's operational activities and facility development is shown in the table below. For Japan, induced production value was estimated at JPY 45,790 million, induced gross value added at JPY 25,320 million, and employment effects at 5,473 jobs. For Okinawa Prefecture, induced production value was estimated at JPY 26,611 million, induced gross value added at JPY 14,889 million, and employment effects at 3,052 jobs.

Table IV-7 Combined Economic Impact of Operations and Facility Development

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	22,687	45,790	21,522	14,339	9,928	2.0	2.1
Okinawa	22,650	26,611	16,626	5,741	4,244	1.2	1.6
Onna	15,298	6,914	5,603	627	684	0.5	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	25,320	24,764	12,707	4,308	5,615	2,263	-128	5,473
Okinawa	14,889	14,464	7,863	2,731	2,084	1,879	-93	3,052
Onna	4,632	4,194	2,427	1,767				1,062

(2) Tax Revenue Effects

Tax revenues generated from compensation of employees, operating surplus, and other value-added components induced by the economic activities described above were estimated. These tax revenues include personal income tax, corporate income tax, corporate resident tax, individual resident tax, and other relevant taxes. Tax revenue effects were estimated at JPY 1,381 million for national taxes, JPY 342 million for Okinawa prefectural taxes, and JPY 53 million for Onna Village taxes.

Table IV-8 Tax Revenue Effects of Operations and Facility Development

Unit: JPY million

	Operations + Facility Development					
	Total	Operations				Facility Development (FY2021–2025 Avg.)
		Total	Education & Research	Faculty, Staff & Student Spending	Other Activities	
National Taxes	1,381	1,198	725	422	52	183
Okinawa Prefectural Taxes	342	298	186	100	12	44
Onna Village Taxes	53	47	45	1	0	7

4. Economic Impact Under Faculty Expansion Scenarios

Note: Unless otherwise stated, monetary values are expressed in JPY million and employment effects are expressed as the number of jobs induced. Facility development expenditures were assumed to require five years before becoming operational. Accordingly, facility development costs were annualized by dividing the total amount by five.

(1) Faculty Expansion Scenario: 120 Faculty Members

Table IV-9 Combined Economic Impact and Tax Revenue Effects Under the Faculty Expansion Scenario of 120 Faculty Members

Operations + Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-equivalent Value added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	29,512	59,688	28,029	18,751	12,908	2.0	2.1	32,951	32,226	16,597	5,600	7,256	2,938	-164	7,084	1,800
Okinawa	29,465	34,856	21,797	7,550	5,509	1.2	1.6	19,367	18,808	10,245	3,528	2,701	2,453	-119	3,949	446
Onna	20,159	9,046	7,329	822	895	0.4	1.2	6,037	5,472	3,179	2,293				1,365	70

Operations Total

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-equivalent Value added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	25,498	50,288	24,016	15,428	10,845	2.0	2.1	28,165	27,553	13,944	4,802	6,452	2,508	-153	6,121	1,524
Okinawa	25,451	28,466	17,784	5,988	4,693	1.1	1.6	16,611	16,168	8,729	3,133	2,346	2,074	-114	3,418	379
Onna	16,146	7,634	6,193	689	752	0.5	1.2	5,238	4,724	2,669	2,055				1,295	59

Education & Research

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-equivalent Value added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	15,027	30,236	14,165	9,034	7,037	2.0	2.1	17,104	16,740	9,049	2,588	3,702	1,482	-80	3,637	925
Okinawa	15,027	16,242	10,334	3,075	2,833	1.1	1.6	9,703	9,428	5,268	1,709	1,156	1,359	-64	2,019	237
Onna	15,027	6,980	5,611	634	735	0.5	1.2	4,758	4,565	2,610	1,955				1,246	58

Faculty, Staff & Student Spending

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-equivalent Value added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0	Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies			
Japan	9,097	17,625	8,600	5,678	3,347	1.9	2.0	9,778	9,556	4,304	1,999	2,491	827	-64	2,145	533
Okinawa	9,050	11,058	6,761	2,625	1,672	1.2	1.6	6,296	6,151	3,109	1,337	1,117	633	-45	1,217	127
Onna	905	532	479	38	14	0.6	1.1	417	130	48	82				22	1

Other Activities

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-equivalent Value added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	1,375	2,427	1,251	716	460	1.8	1.9	1,284	1,257	592	215	259	200	-8	339	66
Okinawa	1,375	1,166	689	288	189	0.8	1.7	611	589	352	87	73	81	-4	182	15
Onna	214	122	102	17	3	0.6	1.2	63	29	11	18				28	0

Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-equivalent Value added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	4,013	9,399	4,013	3,323	2,063	2.3	2.3	4,786	4,673	2,653	798	804	429	-11	963	276
Okinawa	4,013	6,391	4,013	1,562	816	1.6	1.6	2,757	2,640	1,517	395	355	379	-6	531	67
Onna	4,013	1,412	1,136	132	144	0.4	1.2	798	748	510	238				69	11

(2) Faculty Expansion Scenario: 150 Faculty Members

Table IV-10 Combined Economic Impact and Tax Revenue Effects Under the Faculty Expansion Scenario of 150 Faculty Members

Operations + Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects	
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies			
						A	B	b0									b1
Japan		40,399	82,878	38,553	26,370	17,956	2.1	2.1	45,389	44,383	23,088	7,695	9,765	4,049	-214	9,698	2,492
	Okinawa	40,341	49,204	30,787	10,815	7,602	1.2	1.6	26,620	25,817	14,138	4,749	3,683	3,401	-153	5,401	616
	Onna	28,814	12,577	10,182	1,147	1,249	0.4	1.2	8,262	7,515	4,434	3,081				1,768	97

Operations Total

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	31,755	62,633	29,909	19,212	13,513	2.0	2.1	35,080	34,318	17,375	5,976	8,032	3,125	-190	7,624	1,898
Okinawa	31,697	35,440	22,143	7,452	5,845	1.1	1.6	20,682	20,130	10,871	3,899	2,918	2,584	-141	4,257	472
Onna	20,170	9,536	7,735	861	940	0.5	1.2	6,542	5,903	3,336	2,568				1,619	74

Education & Research

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	18,784	37,795	17,706	11,292	8,796	2.0	2.1	21,379	20,925	11,311	3,235	4,628	1,852	-100	4,546	1,156
Okinawa	18,784	20,303	12,918	3,844	3,541	1.1	1.6	12,129	11,785	6,585	2,137	1,445	1,699	-80	2,524	297
Onna	18,784	8,725	7,014	793	918	0.5	1.2	5,947	5,706	3,263	2,444				1,557	72

Faculty, Staff & Student Spending

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	11,253	21,804	10,638	7,025	4,141	1.9	2.0	12,096	11,822	5,324	2,473	3,081	1,023	-80	2,654	659
Okinawa	11,195	13,680	8,364	3,248	2,068	1.2	1.6	7,789	7,609	3,846	1,654	1,382	783	-56	1,505	157
Onna	1,119	658	593	47	18	0.6	1.1	515	161	60	101				27	2

Other Activities

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects	
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies			
	A	B	b0	b1	b2	C=B/A	G=B/b0										
Japan		1,718	3,034	1,564	895	575	1.8	1.9	1,605	1,571	740	268	323	250	-10	424	82
	Okinawa	1,718	1,457	861	360	236	0.8	1.7	764	736	439	109	91	102	-5	227	18
	Onna	267	153	128	21	4	0.6	1.2	79	36	13	23				35	0

Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects	
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies			
	A	B	b0	b1	b2	C=B/A	G=B/b0										
Japan	8,644	20,245	8,644	7,158	4,443	2.3	2.3	10,309	10,065	5,713	1,719	1,732	924	-23	2,074	594	
	Okinawa	8,644	13,764	8,644	3,364	1,757	1.6	1.6	5,938	5,687	3,267	850	765	817	-12	1,144	143
	Onna	8,644	3,042	2,447	285	309	0.4	1.2	1,720	1,612	1,098	513				149	23

(3) Faculty Expansion Scenario: 200 Faculty Members

Table IV-11 Combined Economic Impact and Tax Revenue Effects Under the Faculty Expansion Scenario of 200 Faculty Members

Operations + Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	58,456	121,356	56,008	39,012	26,337	2.1	2.2	66,022	64,551	33,865	11,167	13,922	5,894	-296	14,034	3,641
Okinawa	58,380	73,011	45,704	16,233	11,074	1.3	1.6	38,645	37,439	20,595	6,771	5,308	4,975	-210	7,808	898
Onna	43,231	18,457	14,932	1,687	1,838	0.4	1.2	11,966	10,918	6,525	4,393				2,440	142

Operations Total

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	42,094	83,035	39,646	25,463	17,926	2.0	2.1	46,509	45,499	23,050	7,914	10,643	4,144	-252	10,108	2,516
Okinawa	42,018	46,956	29,342	9,865	7,749	1.1	1.6	27,406	26,674	14,411	5,163	3,860	3,428	-187	5,644	626
Onna	26,869	12,700	10,300	1,147	1,253	0.5	1.2	8,711	7,868	4,446	3,421				2,158	99

Education & Research

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	25,045	50,393	23,608	15,056	11,729	2.0	2.1	28,506	27,900	15,081	4,313	6,170	2,469	-134	6,061	1,542
Okinawa	25,045	27,070	17,224	5,125	4,721	1.1	1.6	16,172	15,714	8,781	2,849	1,926	2,265	-107	3,365	396
Onna	25,045	11,633	9,352	1,057	1,224	0.5	1.2	7,930	7,609	4,350	3,258				2,076	96

Faculty, Staff & Student Spending

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	14,758	28,596	13,952	9,214	5,431	1.9	2.0	15,864	15,504	6,983	3,243	4,041	1,342	-104	3,481	865
Okinawa	14,682	17,943	10,970	4,261	2,712	1.2	1.6	10,215	9,979	5,044	2,169	1,812	1,028	-74	1,975	206
Onna	1,468	863	777	62	23	0.6	1.1	676	211	78	133				36	2

Other Activities

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
		A	B	b0	b1	b2	C=B/A	G=B/b0								
Japan	2,291	4,046	2,085	1,193	767	1.8	1.9	2,139	2,095	987	358	431	333	-14	566	110
Okinawa	2,291	1,943	1,148	480	315	0.8	1.7	1,019	981	586	145	121	135	-6	303	25
Onna	356	204	170	28	5	0.6	1.2	106	48	18	30				46	0

Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	16,362	38,321	16,362	13,549	8,410	2.3	2.3	19,513	19,052	10,814	3,254	3,279	1,750	-44	3,926	1,125
Okinawa	16,362	26,054	16,362	6,367	3,325	1.6	1.6	11,239	10,764	6,184	1,609	1,448	1,546	-23	2,165	271
Onna	16,362	5,757	4,632	540	585	0.4	1.2	3,255	3,050	2,079	971				282	43

(4) Faculty Expansion Scenario: 300 Faculty Members

Table IV-12 Combined Economic Impact and Tax Revenue Effects Under the Faculty Expansion Scenario of 300 Faculty Members

Operations + Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	94,236	197,668	90,602	64,089	42,976	2.1	2.2	106,930	104,537	55,260	18,038	22,144	9,553	-459	22,628	5,919
Okinawa	94,125	120,219	75,291	26,972	17,957	1.3	1.6	62,466	60,456	33,395	10,767	8,518	8,099	-322	12,580	1,457
Onna	72,031	30,196	24,414	2,767	3,015	0.4	1.2	19,359	17,720	10,706	7,014				3,784	232

Operations Total

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	62,438	123,195	58,804	37,759	26,632	2.0	2.1	69,008	67,511	34,244	11,715	15,772	6,153	-373	14,998	3,733
Okinawa	62,328	69,586	43,493	14,598	11,495	1.1	1.6	40,624	39,537	21,377	7,640	5,703	5,094	-277	8,373	930
Onna	40,233	19,007	15,411	1,718	1,878	0.5	1.2	13,034	11,791	6,666	5,126				3,235	148

Education & Research

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects	
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies			
	A	B	b0	b1	b2	C=B/A	G=B/b0										
Japan		37,567	75,589	35,413	22,584	17,593	2.0	2.1	42,759	41,850	22,622	6,470	9,256	3,704	-201	9,092	2,312
	Okinawa	37,567	40,606	25,836	7,688	7,082	1.1	1.6	24,258	23,571	13,171	4,273	2,890	3,398	-161	5,048	594
	Onna	37,567	17,450	14,028	1,585	1,836	0.5	1.2	11,895	11,413	6,525	4,888				3,114	145

Faculty, Staff & Student Spending

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	21,434	41,537	20,264	13,385	7,888	1.9	2.0	23,040	22,518	10,142	4,709	5,869	1,949	-151	5,058	1,256
Okinawa	21,324	26,066	15,935	6,191	3,940	1.2	1.6	14,837	14,494	7,328	3,149	2,631	1,493	-107	2,870	299
Onna	2,132	1,252	1,128	90	34	0.6	1.1	980	307	114	193				52	3

Other Activities

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	3,437	6,069	3,128	1,790	1,151	1.8	1.9	3,209	3,142	1,480	537	647	500	-21	848	165
Okinawa	3,437	2,915	1,723	719	473	0.8	1.7	1,529	1,472	879	218	182	203	-10	455	37
Onna	534	306	256	42	8	0.6	1.2	159	72	27	45				69	1

Facility Development

Region	Final Demand	Induced Production Value				Output Multiplier	Local Multiplier	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects	Tax Revenue Effects
		Total	Direct Effects	Indirect Effects	Induced Effects				Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies		
	A	B	b0	b1	b2	C=B/A	G=B/b0									
Japan	31,798	74,473	31,798	26,330	16,344	2.3	2.3	37,922	37,026	21,016	6,323	6,372	3,400	-86	7,630	2,186
Okinawa	31,798	50,634	31,798	12,374	6,462	1.6	1.6	21,842	20,919	12,017	3,126	2,815	3,005	-44	4,207	527
Onna	31,798	11,188	9,002	1,049	1,137	0.4	1.2	6,325	5,928	4,040	1,888				548	83

5. Comparison with Gross Regional Product

GRP-equivalent value added estimated in this study was compared with gross regional product (GRP) for Okinawa Prefecture and Onna Village.¹³ As of 1 April 2026, OIST generated an economic impact equivalent to 0.3% of the economy of Okinawa Prefecture and 6.9% of the economy of Onna Village. The impact is expected to increase as the number of faculty members expands. Under the faculty expansion scenarios, the impact on Okinawa Prefecture is estimated at 0.4% with 120 faculty members, 0.6% with 150 faculty members, 0.8% with 200 faculty members, and 1.3% with 300 faculty members. For Onna Village, the corresponding impacts are estimated at 9.0%, 12.4%, 18.0%, and 29.2%, respectively.

**Table IV-13 GRP-Equivalent Value Added and Its Share
of Gross Regional Product in Okinawa Prefecture and Onna Village**

Unit: JPY million

	Current Situation as of 1 April 2026	Number of Faculty Members				Gross Regional Product (FY2023)
		120	150	200	300	
Okinawa	14,464 0.3%	18,808 0.4%	25,817 0.6%	37,439 0.8%	60,456 1.3%	4,642,960
Onna	4,194 6.9%	5,472 9.0%	7,515 12.4%	10,918 18.0%	17,720 29.2%	60,701

Note: Gross Regional Product figures are based on the latest available values (FY2023) as of 28 August 2026.

Sources: Prepared using Okinawa Prefectural Accounts, FY2023 and Municipal Economic Accounts of Okinawa Prefecture, FY2023.

¹³ Gross value added reported in input-output tables consists of Compensation of Employees, Operating Surplus, Consumption of Fixed Capital, Indirect Taxes, Current Subsidies (deducted), and Household Consumption Expenditure Outside Households. Because Household Consumption Expenditure Outside Households is not included in Gross Regional Product (GRP), this study excludes this component and reports the resulting measure as “GRP-equivalent value added” when comparing economic impact with regional economic output.

V. Innovation Ecosystem Impact

1. Impact Through Technology Transfer, Intellectual Property Management, Startup Support, and Collaboration Among Industry, Academia, and Government

(1) EF Polymer

1) Business Development of EF Polymer

EF Polymer is a startup company that develops natural and biodegradable super-absorbent polymers derived from agricultural organic waste, including fruit residues. The company is expanding its business operations both in Japan and internationally, with a primary focus on agricultural applications.

In addition to agricultural uses, its polymers are being applied to a wide range of products, including cosmetics, household goods, absorbent sheets, and refrigerant gel packs, by leveraging their water-absorption, moisture-retention, and thickening properties.

2) Overview of the Impacts Included in the Analysis

For agricultural applications, the analysis focused not on the sales revenue of EF Polymer itself, but rather on potential increases in gross agricultural revenue and reductions in fertilizer expenses for farmers adopting the product.

According to publicly available information, the recommended application rate for open-field cultivation is approximately 2–5 kg per 10 ares. In this analysis, the lower bound of the recommended range, 2 kg per 10 ares, was adopted as the reference case.

Among the publicly available demonstration results reported by EF Polymer, a yield improvement rate of 10% was adopted as a relatively conservative assumption.¹⁴

In addition, case studies have reported reductions in fertilizer use of up to 20%. The analysis therefore also estimated the economic benefits associated with a 20% reduction in fertilizer inputs.

3) Increase in Gross Agricultural Revenue

According to the 2024 Farm Management Statistics by Farming Type, the average gross agricultural revenue of open-field vegetable farming households was JPY 11,782 thousand, while average farm operating expenses were JPY 9,037 thousand. The average cultivated area was 150.9 ares (a). Therefore, when converted to a per-10-are basis, average gross agricultural revenue was approximately JPY 781 thousand, and average farm operating expenses were approximately JPY 599 thousand.

In addition, according to the Current Situation Surrounding Fertilizers published by the Ministry of Agriculture, Forestry and Fisheries, fertilizer expenses account for approximately 9% of total farm operating expenses for open-field vegetable production. Based on this ratio, fertilizer expenses were estimated at approximately JPY 54 thousand per 10 ares.

Assuming that crop yield and selling prices remain constant and that increases in production are reflected proportionally in gross agricultural revenue, a 10% improvement in crop yield resulting from the use of EF Polymer would correspond to an increase in gross agricultural revenue of approximately JPY 78 thousand per 10 ares, as calculated below.

$\begin{aligned} &\text{Increase in Gross Agricultural Revenue Resulting from Higher Yields (per 10 ares)} \\ &= \text{Gross Agricultural Revenue} \times \text{Yield Improvement Rate} \end{aligned}$
--

¹⁴ <https://efpolymer.jp/experimentlist>

However, an increase in crop yield may also result in additional costs associated with harvesting, sorting, packaging, and shipment. Therefore, the estimated increase of approximately JPY 78 thousand should not be interpreted directly as an increase in farm income.

In this analysis, the figure is presented as an estimate of the increase in gross agricultural revenue, which can be derived relatively readily from publicly available information.

4) Reduction in Fertilizer Costs

The reduction in fertilizer expenses resulting from the use of EF Polymer was estimated at approximately JPY 11,000 per 10 ares, based on the following formula.

Reduction in Fertilizer Expenses per 10 ares = Farm Operating Expenses × Fertilizer Expense Ratio × Fertilizer Reduction Rate
--

EF Polymer is currently sold at approximately JPY 2,800 per kilogram. Under the reference scenario adopted in this analysis, which assumes an application rate of 2 kg per 10 ares, the product purchase cost is estimated at approximately JPY 5,700 per 10 ares.

Based on these assumptions, the use of EF Polymer in open-field vegetable production is estimated to generate an illustrative net benefit to farmers of approximately JPY 83,000 per 10 ares, combining the increase in gross agricultural revenue resulting from a 10% improvement in yield and the savings associated with a 20% reduction in fertilizer use. This amount corresponds to approximately 11% of the current gross agricultural revenue of JPY 781,000 per 10 ares. The increase in gross agricultural revenue itself corresponds to approximately 10%, which is consistent with the assumed yield improvement rate.

On a per-farm basis, the average cultivated area for open-field vegetable production is 150.9 ares. Assuming that EF Polymer is applied to the entire cultivated area under the same conditions, the resulting illustrative net benefit to farmers is estimated at approximately JPY 1,255,000 per farming operation.

However, applications of EF Polymer are not limited to open-field vegetable production and have expanded to rice cultivation and other field crops. This analysis uses open-field vegetable farming as a representative case in order to illustrate the potential scale of the benefits using publicly available agricultural statistics. Actual benefits may vary depending on crop type, application rate, soil conditions, weather conditions, and other factors.

(2) High-Performance Rice “Churaotome”

1) Method Used for Estimating Economic Impact

The economic impact of “Churaotome”, a new high-performance rice variety developed through collaboration between OIST and Onna Village, was estimated based on the assumptions described below regarding future production volumes and sales.

According to Okinawa Agriculture, Forestry and Fisheries (March 2026), rice cultivation in Okinawa Prefecture had a planted area of 632 hectares, production of 1,980 tonnes, and an average yield of 315 kg per 10 ares in 2025. The principal rice varieties cultivated in Okinawa are “Hitomebore” and “Churahikari”.

In this analysis, a scenario was developed assuming that “Churaotome” is adopted as a recommended rice variety in Okinawa Prefecture. Three different levels of planted area were considered. Yield was assumed to be 500 kg per 10 ares, and the selling price was assumed to be JPY 1,000 per kilogram, based on the pricing of comparable high-performance rice products already available on the market.¹⁵

¹⁵ A previously developed high-performance rice variety, “Manpuku Surari” (developed by Akita Prefectural

Annual production volume and sales revenue were estimated as shown below. The resulting sales revenue was used as the basis for estimating the associated economic impact.

Table V-1 Assumptions for Estimating the Economic Impact of High-Performance Rice “Churaotome”

Scenario	Planted Area, ha	Share of Total Planted Area in Okinawa	Yield, kg per 10 ares	Annual Production Volume, tonnes	Selling Price, JPY per kg	Sales Revenue, JPY million
Scenario 1	12	2%	500	60	1,000	60
Scenario 2	30	5%	500	150	1,000	150
Scenario 3	60	10%	500	300	1,000	300

2) Estimated Economic Impact

The estimated economic impacts of “Churaotome” under the three cultivation scenarios are shown below.

Under Scenario 1, induced production value was estimated at JPY 97 million, induced gross value added at JPY 50 million, and employment effects at 35 jobs for Japan as a whole. For Okinawa Prefecture, induced production value was estimated at JPY 58 million, induced gross value added at JPY 32 million, and employment effects at 10 jobs.

Under Scenario 3, which assumes broader adoption of “Churaotome” as a recommended rice variety, induced production value was estimated at JPY 485 million, induced gross value added at JPY 250 million, and employment effects at 177 jobs for Japan as a whole. For Okinawa Prefecture, induced production value was estimated at JPY 292 million, induced gross value added at JPY 160 million, and employment effects at 51 jobs.

Table V-2 Estimated Economic Impact of High-Performance Rice “Churaotome” (Scenario 1)

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2		
Japan	60	97	45	36	16	1.6	2.1
Okinawa	60	58	34	12	12	1.0	1.7
Onna	60	21	17	2	1	0.4	1.2

Unit: JPY million, jobs

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	50	49	20	16	15	4	-5	35
Okinawa	32	31	22	4	7	3	-4	10
Onna	13	13	5	8				5

University), is marketed at approximately JPY 1,000 per kilogram, or about 1.5 to 2 times the price of conventional rice.

Table V-3 Estimated Economic Impact of High-Performance Rice “Churaotome”
(Scenario 2)

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	150	243	113	90	40	1.6	2.1
Okinawa	150	146	85	31	30	1.0	1.7
Onna	150	53	43	6	3	0.4	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	125	123	51	40	37	9	-14	88
Okinawa	80	78	56	10	17	6	-11	25
Onna	33	31	12	19				12

Table V-4 Estimated Economic Impact of High-Performance Rice “Churaotome”
(Scenario 3)

Unit: JPY million, jobs

Region	Final Demand	Total Induced Production Value				Output Multiplier	Local Multiplier
		Total	Direct Effects	Indirect Effects	Induced Effects		
	A	B	b0	b1	b2	C=B/A	G=B/b0
Japan	300	485	226	179	80	1.6	2.1
Okinawa	300	292	170	62	60	1.0	1.7
Onna	300	106	87	12	7	0.4	1.2

Region	Induced Gross Value Added	GRP-Equivalent Value Added						Employment Effects
		Total	Compensation of Employees	Operating Surplus	Consumption of Fixed Capital	Indirect Taxes	Current Subsidies	
Japan	250	246	102	79	74	18	-27	177
Okinawa	160	157	112	20	35	13	-22	51
Onna	66	63	25	38				24

2. Impact Through Helping to Solve Regional Challenges

(1) Research on Mozuku and Sea Grape Aquaculture

1) Overview of Research and Development on Mozuku and Sea Grape Aquaculture

At OIST, researchers have developed a PCR-based method that can identify life-cycle stages and sex in Okinawa mozuku (*Cladosiphon okamuranus*). The technology has the potential to improve aquaculture practices and support the development of strains with enhanced tolerance to high water temperatures.

For sea grapes (*Caulerpa lentillifera*), OIST has conducted genome sequencing and related studies that contribute to a better understanding of cultivation conditions and morphological development. Research is also advancing knowledge of the biology and evolution of these edible seaweeds.

These research efforts are expected to contribute in the future to higher aquaculture yields and to reduced production losses caused by factors such as high water temperatures and poor growth conditions.

2) Increase in Production Value Through Improved Aquaculture Technologies

In 2023, the production value of cultivated mozuku seaweed in Okinawa Prefecture was JPY 2.531 billion, while the production value of sea grapes was JPY 947 million.¹⁶ The combined production value of these two products was therefore approximately JPY 3.478 billion. Assuming that the application of OIST's research outcomes contributes to improvements in aquaculture technologies and results in a 1% increase in production value through higher production volumes and an increased share of marketable output, the resulting increase in production value would be approximately JPY 35 million.¹⁷

3) Reduction in Production Loss Risks Through More Stable Aquaculture Technologies

The median and minimum production volumes for the period 2019–2023 are shown in the table below.

Table V-5 Median and Minimum Production Volumes of Mozuku and Sea Grapes

Unit: tonnes			
	Median	Minimum	Difference Between Median and Minimum
Mozuku	20,084	15,172	4,912
Sea grapes	355	274	81

The difference between the median and minimum production volumes was 4,912 tonnes for mozuku and 81 tonnes for sea grapes, indicating that production declined substantially in low-production years relative to normal production levels.

For illustrative purposes, this analysis defines the difference between the median and minimum production volume over the past five years as the production shortfall under a low-production scenario for each product. It is then assumed that 50% of this shortfall could be avoided through more stable aquaculture technologies and improved cultivation practices.

Using average unit prices derived from 2023 production values and production volumes,

¹⁶ https://www.pref.okinawa.lg.jp/_res/projects/default_project/_page_001/039/512/5_okinawakennnosuisannngou52-58.pdf

¹⁷ The assumed 1% increase in production value does not represent a demonstrated effect of OIST research. Rather, it is used solely as a sensitivity analysis to illustrate the potential scale of impact.

the avoided production losses are estimated at approximately JPY 310 million for mozuku and JPY 100 million for sea grapes, or approximately JPY 410 million in total.

These estimates provide an indication of the potential value of production losses that could be avoided if OIST's research outcomes are applied to address challenges such as high water temperatures and to optimize aquaculture conditions, thereby mitigating declines in production during low-production years.

However, the years in which minimum production volumes were recorded differ between mozuku and sea grapes. In addition, fluctuations in production volumes are influenced not only by marine environmental conditions such as high water temperatures but also by typhoons, cultivation scale, the number of producers, and other aquaculture conditions.

Accordingly, the estimated JPY 410 million should not be interpreted as an observed annual economic benefit. Rather, it should be regarded as a sensitivity-analysis estimate of the potential value of avoided losses, based on historically observed low-production scenarios for each product.

(2) Coral eDNA Project

1) Overview of Coral eDNA and Its Potential for Monitoring Applications

OIST has developed Coral eDNA, a technology that enables the characterization of coral communities through the analysis of coral-derived environmental DNA (eDNA) present in seawater.

Using the latest eDNA metabarcoding system developed by OIST, 83 of the 85 genera of reef-building corals recorded in Japan can be detected. This technology enables comprehensive monitoring of coral reef ecosystems and has the potential to improve the efficiency and spatial coverage of coral reef surveys.

Coral reef monitoring in Okinawa Prefecture is currently conducted by the Ministry of the Environment at a cost of approximately JPY 4 million per year. Depending on the analytical costs of Coral eDNA, the technology may contribute to reducing or partially replacing these monitoring costs.

2) Economic Value of Coral Reefs

According to the Ministry of the Environment's coral reef valuation study, the annual value of coral reefs attributable to recreational activities directly associated with coral reefs, including diving and swimming, was estimated at approximately JPY 239.9 billion per year for Okinawa, Amami, and the Ogasawara Islands combined based on a 2009 estimate.¹⁸

Coral reefs also function as natural breakwaters that reduce wave energy, storm surges, and coastal erosion. The Ministry of the Environment identifies coral reefs as an example of ecosystem-based disaster risk reduction and highlights their role in mitigating storm-surge damage.

Previous estimates by the Ministry of the Environment suggest that the annual replacement cost of these coastal protection services would be approximately JPY 15 billion per year if only densely populated coastal areas were protected and approximately JPY 55.9 billion per year if all coral reef areas were protected.¹⁹

These estimates were also derived from the Ministry's earlier valuation studies.

3) Current Conditions Surrounding Coral Reefs and the Need for Conservation

Recent trends in coral cover in Japan have varied by region, with some areas recovering and others declining. Consequently, it is difficult to establish a uniform long-term rate of decline under normal conditions. However, major disturbance events, including mass coral bleaching, have resulted in substantial losses within relatively short periods. For example, along the west coast of Okinawa Island, coral cover remained at approximately 50%

¹⁸ https://www.env.go.jp/nature/biodic/coralreefs/pdf/project/development/210312_mat01.pdf

¹⁹ <https://www.env.go.jp/content/900489546.pdf>

through FY2023 but declined to 40% in FY2024.²⁰ In the Sekisei Lagoon, coral cover declined from 19.1% to 17.4% between June and December 2024.²¹

Against this backdrop, Okinawa Prefecture invests approximately JPY 70–80 million annually in its Comprehensive Coral Reef Conservation and Restoration Program. The national government also continues to implement restoration and monitoring programs in areas such as Sekisei Lagoon.

4) Conceptual Framework for Assessing the Economic Benefits of Coral eDNA

The potential economic value of Coral eDNA extends beyond direct reductions in survey costs. Through broader and more frequent monitoring, the technology may enable the earlier detection of abnormalities and ecosystem degradation, thereby contributing to:

1. greater efficiency in existing conservation programs through improved prioritization of conservation actions;
2. avoidance of declines in coral cover during major disturbance events; and
3. avoidance of future coral reef restoration costs.

If broad-scale, high-frequency monitoring using Coral eDNA contributes to the identification of priority conservation sites and improves the targeting of detailed surveys and restoration activities, it may enhance the efficiency of existing coral reef conservation programs.

For example, the Comprehensive Coral Reef Conservation and Restoration Program implemented by Okinawa Prefecture has an annual budget of approximately JPY 70–80 million. If Coral eDNA contributes to efficiency improvements of 1–5% in the components of the program where the technology is applied, the resulting value would correspond to approximately JPY 0.7–4.0 million per year.

However, these figures should be regarded as sensitivity-analysis scenarios intended to illustrate the potential scale of benefits. Estimating actual economic benefits would require a more detailed evaluation of the specific activities to which eDNA monitoring is applied and the resulting changes in costs and outcomes relative to conventional monitoring methods.

The potential value of Coral eDNA is not limited to improved efficiency in conservation expenditures. Previous estimates by the Ministry of the Environment indicate that coral reef-related tourism and recreational activities in Okinawa generate approximately JPY 232.4 billion per year, while commercial fisheries dependent on coral reef ecosystems generate approximately JPY 10.6 billion per year. In addition, the coastal protection services provided by coral reefs have been valued at several tens of billions of yen annually at the national level.

Although these values should not be interpreted as economic benefits directly attributable to Coral eDNA itself, they demonstrate the substantial economic value of the natural capital that may be maintained through improved monitoring and conservation of coral reef ecosystems.

Accordingly, if Coral eDNA enables earlier and broader detection of changes in coral communities and supports decision-making related to site selection for conservation, crown-of-thorns starfish control programs, reef restoration projects, and management of tourism activities, it may contribute indirectly to reducing losses in tourism, fisheries, and disaster-risk-reduction benefits associated with the degradation or loss of coral reefs.

At present, the quantitative relationship between declines in coral cover and reductions in these economic values remains unclear, as does the extent to which Coral eDNA can prevent such declines. Therefore, it is not appropriate to attribute the full value of these benefits directly to Coral eDNA. Nevertheless, Coral eDNA can be viewed as a monitoring and decision-support platform that contributes to maintaining the substantial natural-capital value provided by coral reef ecosystems.

²⁰ https://www.pref.okinawa.jp/_res/projects/default_project/_page_/001/039/989/02_houkokusyohonbun.pdf

²¹ https://kyushu.env.go.jp/okinawa/press_00103.html

VI. Reference Information

Understanding the Local Multiplier

In this study, local multipliers are calculated as part of the economic impact analysis. The local multiplier is defined as the ratio of the sum of direct, indirect, and induced effects to direct effects in estimated induced production value. The value of the local multiplier varies by industry sector, reference year, and geographic area.

Of these effects, the relationship between direct effects and the sum of direct and indirect effects is reflected in the Leontief inverse derived from the input-output table.²² Accordingly, the values of the Leontief inverse were compared across industry sectors, reference years, and geographic areas.

Based on the Okinawa Prefectural Input-Output Table, a comparison across industry sectors shows that Beverages and Foods recorded the highest value at 1.54, followed by Agriculture (1.48) and Personal Services (1.46). By contrast, Textile Products recorded the lowest value at 1.16, followed by Forestry (1.17) and General-Purpose Machinery (1.18).

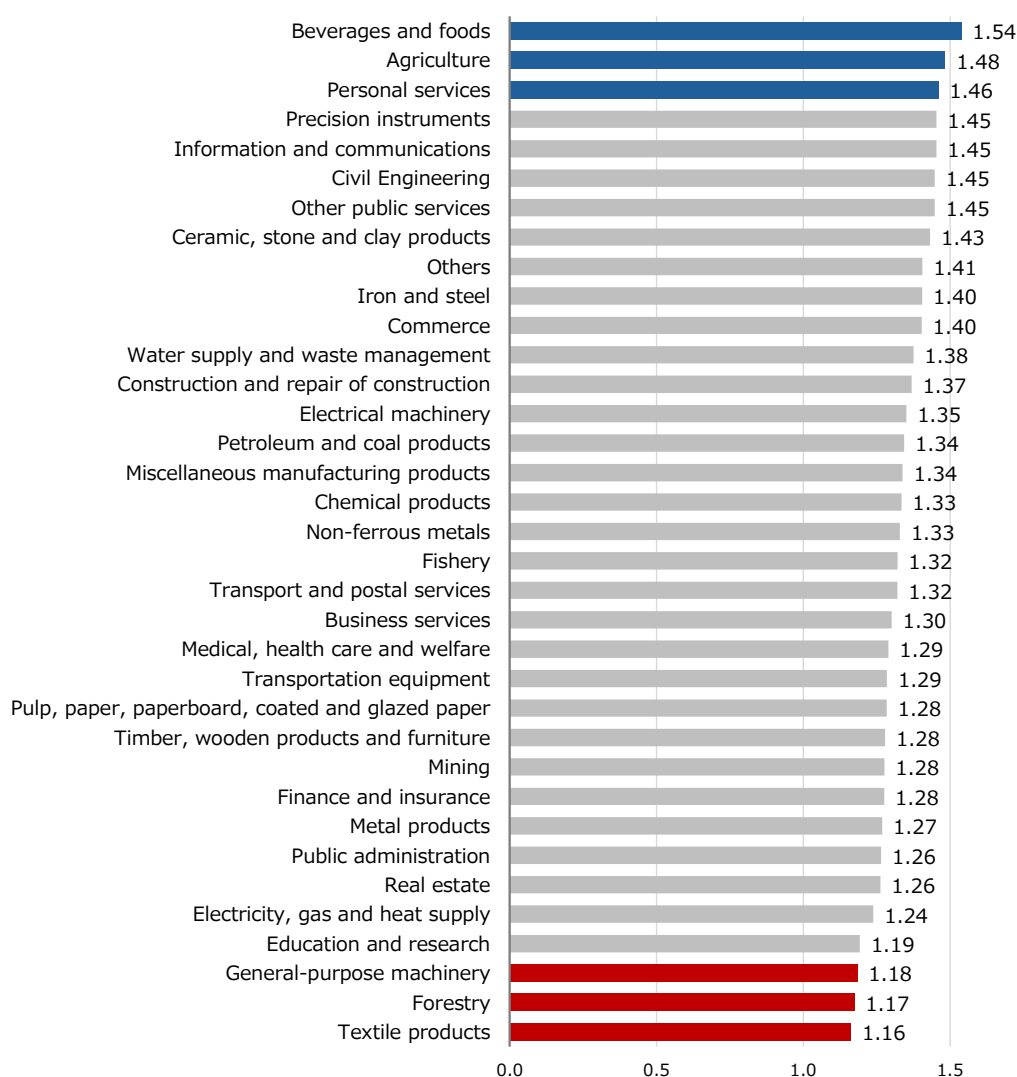


Figure VI-1 Column Sums of the Leontief Inverse by Industry Sector in Okinawa Prefecture

Source: Prepared using the Okinawa Prefectural Input-Output Table published by Okinawa Prefecture.

²² Specifically, the values represent the column sums of the Leontief Inverse for each industry sector.

A comparison of the 2011, 2015, and 2020 input-output tables indicates that the values of the Leontief inverse differ not only among industry sectors but also across years. As a result, even when the same type of expenditure is analyzed, the local multiplier may differ depending on the reference year, reflecting changes in industrial structure and procurement relationships within the economy. For example, construction investment may generate different levels of economic impact at different points in time, even within the same region.

Table VI-1 Changes in Column Sums of the Leontief Inverse by Industry Sector in Okinawa Prefecture

Rank	Sector Name	2011	2015	2020
1	Beverages and foods	1.54	1.48	1.54
2	Agriculture	1.50	1.47	1.48
3	Personal services	1.48	1.41	1.46
4	Precision instruments	1.39	1.41	1.45
5	Information and communications	1.42	1.38	1.45
6	Civil Engineering	1.53	1.45	1.45
7	Other public services	1.49	1.42	1.45
8	Ceramic, stone and clay products	1.62	1.43	1.43
9	Others	1.73	1.36	1.41
10	Iron and steel	1.93	1.52	1.40
11	Commerce	1.42	1.31	1.40
12	Water supply and waste management	1.52	1.37	1.38
13	Construction and repair of construction	1.45	1.39	1.37
14	Electrical machinery	1.32	1.28	1.35
15	Petroleum and coal products	1.08	1.16	1.34
16	Miscellaneous manufacturing products	1.32	1.29	1.34
17	Chemical products	1.39	1.41	1.33
18	Non-ferrous metals	1.27	1.26	1.33
19	Fishery	1.32	1.24	1.32
20	Transport and postal services	1.37	1.33	1.32
21	Business services	1.29	1.27	1.30
22	Medical, health care and welfare	1.25	1.24	1.29
23	Transportation equipment	1.22	1.22	1.29
24	Pulp, paper, paperboard, coated and glazed paper	1.31	1.26	1.28
25	Timber, wooden products and furniture	1.29	1.23	1.28
26	Mining	1.42	1.29	1.28
27	Finance and insurance	1.26	1.22	1.28
28	Metal products	1.51	1.43	1.27
29	Public administration	1.31	1.29	1.26
30	Real estate	1.20	1.19	1.26
31	Electricity, gas and heat supply	1.34	1.27	1.24
32	Education and research	1.18	1.17	1.19
33	General-purpose machinery	1.24	1.17	1.18
34	Forestry	1.25	1.19	1.17
35	Textile products	1.28	1.22	1.16
–	Average	1.38	1.32	1.34

Column sum of the Leontief inverse (2020) **Top 5** Top 10 Bottom 10 Bottom 5

Notes:

1. Values for all years are color-coded based on the 2020 column-sum rankings (top 5, top 10, bottom 10, and bottom 5).
2. Industry sectors are arranged in descending order of the 2020 column sums of the Leontief inverse.

Source: Prepared using the Okinawa Prefectural Input-Output Table published by Okinawa Prefecture.

The values also vary substantially among prefectures.²³ Even for the same industry sector and reference year, the structure of local industries and the degree of local procurement differ across regions, resulting in different local multipliers.

For example, the generally lower values observed in Shiga Prefecture in 2020 may reflect the concentration of manufacturing activities combined with a relatively high dependence on raw materials, intermediate goods, and components procured from outside the prefecture. As a result, a larger share of production-related expenditures leaks to surrounding prefectures rather than generating additional economic activity within Shiga itself. In contrast, the relatively high values observed in the Food Products, Tobacco, and Beverages sector in prefectures such as Kumamoto and Kagoshima may reflect stronger linkages between food manufacturing and agricultural products sourced within the prefecture. This allows a larger share of expenditures to circulate within the local economy.

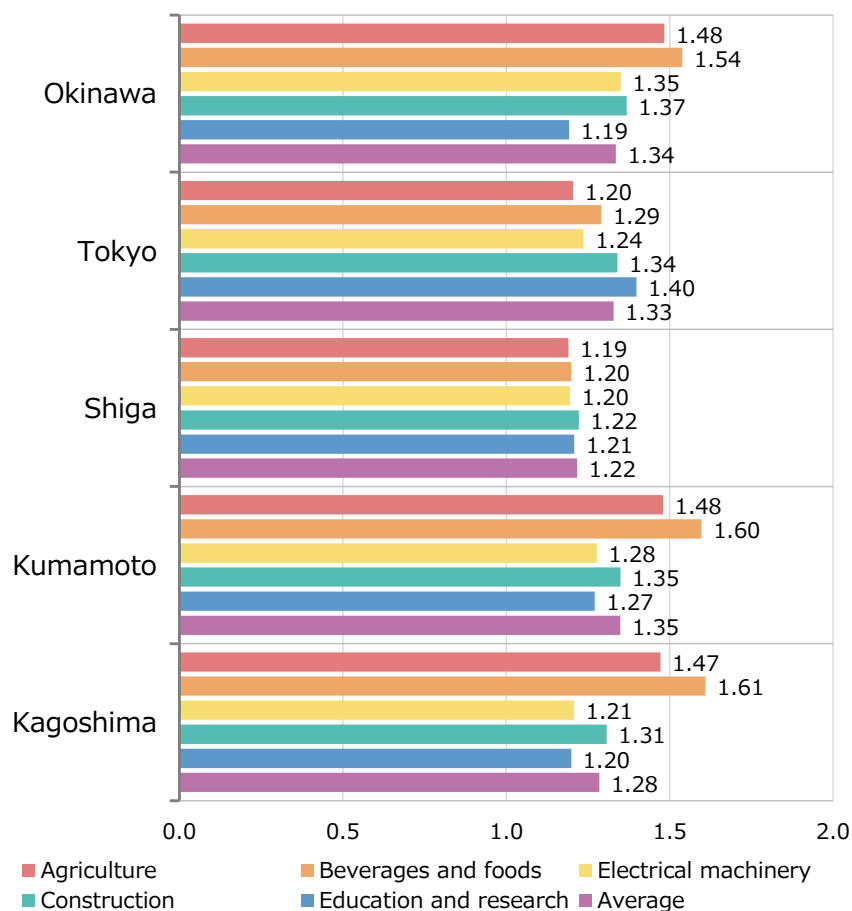


**Figure VI-2 Column Sums of the Leontief Inverse by Industry Sector
Across Selected Prefectures (2020)**

Notes:

1. For "Agriculture," Shiga Prefecture uses the broader category "Agriculture, Forestry and Fishery." For "Construction," Okinawa Prefecture uses the category "Building Construction and Repair."
2. "Average" represents the simple average of the column sums of the Leontief inverse across all industry divisions.

Source: Prepared using the 2020 Input-Output Tables published by the respective prefectural governments.

²³ Because the number of sectors and sector definitions differ across prefectures, only comparable sectors common to all prefectures were extracted for comparison.